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NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF:

DUKE POWER COMPANY

(Oconee-McGuire)

Docket No. 70-2623

Place - Charlotte, North Carolina

Date 6 August 1979

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the matter of:	
DUKE POWER COMPANY	Docket No.70-2623
(Amendment to Materials License SNM-1773 for Oconee Nuclear Station Spent Fuel Transportation and Storage at McGuire Nuclear Station)	

Board Room, Fourth Floor,
Mecklenburg County
Administration Building,
720 East Fourth Street,
Charlotte, North Carolina.

Monday, 6 August 1979.

The hearing in the above-entitled matter was resumed, pursuant to notice, at 9:30 a.m.

BEFORE:

MARSHALL E. MILLER, Esq., Chairman,
Atomic Safety and Licensing Board.

DR. EMMETH A. LUEBKE, Member.

DR. CADET H. HAND, Member.

APPEARANCES:

On behalf of the Applicant:

J. MICHAEL McGARRY, III, Esq.,
Debevoise & Liberman,
1200 Seventeenth Street, N.W.,
Washington, D. C.

WILLIAM LARRY PORTER, Esq.,
Associate General Counsel,
Duke Power Company,
Charlotte, North Carolina.

On behalf of the NRC Regulatory Staff:

EDWARD J. METCHEN, Esq.,
RICHARD K. HOEFLING, Esq.,
JAMES R. TOURTELLOTTE, Esq.,
Office of the Executive Legal Director,
United States Nuclear Regulatory Commission,
Washington, D. C. 20555.

On behalf of the State of South Carolina:

RICHARD P. WILSON, Esq.,
Assistant Attorney General,
Office of the Attorney General,
State of South Carolina,
2000 Bull Street,
Columbia South Carolina 29201.

On behalf of Intervenor Natural Resources Defense Council:

ANTHONY E. ROISMAN, Esq.,
Natural Resources Defense Council,
197 - 15th Street, N.W.,
Washington, D. C.

On behalf of Intervenor Carolina Environmental Study Group:

JESSE RILEY, Charlotte, North Carolina

C O N T E N T S

P R O C E E D I N G S

CHAIRMAN MILLER: The evidentiary hearing will resume, please.

MR. KETCHEN: Mr. Chairman, can we maybe approach the bench about a procedural matter?

CHAIRMAN MILLER: Yes.

(Whereupon, a bench conference was had.)

CHAIRMAN MILLER: On the record.

Good morning, ladies and gentlemen. As you know, we are resuming the evidentiary hearing. We've spent several weeks on about a month or so ago in the pleasant area of Charlotte.

Pursuant to notice in the Federal Register, this is a resumption of hearing commencing today at 9:30 your time. Starting tomorrow and for the balance of the week or so much thereof as is necessary for the purposes of completing the evidentiary hearing and closing the record, we will convene at the Charlotte Mecklenburg Educational Center at 701 East 2nd Street, which I'm advised is very close at hand. Unless otherwise changed, and we'll take a reading this afternoon on the witnesses and testimony that remains, we had planned to commence at our usual time of 8:00 in the morning in order to accomplish as much as we can and to be able to close the evidentiary record.

As a preliminary matter, we will first have counsel

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identify themselves and their associates, and then if there are any matters pertaining to practice, procedure and the like, which you wish to take up preliminarily before we resume with the cross-examination of the panel, you may so indicate.

Mr. McGarry, I guess you can lead off.

MR. MC GARRY: Thank you, Mr. Chairman.

My name is Michael McGarry, and I'll be representing Duke Power Company in this proceeding.

MR. PORTER: William L. Porter. I'll also be representing Duke Power.

MR. WILSON: I'm Richard Wilson and I represent the State of South Carolina in these proceedings.

MR. ROISMAN: I'm Anthony Z. Roisman and I'll be representing the Natural Resources Defens Council.

MR. RILEY: My name is Jesse Riley. I'll be representing the Carolina Study Group, although I'm not an attorney.

MR. KETCHEN: Edward G. Ketchen. I represent the Nuclear Regulatory Commission Staff.

With me at the counsel table is Mr. Brett Spitalny who is the project manager for this application with the Nuclear Regulatory Commission Staff.

MR. HOEFLING: Richard K. Hoefling, counsel for the NRC Staff.

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CHAIRMAN MILLER: Thank you.

Are there any preliminary matters that you wish to have reflected in the record?

I would like to introduce to you two members of the NRC Staff. Mr. Herbert Grossman from the Justice Department has joined as a full-time member as attorney-chairman of our NRC Staff. He will be an observer, and he will be accompanied by Mr. Andrew Goodhope who is also an attorney-chairman and is associated with the NRC STaff.

The panel when it meets to consider any of the issues here meets solely among the members, in other words, the ex parte rule will apply. However, we do expect to enjoy the company of Mr. Goodhope and Mr. Grossman at recesses and other times. The ex parte rule rule, however, will be adhered to by the Staff which alone will consider any matters substantive or procedural. Other than that, our associates will be here.

Any objection, by the way, to this procedure by any of the parties?

MR. WILSON: No objection.

MR. ROISMAN: No objection.

MR. RILEY: No objection.

MR. KETCHEN: No objection.

MR. MC GARRY: No objection.

CHAIRMAN MILLER: We'll proceed in that fashion.

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Does anyone have any preliminary matters which you wish to have the Board pass upon?

MR. ROISMAN: A point of clarification. Did the Board receive our letter indicating objections to the four pieces of testimony that the Staff has filed?

CHAIRMAN MILLER: No, we have not received it. We understood you were sending it, but it had not been received when we left Washington. We did give you leave to file objections to the additional prefiled testimony, was that what it referred to?

MR. ROISMAN: Yes.

CHAIRMAN MILLER: If you could hand up one or more copies, we'll consider them at a recess.

MR. ROISMAN: The lateness at which it was done, I left before a copy was available to me. But I could give you the essence of it.

CHAIRMAN MILLER: Does it relate to the panel, or would it come a little later?

MR. ROISMAN: It refers to the four pieces of testimony that were offered.

CHAIRMAN MILLER: We'll give that an opportunity before those pieces of testimony are referred to in any way by any of us.

Very well.

Anything else?

(No response.)

CHAIRMAN MILLER: We were in the midst of cross-examination of a panel. I think there has been one change, has there not?

Mr. Ketchen, perhaps you had better explain you are withdrawing one member of the panel who had been interrogated on voir dire but who had not been cross-examined, at least to any extent, who I believe is to testify separately. Will you describe that for the record, please?

MR. KETCHEN: Yes, sir. Mr. T. Jerrell Carter was sitting on the panel, he had been voir dired. He is the Staff witness to speak about full core reserve. He has business commitments in Arlington, Texas. He could arrive at 2:00 today, but at my request I've asked that his cross-examination be deferred until 2:00 Tuesday on his withdrawal from the panel.

At the point of -- at the point where we ended on Friday, June 29, as I recall, he had not been asked many, if any, questions on cross-examination.

As I understand it, there was no disagreement among the parties or any objection by the parties or the Board to me having Mr. Carter come in after 2:00 tomorrow to be available the rest of the week to continue with his cross-examination on his direct testimony relative to full core reserve.

wrb/agp6

Is that adequate?

CHAIRMAN MILLER: Yes, thank you, that covers it.

When we discussed the matter at the bench prior to opening this session, there were no objections. I will ask again, are there any objections by any counsel or parties to this procedure?

MR. MC GARRY: No objection.

CHAIRMAN MILLER: I take it there are no further objections and leave is given to the Staff to withdraw the witness, Mr. Carter, and put him on tomorrow afternoon.

Anything else?

(No response.)

CHAIRMAN MILLER: Will the panel then, minus Mr. Carter, resume their places?

MR. ROISMAN: Mr. Chairman, I believe we were going to start with Mr. Nehemias and then he can go as far as we are concerned. He preceded the panel, on his own panel with Dr. Parsont.

MR. KETCHEN: If I may. We would explain that at the end of the hearing there was an opportunity to file a schedule set up for filing of any additional testimony in the form of either, I assume, redirect or rebuttal testimony by June 20, I believe, with objections to be filed by June 29.

On June 20th, I had an NRC messenger hand carry

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copies to the Board, to Mr. McGarry and to Mr. Roisman. I understand from later communications with Mr. Roisman that he did not receive his copy around 5:00 on Friday, June 20.

I checked with the NRC messenger. He indicated to me some problem with finding Mr. Roisman's office because of some constructionin the building where Mr. Roisman is located. However, our messenger did inform me that he did give it to a young lady sitting in an office that was identified as an NRDC office and she indicated to him that she would take care of it.

Since that time, I understand Mr. Roisman did actually get the material on June 24. And subsequent to that, when he did get the material, he has filed objection to the testimony.

At this time, at the request of Mr. Roisman, we will take Dr. Nehemias out of order. We propose to call him to the witness stand for presentation of rebuttal testimony.

One additional matter that I would like to bring up in this regard. We also filed testimony of Dr. Parsont which is a minor correction to the record, actually, but we think it's important.

At the end of the hearing on Friday, I believe, June 29, I had indicated that Dr. Parsont could make those corrections right then but at the Board's request we put it

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in writing, and we have that.

If possible, after finishing with Dr. Nehemias, we would like to call Dr. Parsont for this very brief piece of testimony to correct the record, to get into the record an answer that he gave that was not recorded.

And we would probably ask that if possible, subject to anybody's objection, that he might also be released as a witness.

At this point in time, with those preliminary statements, I would call Dr. Nehemias to the witness stand.

CHAIRMAN MILLER: Very well. You may do so.

Dr. Nehemias, you are previously sworn, you remain under oath, sir. You may be seated.

Whereupon,

JOHN V. NEHEMIAS

resumed the stand on behalf of the Regulatory Staff, and, having been previously duly sworn, testified further as follows;

FURTHER DIRECT EXAMINATION

BY MR. KETCHEN:

Q Dr. Nehemias, you've appeared before in this proceeding, have you not?

A Yes, sir.

Q And you gave testimony with respect to radiation dose relative to NRDC Contention Number 4, is that not correct?

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A Yes, sir.

Q Dr. Nehemias, do you have before you a copy of a piece of testimony which on the cover sheet says "Testimony of Dr. John V. Nehemias" and beyond that pages numbered one through six?

A Yes, sir.

Q Do you have any corrections --

MR. ROISMAN: Excuse me, Mr. Chairman. Could we get it marked for identification?

CHAIRMAN MILLER: Yes. Has it been marked?

MR. KETCHEN: No.

CHAIRMAN MILLER: It'll be Staff Exhibit for identification number --

MR. KETCHEN: 20, I believe it is.

CHAIRMAN MILLER: Very well.

(Whereupon, the document previously referred to as Staff Exhibit 20 was marked for identification.)

BY MR. KETCHEN:

Q Dr. Nehemias, do you have any corrections to the testimony that is now marked as Staff Exhibit Number 20 for identification?

A Yes. There's a typographical error on page five. The bottom line of the first big paragraph, the last

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sentence should read:

"Therefore, there is no reason to pursue other factors such as social or economic considerations and no reason, based on radiation dose considerations, not to approve the transshipment application."

The "not" was omitted in the typing.

CHAIRMAN MILLER: It sure changes the meaning a little bit, doesn't it?

THE WITNESS: Yes.

BY MR. KETCHEN:

Q Dr. Nehemias, with that correction, is this testimony true and correct?

A To the best of my knowledge, yes.

Q And do you adopt it as part of your testimony in this case?

A I do.

MR. KETCHEN: Mr. Chairman, at this time that completes my direct examination of Dr. Nehemias and I would like to turn the witness over for cross-examination.

CHAIRMAN MILLER: Very well. You may proceed with cross-examination. Who wishes to go first?

Mr. Roisman?

MR. ROISMAN: Mr. Chairman, I think this is the appropriate time to state the objection that is contained

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in the latter.

CHAIRMAN MILLER: Very well.

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MR. ROISMAN: Let me say the letter was done in haste. It covered all the pieces of testimony. I have no objection to the testimony of Dr. Parsont, at least to it being introduced.

The difficulty that I have with Dr. Nehemias' testimony is that it's really not rebuttal testimony, it is redirect. Now, as I understood the Board's ruling, the purpose of the opportunity for further testimony to be filed was either the testimony to be presented-- For instance, there had been some discussion from the Staff, from Mr. Tourtellotte that maybe the Staff might have put on a different case if the scope of the hearing were going to be different than the position they were taking. And there was at least the possibility, although no commitment, that the Staff might offer a case along that line.

The Applicant had indicated the possibility that they may well have called some of the people who had been interviewed by Mr. Rotow, and I understood that the Board's ruling was testimony like that, not rebuttal or redirect, but testimony that related to an issue which hadn't been covered at all, and the parties are being given some chance to allow the recess to be used for the Staff to have written redirect is to put a party like ourselves or like CESG, particularly us, into a position which only exacerbates the problem of the financial disparity between ourselves and

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the other parties.

We would have had to incur the cost of bringing our witnesses down a second time. We brought them down once. We did our redirect as most people do, immeidately after cross-examination. We took our chances on our ability to remember the record and to deal with it.

What the Staff has done is gone back and attemptad to go over the record with a fine tooth comb and find all the blunders and then, attempting to correct those blunders, come back with a new piece of testimony.

Now I'm not a proponent of the gamesmanship theory of litigation, but if you don't proceed by the rules that you do the th ngs orally at the time that you have the opportunity to do them, you do disadvantage to those of us who do not have the same amount of resources to put into the case that other parties do.

The Staff is basically taking advantage of the fact that it has, for all practical purposes, an unlimited budget. It can bring these witnesses back a second or a third time; it can prepare new testimony for them. And we just want to state our objection, without having a lengthy argument on it unless the Board wants it, that we consider it to be unfair and outside the scope of what the Board had intended to be done on this additional testimony, these areas of additional testimony.

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As I say, Dr. Parsont-- I think the issue was raised whether he should do it orally or in writing, to merely clarify an answer that he had given, and as I understand it, he was equally prepared at the time to do it orally, and that means that no one was taking advantage of the three or four weeks that we've had in recess to do it.

The rest of this, however, is brand new. All these people were here. If they had wanted to say something on these subjects they could have done so in the form of re-direct at the time.

That's the essence of the objection, and I apologize for the letter not reaching the Board. I see Mr. Ketchan did get it, but as he explained, his messengers are not the most reliable way to transport information.

CHAIRMAN MILLER: I understand.

Mr. McGarry, do you wish to be heard?

MR. MC GARRY: I just have two observations.

The first observation is I'm not sure whether or not Dr. Nehemias has been excused so perhaps redirect is appropriate. I'm just not-- The lapse of time has caused my memory to blur in that regard.

A second comment, simply an observation: This Board is here to collect the relevant information and to amass a full and complete record, and Dr. Nehemias' testimony, subject to cross-examination, provides that information, and

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I think it should be received.

CHAIRMAN MILLER: The Staff?

MR. KETCHEN: Mr. Chairman, in my letter I called Dr. Nehemias' testimony, as well as the others, as additional redirect or rebuttal testimony. As you know, the Staff opted to go last and as you know, in our proceedings, Intervenors are allowed to make their cases on cross-examination if they would. Their ability to do so on some occasions we believe brings out new information or maybe additional information which at the time has to be either considered or left alone.

We believe that during the cross-examination of Dr. Nehemias there were areas that were gone into, we believe, based on hypotheticals factual situations that were not supported in the record, in other words, brought out through cross-examination under the Intervenors' right under Point Beach to make a case on cross-examination. We think that we're entitled to rebut that information, whether we do it on the spot by working on it.

If we had continued with the hearing there would have been an opportunity to go back to our hotel rooms at night and work on rebuttal or continuing redirect examination. Fortunately, we had a break and we went back and worked on it. It's much more concise, probably much less confusing, having the time to work on the rebuttal testimony,

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than it would have been if we had had to work on it through working in our hotels at night.

So I think it is appropriate rebuttal testimony or redirect testimony to bring out additional information from Dr. Nehamias to clear up either confusing parts of the record that came about during cross-examination, or to address matters that we feel were somewhat new matters that were raised during cross-examination.

In addition to that, I think Mr. McGarry hit on the point here that we're here to develop as full a record as we can, and we think that the additional testimony of Dr. Nehamias will help do that. And therefore, we present him as either additional redirect testimony or as rebuttal testimony.

MR. ROISMAN: Mr. Chairman, may I just say one thing on the last point Mr. Ketchen made, and Mr. McGarry?

If we were here to fully develop the record then we would not have one or two parties that are so hamstrung by financial constraints that they can't put their case on. We went through two weeks of hearings during which we all recognized that it would have been useful, if not essential, to have here the people from the Department of Energy who could discuss some of the subjects that Mr. Cochran, Mr. Tamplin, and Mr. Rotow were discussing. The Staff didn't offer to put them on. The Applicant, by an exhibit that's already in the record, had talked with DOE officials about the possibility

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of bringing them in. They didn't agree to put them on.

I just think it is a little bit hypocritical to use the as the standard. I'm in favor of that standard, too, but I know what its limits are, and its limits are the resources of the parties, and that is the burden of the objection. The objection would go away if the Commission's policy were different and if the funding of the intervenor participation in appropriate cases were available.

Then we would have had no difficulty in bringing our witnesses back here and preparing some new direct or redirect or rebuttal or whatever you want to call it.

CHAIRMAN MILLER: Would you have any difficulty, or at least insuperable difficulty in putting on such witnesses in Washington, D. C.?

MR. ROISMAN: If we were in Washington, no, we would not.

CHAIRMAN MILLER: You can see what we are going to suggest, so you had better be thinking about it.

MR. ROISMAN: I don't have any problem with it.

CHAIRMAN MILLER: I know, but I'm going to ask other Counsel. I'm not addressing your problem on that one.

(The Board conferring.)

CHAIRMAN MILLER: We'd like to hear from all Counsel and parties with respect to this proposal:

Let me say by way of background we agree with

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Mr. Roisman's contention that the purpose of th additional witnesses, as we understood the Staff's representation, and the reason we allocated a full week, we did understand and believe that there were to be additional witnesses as to other matters that the Staff was at least considering putting on.

We did not intend to be ruling upon so-called rebuttal testimony. However, the Staff is correct also that it is our responsibility, representing the public interest and taking an overview which should transcend all parties, what is in the public interest, and we think that a full record is.

We recognize these problems that the Intervenors and all Intervenors have with reference to money with which to hire Counsel in some cases and expert witnesses on the other. We as a Licensing Board have no power nor authority to allocate any funds for these purposes.

On the other hand, if there are ways in which we can ameliorate that situation in the public interest, we are willing to consider it. The Board, therefore, would like to inquire of all Counsel and parties whether there would be any objection, or whether the parties could stipulate that following the taking of all the evidence and testimony here this week and closing the evidentiary record as we would contemplate, both testimony and evidentiary, but leaving open for

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the purpose of rebuttal testimony or the taking of evidence or testimony in Washington, D. C. of persons, witnesses and the like who would not otherwise be available for financial reasons or their own schedules or the like for a stated limited period of time in Washington, D. C. for that purpose, and for that purpose only.

Have you had a chance to give that any consideration or thought, Mr. McGarry, for example?

MR. MC GARRY: Not much, Mr. Chairman.

CHAIRMAN MILLER: Well we don't want to cut the baby in half. And this occurs to us as a way where there could be a legitimate opportunity not only for Mr. Roisman and his client but for others who wish to have Department of Energy testimony or other testimony available in Washington, but not available here because of both time and money for them.

It is for that limited purpose that we're proposing that additional ancillary proposal.

MR. MC GARRY: You would contemplate a hearing in Washington?

CHAIRMAN MILLER: Yes.

MR. MC GARRY: Or the filing of documents?

CHAIRMAN MILLER: We prefer the hearing. I'd much rather have the Board have the opportunity to see and observe during the testimony the demeanor and appearance of the

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witnesses. We could be persuaded to the contrary but our preference is certainly to have live witnesses, and especially if you're going to be dealing with the Department of Energy or other federal departments.

Do you want to think about it a little longer?

MR. MC GARRY: If we could just pass on, maybe in a break we can put our minds together.

CHAIRMAN MILLER: Except we're going to have to rule pretty shortly on whether or not this testimony is going to be permitted.

MR. ROISMAN: Mr. Chairman, I would be willing, unless the parties object, to go ahead with Mr. Nehemias with the understanding that the direct and cross would be struck if the Board should later rule that it shouldn't be allowed in, but at least to proceed.

CHAIRMAN MILLER: The Board would have no objection to that procedure.

MR. ROISMAN: Or we could take a 15-minute break now, and let the parties talk among themselves and let them come back and address it. Obviously I have no objection to the procedure you suggest, and think it has a lot of Solomon like qualities of saving the baby.

CHAIRMAN MILLER: Staff, I guess it's up to you. We can proceed, subject to being stricken if you wish, or do you wish to think about it now, or take a flat position?

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MR. KETCHEN: I'll take a flat position. I thought about it, Mr. Chairman.

I think-- Let me start back.

As I read the Board's ruling, I think the Staff is entitled to a rebuttal case in any event, and I felt that that was the sense of your ruling at the last hearing, that any additional material, whether it was DOE witnesses or anything else, would be involved in that schedule. I didn't read that so strictly as Mr. Roisman did, and I think the record will reflect that.

With respect to DOE witnesses. we've considered that and we're sticking with our theory of the case. If we had felt it necessary to call DOE witnesses as rebuttal witnesses, we would have done so in the interim that we had, but the fact that we did not do so we think, as far as the Staff's case is concerned, is not necessary.

If somebody else had wanted to do that I believe they should have made that position known in the break. They should have either said we are going to attempt to call DOE witnesses or we're not, to be available for the hearing in Charlotte as scheduled, or ask for the accommodation that's being asked for now.

There is no reason I think to bring this up. I think it is pretty late to start reopening the case for additional witnesses that-- I think it's highly speculative.

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Nobody is indicating that they are going to call such people. I'm not. I don't know whether Mr. McGarry is, and I don't know whether Mr. Roisman is.

But if that's his intent, I think it should be more clear that if we are going to recess and have additional testimony that he should make that known now. My sense of what he says, the way I interpret it, we would have that hearing scheduled and he would go back and reconsider whether he would call additional people.

I think the problem of Intervenor funding comes up all the time, but I don't think that is an excuse for not making these requests known at an early stage during the break from the last hearing, and that accommodation could have been dealt with.

So I sort of have no objection to that procedure but I think it comes-- I have an objection that it comes so late. I think we should have known it by now. I met the schedule that the Board set for my additional rebuttal testimony.

CHAIRMAN MILLER: Mr. Roisman? Mr. McGarry? Anything further?

MR. ROISMAN: Nothing further, Mr. Chairman.

MR. MC GARRY: Mr. Chairman, I guess if I can just sum up the Applicant's position, we were hoping to complete the hearing in Charlotte and as we understood it, if

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anybody wanted to bring on additional witnesses, they'd have that opportunity.

Now we have a question of fairness, or however we want to characterize the issue. It seems to me the issue is boiling down to calling DOE witnesses or not calling DOE witnesses; and whether they're going to be here in Charlotte or Washington.

Obviously, everybody has had the subpoena powers available to them. They're not that costly. Indeed, we were thinking of calling a DOE witness and we would have had to request a subpoena from the Board to get that individual. If the Board would have approved that subpoena we would have paid the witness fee and then perhaps an airplane ticket. That's not for certain.

But what I'm suggesting is if any party wanted to proceed along this course they had the procedures available to them and could have met the time frame established by the Board.

Therefore, we think that all parties have been on the same footing and we should get on with the business at hand and complete the case here in Charlotte.

MR. ROISMAN: Mr. Chairman, let me just say two things:

One, as you know, we were amenable to having a hearing in Washington this one week of the hearing and if that

had been done we would have been able to pursue the subpoena route, or even get a witness who would show up without having to be forced into the subpoena situation from the Department of Energy.

The travel expenses. I thought Mr. McGarry's point was a good one. They are de minimus to Duke Power Company; they are not de minimus to the Natural Resources Defense Council.

CHAIRMAN MILLER: Well, would not the government pay the expenses of travel and attendance of the Department of Energy?

MR. ROISMAN: Not if their witnesses have to be subpoenaed to come. They are then subject to us paying their travel expenses.

CHAIRMAN MILLER: Let me inquire on that point: What is the Staff's view on the expenses of the Department of Energy, using as an example any federal agency?

MR. KETCHEN: I don't know the legal requirements but my experience has been that for government witnesses that the government pays for travel.

MR. ROISMAN: My experience is not when they're subpoenaed. Voluntarily of course they can go all over the country.

I should also add we had Dr. Cochran, and I'll be more than happy to provide the Board with a copy of our

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authorization memorandum which went through the board of NRDC to approve our participation in this proceeding. We are substantially over budget. We are substantially beyond the budget that we had allocated. Dr. Cochran's round-trip air fare plus staying here put us even further over.

And again, if we raised our money through taxes or ratepayers, I guess we would have been willing to do it and get it out of next year's rate increase or tax increase. We don't raise it that way.

The project this work is being done on at NRDC in itself over budget. We run a deficit of $100,000 a year or so which has to be made up out of funds, federal funds or, in some years, the organization runs a deficit that has to come out of the following year.

The point is we do not have the resources. Those little bits of money to other people are big bits of money to us. And if this hearing had been held in Washington or if we take a hearing day or two in Washington, we would call Dr. Cochran back to the witness stand to do the sort of clean-up that we see--

CHAIRMAN MILLER: I think we've heard enough, Mr. Roisman.

I think we're going to suggest that Counsel discuss this at a recess or at lunch because it is the belief of the Board that we do wish to have a full and fair record.

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We're taking into consideration all of the factors. What we had contemplated was the resumption at this time would be for additional or other witnesses that we thought the Staff was talking about. And it is also perfectly true we will not cut off the Staff nor other parties from the opportunity to put on rebuttal testimony or testimony supplemental to that which has been developed in the hearing. This is available to all parties.

So what you're really talking about is whether we're going to have the opportunity for rebuttal or additional testimony, whether it be the Intervenors and the parties themselves exclusively in Charlotte, or whether you wish to complete the evidentiary hearing in Charlotte and take, say, two days for supplemental testimony available in Washington and not conveniently elsewhere.

So we're going to allow rebuttal testimony to all, including the Staff, including Mr. Roisman, including Mr. McGarry. So what you have to consider is the practicalities, the realities. Is it preferable to require it all be done here, which may well necessitate an additional appearance here, or is it better to conclude our business in Charlotte and by stipulation or agreement have a short period of say, two days available for such rebuttal or additional testimony as can be obtained in the Washington area.

I think that's the limited nature of the decision

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that you ladies and gentlemen can make and advise the Board.

But there will be permitted rebuttal testimony by all.

You may proceed with Dr. Nehamias.

.c fls.

MRB/wb.

CROSS-EXAMINATION

BY MR. ROISMAN:

Q Doctor, let me address your attention to page 1 of Staff Exhibit 20.

First of all, Doctor, could you briefly describe how did it happen that this testimony was prepared? Did you suggest that it be prepared because of discrepancies or ambiguities that you thought existed in your testimony before?

A No, sir. Mr. Ketchen suggested that I look at the testimony and if I thought there was something that needed clarification to try to make it more clear.

Q And are these the points that you thought needed clarification?

A Yes, sir.

Q They're not points that anybody else thought needed clarification?

A No, sir.

Q Let's take a look at your answer to question No. 1 on page 1. You make reference in the second sentence of that response, you say,

> "This value represents, to the best of my knowledge, the highest occupational radiation dose that has resulted from prior actual spent fuel pool rerackings."

Can you say now as testimony that you have examined

WRB/wb2

all of the actual radiation emperience from prior spent fuel pool reracking?

A No, sir.

Q How many have you looked at?

A We have complete data on I believe seven.

Q And did you look at all seven of those?

A Yes, sir.

Q --in making this statement?

A Yes, sir. I cannot say that I've looked at all of them.

Q I'm sorry; you have not looked at all seven?

A However many more there may have been I'm not sure.

Q So your testimony is that you've looked at seven, and you don't know how many more than seven there may have been with actual experiences that are different than the maximum 20 manrem number that you used in this paragraph; is that correct?

A It's correct, but it is not complete.

I've also communicated with the people in the group that have done those reviews.

Q How many of those reviews were there beyond the seven?

A I don't know that. But they did tell me that none of them were aware of any doses higher than 20 man-rem.

WRB/wb3

Q For a total reracking?

A Yes.

Q Could you briefly describe how do you find out what the doses were from a reracking? What exactly happens?

A The Licensing Project Manager communicates with the licensee or the applicant and finds out what the doses were.

Q But how do they measure those?

A Principally with TLD badges.

Q Of each of the employees?

A Yes.

Q Are there experiences that you know of where the TLD badges would not accurately disclose the exposures that the worker received?

A It would depend on what you mean by "accurately." The TLD is the best, the most accurate kind of dosimeter to use in these kinds of situations.

Q Well, but, for instance, are you aware of situations in which the employee's badge didn't function properly or he didn't carry it or anything like that?

A If he did not carry it then it clearly would not be a measured dose. I'm not aware of situations of this kind where it occurred that a person went into a reracking operation without his badge.

Q Can the badges get full and not -- and therefore

WRB/wb4

the amount of dosage would exceed the ability of the badge to measure it?

A Yes. But it would only occur at doses very much higher than we're dealing with. You would have a medical problem if you received doses high enough to saturate the badge.

Q If you kept using the badge over and over again would you?

A No, sir. You anneal the badge between measurements, bring it back to zero.

Q And are you aware of any situations in which badges have not been properly set up so that when they were used they would accurately record the exposures to the best of the ability of a properly functioning badge that a worker received?

A No, sir.

Q And the other people who looked at these experiences, do you know how they go about verifying the accuracy of what is reported to them?

A The people who do the review of the application do not themselves verify them. The measurements are verified by inspectors. Our inspectors look at the equipment, look at the procedures and look at the records.

Q Have you personally talked to any of the inspectors about any of the seven specifics, for example, that you

WRB/wb5

rely upon for your statement here?

A No, sir.

Q Have you talked to the inspectors in general about how to go about verifying the accuracy and adequacy of the measuring?

A Yes, sir. The inspectors-- If there is a serious violation of the kind you describe, the inspectors would cite that violation and we would hear definitely of that.

Q Do you know, do the inspectors-- Are they there for every single. . . I don't know what you would call it. . . process, every single exposure that a worker will get?

A No, sir.

Q So it's a spot check?

A They review the procedures and the apparatus.

Q I'm sorry?

A They review the dosimeters to see how they're used, what the procedures are.

Q But they don't know for sure that they were actually used properly at the time that the measurements that are subsequently recorded were made; is that correct?

A Only if it happened while they were there, yes.

Q Do you know how frequently they are there compared to the number of times-- In a reracking operation would you expect an inspector to be there at all during the

wrb/agb1

reracking; and, if so, what percentage of the time?

A I'm sorry, I don't know their schedule.

Q Now you say on page two of this same piece of testimony at the first full paragraph on the page beginning with the word "The projections," that essentially when you're doing occupational doses there is a built-in inaccuracy because of the nature of the exposures and the like, and you make the statement:

"It is typically not possible to determine dose rates and occupancy times within a factor of two or more prior to the actual start of the operation, if then."

What's the basis for your reference to "it is typical," what are you relying on?

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A Just my experience with the use of this kind. You don't know how long a man is going to be there. You don't know until you get there what the dose rates will be.

Q Let's take the seven cases that you looked at specifically.

A Yes.

Q IN those cases, did you have a pre-operational estimate of what the radiation exposures would be?

A We don't have them completely. The ones that we do have were all high.

Q Can you tell me specifically? Let's take them

wrb gbl

one by one?

A No, sir, I did not bring that record.

Q Can you give me some order of magnitude? A little more precise an order of magnitude? Can you give me some reasonable estimate of what the original prediction was in a case and, if possible, identify the reactor and the re-racking and what the actual experience was?

A No, sir.

Q Could you tell me of your own personal knowledge that you're sure it was a factor of two or more difference?

A On more than one occasion it was, yes.

Q More than one, but not necessarily in all of them?

A No.

Q What do you mean when you use the word "typically?"

A It's a phenomenon that I have seen on many occasions, not just re-racking. It's the nature of the beast. It's conservative to make the measurements, to make the calculations based on the data in hand and not allow for corrections that will result from ALARA procedures. So typicallythe doses are lower than you expect.

Q But you have used within a factor of two or more.

A Yes, that's a subjective statement.

Q So that for purposes of this proceeding, you're not trying to tell us that the 76 man-rems might actually be a factor of two less based upon typical experience?

wrb/agb

A The 76 is more or less an example of what I meant, sir. The Applicant's original estimate was 150. After they had more information, taking into account fsome of the ALARA procedures, their projection is down to 76. There is the factor of two.

Q But that 76 was still pre-occupational.

A Yes.

Q -- pre-operational, I'm sorry.

A Yes, sir. But it is an example of what I mean. The difference is a factor of two.

1.600

Q Would you describe yourself as a cynic?

A No, sir.

Q So it wouldn't necessarily have occurred to you that maybe the reason the number was 76 when it had originally been 150 was that at the time the estimate of 150 was made the Applicant was not seeking a re-racking license but was seeking a transshipment license and that the number got lower when they got to seeking a re-racking license, that there may be some connection between that?

A No, sir, I believe the actual measurement was made on the water and it was on the basis of those measurements that Mr. Lewis described here that the estimate of 150 was based.

Q I'm sorry, you're saying the 150 was based upon actually measuring in the water ofthe pool?

wrb/agb4

A Yes.

Q -- how much radiation was there?

A How much -- the environment in which the divers would be working if nothing else changed. Since then there were ALARA procedures taken such as vacuuming the bottom of the pool which reduced the dose rate.

Q All right. But now I'm asking you about the 76 number, do you think that's going to go down also by a factor of two if it is typical, is that your testimony?

A It's my understanding that it has already gone down to 60 percent as a result of the vacuuming of the pool.

Q Well correct me if I'm wrong, Doctor, but isn't it your testimony that you're referring to testimony about one part of the operation, not the entire operation?

A That part which takes place in the water in the pool, yes.

Q So it is not true that the 76 is going down by 60 percent, but that a portion of what made up the 76 is going down to 60 percent?

A Yes.

Q By the way, did you do -- did you attempt to verify that as to what the exposures were? Did you go and look at the TLD readouts or printouts or however they are recorded?

A What they actually had been in this re-racking?

mrb/a

Q Yes.

A No, sir.

Q Beginning on page three of your testimony, you're asked the question:

"Is there a qualitative difference between ALARA consideration as far as occupational radiation exposure versus reactor effluent?"

And at the very end you say -- and that's on page four, the last paragraph:

"As a result, the ALARA processes applied to occupation situation is principally qualitative in nature, it is concerned with assuring that all reasonable actions to reduce radiation doses are considered."

Is it your testimony that there is no feasible way to make a comparison between the alternative courses of action with respect to occupational situations, that all you can do is simply take the course of action proposed and guarantee that they do everything that you know of that is "reasonable" in terms of ALARA standards to reduce doses? Is that the thrust of your testimony?

A No, sir.

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Q Would you explain to me, then, what you mean by saying that the ALARA process is concerned with assuring that all the reasonable actions to reduce radiation doses are considered?

A The ALARA process involves, as you just read, taking the actions -- seeing that the actions are taken, that all reasonable actions are taken, to keep doses, occupational doses, as low as reasonably achievable.

Q All right.

Let's just assume for a moment, without accepting it, that the Applicant's transshipment proposal is intended to utilize all the things that are considered to be reasonable to reduce the doses from transshipment, whatever those processes and procedures are going to be, all right?

A Yes.

Q Let's take that as a given for the moment. Are you saying that that is the end of the ALARA processes that relate to the transshipment option?

A No, sir.

Q Where do you get the comparison of the transshipment option to some other option? Where does that take place, in your judgment?

A In the presentation of the application the Applicant is required to estimate the best he can the doses for each alternative under consideration.

Q And would ALARA require that that alternative which has the lowest exposures, assuming -- let's just for a moment make another assumption -- assuming the costs -- dollars and cents costs -- are identical, the option that has the lowest projected radiation exposures would be the one selected?

A No, sir.

Q All right. Why not?

A There are other factors besides dose and money.

Q Like?

A ALARA involves other environmental impacts, social considerations. There are a lot of things to take into account in deciding which is the least total impact. It's not simply dose.

Q Let's assume for the moment all the other things are equal except dose. Would you then pick the one with the lowest dose? Is that what ALARA requires you to do, as you understand it?

A If all the other factors were identical, and if all the alternatives but one were substantially higher than that one, yes, I would choose that one.

Q What if they weren't, in your judgment, substantially higher, but they were higher? We'll get to what you mean by substantially in a minute, but I'll let you use your term.

A Well, you're focusing on my use of the word qualitative. The estimates are not precise. The variations --

if you get a variation within a factor of 2 of your estimates of the dose, it has no real meaning.

Q So what you've telling me is that the state of the art in dealing with occupational exposures is such that you might actually expose workers to twice as much radiation as necessary in reality, because when you did your estimates you didn't know whether the estimated exposures to the workers, which looked like they were going to be double, were accurate enough to rely upon in choosing the lower dose course of action, is that correct?

A Would you repeat the question, please?

Q You said -- or at least I understood you to have said -- that exposures to workers might vary by a factor of 2 in making estimates of two different procedures that could be used for dealing with the problem, and that the range of the uncertainty is about a factor of 2 also, and that, therefore, a difference of a factor of 2 wouldn't be significant enough to choose one of those procedures over the other.

Is that correct?

A Yes, sir.

Q So if in reality the factor of 2 difference was not wrong, but was accurate, but you chose the one that had the higher dose rate, then you could have exposed the workers in that situation to twice as much radiation as they would

have gotten if you'd chosen the other one, but you don't have enough knowledge in the area to be certain to do that, is that right?

A Given all those assumptions and that choice, that's correct.

Q Now, when you're faced with a situation of uncertainty is there any rule of thumb that you can use if you're trying to stay to the safe side as to whether you should choose between two proposed courses of action, one of which estimates the doses to be twice as high as the other? You've got to choose one of the two, and you know that they both could be wrong by a factor of 2. So that the one that's two times too high--or two times higher could be two times too high, and the one that's too low could be two times too low, and you don't know objectively which one to choose, is there a rule of thumb as to which one you would choose subjectively? Would you choose the one at the bottom end or at the top end if you're trying to keep the actual exposures low?

A If everything else was equal, and if, indeed, one was lower than all the others by a factor of 2, I might very well decide to make that choice, subjectively.

Q Have you ever had that experience?

A No, sir. Those assumptions are outside reality. In reality the other impacts are substantially more.

Q Substantially more than the difference of a factor

of 2?

A Substantially more than the impact due to the radiation levels we're talking about.

Q Now, am I correct in assuming that it's your testimony that a factor of 2 represents your judgment of the error band on these estimates before we've actually done the work? When we're dealing with occupational exposures of the type involved in spent fuel handling, a factor of 2 is the number, is that correct?

A That's not a scientific number, sir. It's a subjective evaluation based on a lot of --

Q No, but it's the number that you're testifying to. That's what I want to be clear about.

A Yes, sir.

Q And I take it the uncertainty goes both ways? That is, it's a factor of 2 -- it could be a factor of 2 too high, a factor of 2 too low?

A It's certainly not equally divided. It's very much likely to be high, because the Applicants are conservative. They estimate at the high end.

Q That's your experience?

A Yes, sir. The resulting doses normally, typically, turn out to be lower.

Q Now, was that true in all seven of the specific cases that you looked at?

A The data I have are the results of the measurements. I don't have all the prior estimate information.

Q For all the ones that you have the prior estimate information for, is that correct?

A Yes, sir.

Q How many of the seven do you have that for?

A Three. I don't remember which ones.

Q I'm sorry? Three?

A Yes, sir.

Q And then there's some indefinite number beyond seven where other Staff people have direct personal knowledge, and we don't know what that number is, and you have no knowledge as to either the conc[illegible]sory numbers or the prior estimates on those?

A Yes, sir. I do not.

Q If the others show that the Applicants -- let's just say that ten others, in six of the ten they underestimated the values, would that change your judgement as to whether Applicants typically overestimate the values?

A Yes, sir.

Q Let's go back for a second to your statement about using a lot of different considerations in the ALARA, other than just cost and dose.

Do you have a list of those that you use, like a checklist? What are the other considerations, to make sure that

you look at all of them when you are examining a proposed action?

A Well, in the present case from my point of view the doses that are projected are not significantly different among themselves.

Q I'm sorry?

A -- are not significantly different among themselves. Therefore, other factors don't come into account.

Q Just so we've got it clear, what groups of activities did you consider the doses for? You considered the doses for transshipment and made an estimate of that. What else did you look at as a comparison?

A There were five specifically identified in Exhibit 11A--reracking the present spent fuel pool --

Q Excuse me. Is that the reracking that has already occurred? The stainless steel reracking?

A Yes, sir.

Q All right.

A Transshipment of Oconee fuel from McGuire, construction of a new spent fuel pool at Oconee, and then the other two were reracking with poison racks and a new pool at another site.

Q Now, are those the only ones that you look at? I just want to make sure that we've got the universe here.

A Yes, sir.

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Q Why didn't you look at pin packing?

A It wasn't presented to me as one of the alternatives.

Q I'm sorry. Who presents the alternatives to you?

A I receive the material from the Office of Nuclear Measurement Safety and Safeguards.

Q I'm sorry? I didn't hear that.

A What I receive, I receive from Mr. Spitalny, from NMSS.

Q So he sends it over and says, we've picked these five alternatives; give us dose estimates on them?

A He provides me the documents, and they were the basis for my review.

Q What documents did he provide you for purposes of the review that's reported in Staff Exhibit 11A?

A Some of it was in the environmental impact statement. Others were in other documents. I'm sorry, I don't have a listing of them.

Q So you don't, of your own knowledge, know that this represents the appropriate universe of possible alternatives to the transshipment? You just take it on faith from Mr. Spitalny that he has found what are the appropriate range of alternatives, is that correct?

A Yes, sir.

Q Now, what about the manner in which one analyzes

the alternatives? Do you attempt to figure out what the doses might be if the alternatives were pursued in different order, or at different times with different volumes of spent fuel in the pool, or anything like that? How do you figure out what the parameters are that control the alternatives?

A The choice of the alternative is the Applicant's. I do not make an effort to choose one. I made an effort to evaluate each one separately.

Q Well, for instance, if part of the exposures associated with transshipping are the exposures associated with the radiation at the recipient site as well as the radiation at the sending site, did you have to factor into your calculation of the amount of the exposure how much spent fuel, if any, would be in the pool at the recipient site?

A As I recall the assumptions, the fuel handling dose cost at each end was the same. We assumed that the pools were occupied.

Q Does it matter how much they're occupied?

A Not very much.

Q Would it matter if the pool that you were depositing into --

A Oh, I'm sorry. I misunderstood. Yes, it matters if it's occupied, as compared with not occupied. It doesn't matter how much fuel elements are there.

Q Ten or a thousand wouldn't markedly change it?

A There is a change in the short term, in the process of putting them in. But once they're in place and that increase has settled down, after that there isn't very much difference, no.

Q What about the age factor? If the spent fuel is older in the pool would the doses be lower if you were putting spent fuel in a pool that had older spent fuel in it?

A Older fuel is less radioactive, yes. It would be less.

Q Now, let's take the reracking with poison racks option for a second. If you reracked a pool that had no spent fuel in it with poison racks, or reracked it if it already had spent fuel in it, which would you get higher doses from?

A I thought I answered that question, sir.

If there's fuel present, the dose will be higher.

Q All right.

And did you factor in at all, looking at the options of reracking, whether the pool into which the spent fuel from Oconee was going was reracked with poison racks at all, and if so, before or after spent fuel from Oconee went into the pool?

A I think, as I recall, the assumption was that the reracking would occur before fuel was in place.

Q All right. Let's get it so we've got it down

wal 11

specifically.

You were assuming that McGuire would be reracked with poison racks before Oconee spent fuel reached the McGuire pool, is that correct?

A If that option was selected, yes.

Q Well, for purposes of transshipment did you make any assumption about whether -- I mean the only way it gets to the McGuire pool is if it's transshipped -- and I'm asking you: That's an alternative, that's a proposal; that's not even an alternative. That's the proposal on the table.

When you evaluated the exposures associated with transshipping, did you assume that the pool into which the transshipped spent fuel would go had already been reracked with poison racks?

A No, sir. I assumed there was fuel in the pool, however.

Q Would it change the dose estimates that you get -- strike that.

Let's take it a step at a time:

The transshipment of spent fuel from Oconee to McGuire involves exposures associated with removing it from the Oconee pool, isn't that right?

A Right.

Q All right. Is it your testimony that essentially the amount of exposures associated with removing it from the

Oconee pool are not affected by how much spent fuel is already in the Oconee pool? Is that correct?

A There's a step difference between having fuel and having no fuel.

Q I understand. But you're saying that if you transshipped in 1979 and 1985, in your judgment it wouldn't markedly change the amount of exposures associated with physically taking the spent fuel out of the Oconee pool, is that correct?

A Yes, sir, with the exception that I mentioned. When the process is underway things can get stirred up and there's a temporary increase in dose rate.

Q That would be higher if there were more fuel in the pool than if there were less?

A Probably not.

Q All right.

I'm sorry to keep asking this, but we keep getting the interference. I don't want to have any qualifiers in the way of your making a clear statement.

A I'm trying to answer clearly, sir.

Q I understand you are.

You're saying that removing spent fuel from the Oconee pool for purposes of transshipment, given the status of the Oconee pool now, would not be markedly changed if the pools had more spent fuel in them than they now do?

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A Right.

Q All right.

Now, I assume that assuming the same age spent fuel is moved that the exposures during transit to the McGuire pool wouldn't be affected by when you took it out either.

A Right.

Q Now, did you look at what differences might occur to the exposures depending upon the status of the McGuire pool at the time the Oconee spent fuel was put into it?

A I believe I testified that I assumed that the pool would be in place at McGuire.

Q That is that there would be some spent fuel in the McGuire pool?

A Yes, sir.

Q All right.

Did you consider whether or not the presence of the Oconee fuel in the McGuire pool would require a re-racking operation to take place at McGuire at some time in the future while there was already spent fuel in the McGuire pool?

A No, sir.

MR. MC GARRY: Objection, Mr. Chairman, this is all very interesting but I don't see how this individual

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has any expertise to determine whether or not there's going to be a need for further re-racking at McGuire.

CHAIRMAN MILLER: Well he's already answered. We would have overruled the objection.

Proceed.

BY MR. ROISMAN:

Q Why did you not either ask Mr. Spitalny or on your own make some calculation of the occupational exposure consequences associated with the movement of the spent fuel into the McGuire pool insofar as it might affect McGuire's subsequent need to expand its spent fuel storage capacity?

A I don't know why I made that decision.

Q Was it your decision?

A Yes, sir.

Q Is it your testimony now that that can't have any ALARA implications, that ALARA stops at some point in time in looking at the consequences of a proposed action?

A No, sir.

Q Well what do you now think -- or do you now think that one should not look at the consequences -- the possibility of, let's get them in order, the possibility that McGuire might have to do something to make more space available for spent fuel at a site and the consequences of doing that after there's already spent fuel in the McGuire pool, in terms of occupational exposure consequences, I mean.

wel/agb3

A Yes, I agree it would have been helpful had I made the estimate with and without some fuel in the pool.

Q Do you have any judgment at this point as to whether the numbers that you would come up with in that case would be, in your words, significant? That is, the exposures associated with re-racking the McGuire pool with poison racks prior to any spent fuel being in there versus re-racking the McGuire pool after there's spent fuel in there.

A I have no basis to sit here now and make an estimate, sir, but it would be more. I do not believe it would be a factor of two.

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Q Well, you did make an estimate of the reracking with poison racks of the Oconee pools -- right? -- because that's your Number 4 of your alternatives to the transshipment option. Isn't that correct?

MR. MC GARRY: Mr. Chairman, again I'm going to object to the line of questioning concerning McGuire. This application concerns Oconee fuel and what we're going to do with Oconee fuel. What we're going to do with McGuire fuel and what we're going to do with reracking McGuire if indeed that eventuates will be the subject of a potential further hearing in another case.

CHAIRMAN MILLER: Overruled. You'll recall, Mr. McGarry, we had these matters up preliminarily and we made it an issue as to whether or not there is more than something to transfer from A to B.

Without making any judgment, it's an issue to be explored in the hearing. On that basis, therefore, we overrule that objection, the line of the objection.

I think we will take our morning recess, about ten minutes.

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(Recess.)

CHAIRMAN MILLER: We'll resume the evidentiary hearing, please.

MR. KETCHEN: Mr. Chairman, when I presented Dr. Nehemias' testimony I neglected to hand the Board members

WEL/eb2

copies. Does the Board have copies?

CHAIRMAN MILLER: I think we have it. Does everyone have them?

Well, if you have two extra ones it would be helpful, yes.

(Documents handed to the Board.)

CHAIRMAN MILLER: Thank you.

MR. KETCHEN: Mr. Chairman, I've given the appropriate number of copies to the Reporter also.

CHAIRMAN MILLER: Thank you.

You may proceed.

BY MR. ROISMAN:

Q Dr. Nehemias, directing your attention to the chart that appears on Staff Exhibit Number 11-A that gives your projected occupational doses, based on Duke Power estimates under "Fuel Assemblies" --

A I have it.

Q All right.

Now if you were to rerack with poison racks at the Oconee pool with fuel in it, you indicate that Staff estimates -- I'm sorry, Applicant estimates 76 man-rems for the pool work, the physical job of doing the racking.

A Yes, sir.

Q Is it reasonable to assume that that's the number that you would expect if you would put poison racks in the

WEL/eb3

McGuire pools with fuel already in there if you were reracking them?

A The 76 is based on the measurement in the Oconee pool. If the measurement in the McGuire pool were the same than the dose rate would be the same.

Q I'm sorry, I thought you said that 150 had been based on the measurement in the Oconee pool and 76 represented what they were estimating if they did certain measures designed to lower the doses.

A Yes, sir.

Q Well, what is there that you would expect about putting fuel in the McGuire pool that you would expect the pool to measure differently than at Oconee?

A The dose rate is principally determined by the amount of material in the water and on the bottom of the pool and there's no uniformity about that. It depends on the history, the number of manipulations, the kinds of nuclides that are in the water.

You have to-- You can't make a realistic projection of what it would be.

Q Is it the case that the more you handle spent fuel the more likely it is that the measurements in the pool will be higher? Is that what you're saying?

A The material that's in the pool, in the water, comes from failures in the cladding partly, and partly from

WEL/eb4

crud on the surface of the fuel assemblies, and the amounts of those two are impossible to predict with precision.

Q Well, does moving the spent fuel increase the likelihood that there will be cladding failures?

A Yes, sir. That's what I meant when I said the doses would be higher during the actual manipulation of the fuel because that's when the material can become dislodged.

Q No, I'm sorry. A failed fuel assembly has some kind of a pinhole in it, doesn't it?

A Yes, some kind of a leak.

Q My question to you is if you move it, are you likely to create the leak and not have material come out through a pre-existing hole but actually create the hole or the break? Is that more likely to occur when you're moving the fuel?

A To make a new break?

Q Yes.

A No, sir, I didn't mean that. I meant the fact that if there is a hole it's more likely in the process of moving it around that some would come out.

Q Well, when you're transshipping spent fuel then are you saying that during the period of transshipment, because it is physically moving around, if there are holes in the spent fuel rods that are being shipped that they will release more radioactivity during the transshipping period

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into the water in which they are being held?

A I don't envisage moving around in the cask during the transshipment. If they'd be moved around that would be correct, yes.

Q Well, the cask itself moves around, though, doesn't it?

A Yes.

Q I'm not a physicist but if something that's holding something moves around, wouldn't you say that the thing that's inside is also moving around relative to the world?

A Yes, relative to the world, but not relative to what it's against, what it's in contact with. It's in contact with the bottom of the space and with the water, and those are moving with it.

Q So you're saying that as long as when it moves the things in which it is submerged are not moving relative to it, then you wouldn't expect it to produce any more radioactivity?

A That's my answer, yes, sir.

Q Oh, all right. Okay.

Based on your knowledge of the reracking with poison racks and the spent fuel pools generally, do you have any judgment about what you would expect McGuire might -- you might get as a result of reracking the McGuire pool?

WEL/eb 6

A Well, I have no basis in my knowledge to predict it would be different than a non-poison reracking.

Q All right.

And what about non-poison reracking? Would you then give us some basis-- Can you give us a number, an estimate as to what you think the McGuire pool might -- the exposures might be if you reracked the McGuire pool, assuming that there was spent fuel already in it?

A No, sir, there's no abasis to predict in advance before you make some measurements. You might start with the estimate based on the Oconee measurements but that wouldn't be very direct.

Q For hypothetical purposes let's assume that the reracking of the McGuire pool with spent fuel already in it would be a 50 man-rem dose. All right? And we'll just take that as a hypothetical.

A Yes.

MR. KETCHEN: Objection, Mr. Chairman.

CHAIRMAN MILLER: What grounds?

MR. KETCHEN: Two grounds. Basically it's a hypothetical with no background of fact in the record.

Second, the witness has indicated there is no basis to make any kind of judgments like that until measurements are made, and I think it requires highly speculative guesswork on the part of this witness.

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WEL/eb7

CHAIRMAN MILLER: Let me hear the question again, please.

MR. ROISMAN: I hadn't gotten to the question except to ask the witness to assume for a hypothetical thatthe McGuire pool would involve 50 man-rem exposure if you reracked it after it had spent fuel in it.

The question was then going to be to ask him if he could tell us whether that would be a significant dose difference between zero and 50.

CHAIRMAN MILLER: Yes. The question may be asked. It's testing the mathodology as well as the knowledge of the witness.

Had you completed asking the question so that the witness understands it?

MR. ROISMAN: No, I'd only gotten to the hypothetical.

CHAIRMAN MILLER: All right, let's have the whole thing.

BY MR. ROISMAN:

Q Dr. Nehemias, the hypothetical is to assume that reracking of the McGuire pool after there was spent fuel in it would involve an exposure of 50 man-rem for the pool work.

And my question then is using that as the hypothetical, if the alternative to that was having zero exposure, would you say the difference between zero exposure and 50

WEL/eb8

man-rem exposure is significant?

A Numerically the difference is significant. The comparison that you would make in looking at alternatives, however, is not from zero but with the dose cost of the alternative.

Q I understand that. I'm just trying to get-- What I'm trying to find out is -- by going at you with numbers is that numbers do you put on "significant" when you say that the differences as to other things you've testified to are not significant.

And am I correct that you're saying 50 man-rems -- that if zero is at one end and 50 man-rems is at the other, that difference would be significant?

A Yes, because it's zero. Anything is significantly better than zero. Zero is a stranger.

Q Are you suggesting that if the number of 50 man-rems was 100 man-rems you might not call it a significant difference?

A Yes, sir.

Q I've framed the question in a way in which the answer won't give me the answer. Excuse me for doing that.

Is it significant that the difference is between 50 man-rems and 100 man-rems?

A My testimony is that in these estimates a factor of two is not significant. The relationship of 50 to zero is

WEL/eb9

infinite.

Q It's what?

A Infinite.

Q Did you have presented to you or did you analyze any alternatives where you could avoid putting spent fuel into the McGuire pool from Oconee before McGuire had been re-racked?

A I believe I testified that I assumed there was no spent fuel in McGuire when the poison racking occurred.

Q No, I'm sorry, I....Well, all right, I can't put it precisely but you traced out a transshipment of spent fuel from Oconee to McGuire in which you assumed that McGuire had already been reracked with poison racks and there was no spent fuel in there when it was reracked with poison racks.

A No, sir. The transshipment estimate includes the assumption that there's fuel in the McGuire pool.

Q But that it had been previously reracked with poison racks before any fuel went in?

A No, sir, nothing about the nature of the racks in place.

Q Okay.

Let's see if we can get it clear. I believe you previously testified just a few minutes ago that moving spent fuel by transshipment from Oconee to McGuire, at least until we get to McGuire, is relatively unaffected by the time in

WEL/eb10 1 which it occurs because of the presence of spent fuel already
2 in the Oconee pool; that if you move spent fuel in 1979 from
3 Oconee to McGuire, at least until we get to the gate of the
4 McGuire facility, it doesn't make any difference whether it's
5 '79 or '82 or '85 essentially.
6 Is that a correct summary of what we've gotten be-
7 fore?
8 A Yes, sir.
9 Q All right.
10 I'm now trying to find out whether there are any
11 differences that might occur after you've gotten to the
12 McGuire site.
13 Now one of the differences that might occur
14 in terms of occupational exposures, is it not, is if the
15 McGuire pool were reracked after spent fuel had already been
16 put in the pool, you would get exposures to workers the number
17 of which you're not prepared to give us, but some number which
18 wouldn't be there if the pool had been reracked before any
19 spent fuel went into it? Isn't that correct?
20 A Yes, sir.
21 Q Now did you, in examining alternatives to the
22 transshipment option, consider the alternative of holding up
23 transshipment until such time as McGuire had been reracked
24 with poison racks? Is that one of the options that
25 you looked at?

WEL/eb11

A No, sir. I believe I testified that I just considered each dose of itself.

Q And you did not consider it your responsibility to hypothesize other alternatives? You just took the alternatives as they were presented to you --

A Yes, sir.

Q -- and that came to you from Mr. Spitalny?

A Yes, sir.

Q Now on the bottom of page 4 of Staff Exhibit Number 20, the last sentence on the page, you're referring to the range of alternative values associated with spent fuel options discussed in Staff Exhibit Number 11-A, and you say in the last sentence:

"These values are within a factor of 3 of one another, which is not a significant variation, given the inherent uncertainties in making such projections...."

What is your limit on your willingness to say the factor differences between estimates are irrelevant? Is 3 the top, or will you go to 4?

A I can't put a hard number on that, sir. It's dependant on circumstances.

Q Well, are you telling me that the present state of knowledge is such that these estimates are inherently uncertain, or that your present state of knowledge is such that

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WEL/eb12

for you they are uncertain?

A My testimony is they're inherently uncertain by the nature of the physical situation.

Q Are you aware or do you have any judgment as to things that could be done if somebody came to you and said, "Doctor, it's extremely important that within the next three months you produce more reliable estimates as to the radiation exposures which may occur from the handling and storage of spent fuel alternatives like those discussed in 11-A"? Could you do anything in three months that would help?

A You could discuss the possible alternative ALARA actions, you could project the improvements that might result, but you won't know until you take the actions what the actual reductions will be.

Q Well, could you study them all rather than just seven of the actual reracking experiences to try to get experential data that would form the basis for a more reliable estimate of what you'd expect to happen in the next case?

A Yes, you could get the data. No, it would not be more reliable. It would just show you that there's a wide range.

The same process in one pool might be a 90 percent reduction and in another pool, it might be a 10 percent reduction.

Q What about finding out what were the variations

WEL/eb13

that affected the differences in the pool such as the age of the spent fuel that went in, or the number of leakers, or the type of filters used? Wouldn't that help you find out some factors that you could say if these factors are present, the number will be higher; if these factors, the number will be lower?

A Yes, sir. Finally if you had an infinite number of reracking you could probably correlate all the variables and make a statistical projection.

Q I'm not asking you for a specific number. I'm asking you for the number that have actually occurred as of July 1 of 1979.

A There are a number, a large number of variables. The chemical state of the water is an important one.

Q Yes, but these are measurable, aren't they?

A Yes, but I'm not aware that there's detailed data available on any.

Q But it could be done?

A Yes.

Q So what do you mean by "inherently"? We may be using that word differently. Do you mean incapable, physically impossible with the present data, or are you saying simply very difficult and expensive and time-consuming?

A I'm just giving the chemistry of the water as an example. I could list many others I think.

WEL/eb14

Q Okay, please do. I think it's relevant to know what these variables are.

The chemistry of the water. I take it you could send an inspector to each one of the sites and get the chemical composition of the water from some records that the Applicant has.

A The chemistry of the water would change with time and with temperature.

Q Yes. But wouldn't the Applicant have the chemistry of the water recorded as part of its normal reporting of what the hell is going on in the spent fuel pool?

A I don't know how much records they keep detail on.

Q Give me another variable.

A The state of the surface. That would affect how much material's absorbed on it.

Q What do you mean by the state of the surface? Do you mean whether it had fissures in it?

A Yes, or discontinuities or rust. All these things would change the absorbent rate.

Q These are stainless steel-lined poles?

A Some are.

Q So you could determine if they were likely to have rust or not by the materials out of which they were made. That would help you there, wouldn't it?

A Yes. You can use averages, but the reality would vary from case to case.

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wel/3
wel/agbl

Q Let's be clear then. Your testimony is that right now, today, there's nothing that you could imagine doing that would allow you to accurately predict what the exposures would be from the proposed action of transshipping or from alternatives to the proposed action listed in 11A closer than a factor of three.

A My words if you'll note were within a factor of three.

Q All right.

A Just barely over a factor of two. Between 30 and 76.

Q Well how are you so confident that those numbers are any good? You've given me a very clear case for saying that there are so many variables and they change so much that you cannot give me accurate numbers. Why do you think 30 and 76 are any good, maybe the numbers are 300 and 760.

A My conviction based on a long series of reviews, not just of re-racking, is that these estimates are conservative. They're high, I think.

Q So you feel that although there are still just a whole passel of variables and things like how much rust in the configuration of the material of the pool and all of that, those variables don't keep you from saying that the Applicant's estimateof what the numbers are and the Staff's estimate of what the numbers are must fall within the range

wel/agb2

of what will happen here.

A When the projections are made, they're based on a measurement which includes whatever's on the wall and whatever's on the floor. In this case, the Applicant has committed to do something about cleaning the walls and the floor. I have no basis to know how effective that will be. We have a measurement, Mr. Lewis gave us a measurement of how effective it was but we did not say in advance.

Q I guess the part that's troubling me is that you seem to feel a higher level of confidence about predicting the as-yet unaccomplished transshipment option. But the alternatives that my client thinks are more desirable, you've let the uncertainties keep you from finding the numbers are significantly lower for. And I guess I'm troubled by that, I don't understand how your certainty is better for the proposal but not so good for the alternatives, maybe you could explain that to me.

A The transshipment itself has less variables in it. For one thing, there's a dose rate limit on the cask.

Q But we do have the handling at the McGuire pool, don't we?

A Yes.

Q And as that pool begins to get spent fuel in it, the buildup of radioactivity in the pool due to the chemistry of the water and all these other variables is going to change

wel/agt3

the doses at that end of it, aren't they?

A Yes, sir.

MR. KETCHEN: Mr. Chairman, objection.

CHAIRMAN MILLER: What grounds?

MR. KETCHEN: I'm troubled by this line of questioning. There's no evidence or testimony that I know of that when this transshipment takes place like today that there will be, in fact, spent fuel in the pool.

CHAIRMAN MILLER: That's the subject of cross-examination.

MR. ROISMAN: The witness testified that's the assumption he used in making the calculation.

CHAIRMAN MILLER: I heard the witness so testify. He's now being asked about certain varying assumptions.

MR. KETCHEN: That's still -- well, I was under the impression that it's now a fact but --

CHAIRMAN MILLER: Nothing's a fact. The record hasn't been closed. We're probing. All of you are.

Objection overruled. I think the witness had answered that question. Again, the next question.

BY MR. ROISMAN:

Q How are you so certain of the estimates for transshipping when they have to involve some estimates of exposures associated with unloading the spent fuel into the McGuire pool that you were assuming has spent fuel in it,

wel/agb4

when you tell me that making the estimate of how much will be in the McGuire spent fuel pool radiation depends on making some actual measurements in the pool. What's the foundation for your certainty about that end of the exposures associated with transshipment?

CHAIRMAN MILLER: Do you understand the question?

THE WITNESS: You're asking me how I'm so certain about the dose in the McGuire pool? I'm not certain. I'm certainly not more certain for McGuire than I am for Oconee, in fact we used the data from Oconee assuming it was approximately the same dose rate as McGuire. There's no basis in fact, for that.

BY MR. ROISMAN:

Q Doctor, I'm really having trouble. Every time you have a conclusion here that supports the Staff position, you're willing to take the Oconee data as a basis for McGuire. When I want you to make a conclusion about McGuire, you're telling me you don't have enough certainty to do it. I don't understand how you're doing that, I'd like you to explain it to me so it doesn't look in the record like it looks to me now. Will you explain to me why you weren't willing to giveme an estimate for the amount of radiation exposure associated with re-racking the McGuire pool with poison racks assuming there was spent fuel in it but you are willing to give me an estimate and testify to it regarding the amount of exposures which will be received by workers

wel/mgb5

unloading spent fuel from Oconee into the McGuire pool assuming it already has spent fuel in it.

MR. KETCHEN: Objection. Mr. Chairman, this goes back to my original objection I made before the break. The point is Dr. Nehemias has testified that in Oconee you can make measurements, make estimates. He has made no measurements with respect to McGuire, and he said very early on I can't do anything until I have made some measurements of points in the pool. Well there's nothing in the pool yet. I assume the assumption of spent fuel in the pool is a more subjective assumption than at McGuire where they do have some spent fuel in the pool where there are measurements made that can be used for some sort of general judgment.

And I think that's the problem. That traces back to the original hypothetical where Dr. NEhemias said there's nothing -- it's guessing until you make some measurements. And I think that's where the problem is coming in.

And I think he has also testified several times that any of his estimates are all just that, estimates, until the action is taken. So that's the basis for my objection.

MR. ROISMAN: Mr. Chairman, I want to support Mr. Ketchen's objection and would move to strike all the testimony of Dr. Nehemias that testifies what those doses

wel/ayb6

will be associated with transshipment of spent fuel from from Oconee to McGuire because they include what Mr. Ketchen has just said, our guesses as to what the amount of exposure will be in putting it into the McGuire pool if there's already spent fuel in there.

And I believe the Board -- I was going to look for it and I may not have to remind you of it -- the Board at one point said during cross-examination we don't want the witnesses to put in guesses. I think it's when I was asking Mr. Spitalny.

Now if I understand Mr. Ketchen's objection, it is that this witness cannot reliably testify as to the amount of exposures that will take place anywhere except in the pool where the witness is able to get measurements, they can't do any measurements of the McGuire pool because there isn't any spent fuel in it, but their analysis of what the transshipment option will be assumes that there will be spent fuel in the McGuire pool, therefore, there is no reliable estimate of what the exposures will be associated with transshipment.

And I move to strike that line of the chart on Staff Exhibit 11A which is the first line, "Transshipment to McGuire...," and with time I can find you the other places where Mr. Nehemias has testified as to what those exposures will be.

wel/a:b7

CHAIRMAN MILLER: It appears to the Board that there is a difference between observed data, whether it comes from the Applicant or not, that the witness in part is testifying as to certain areas, and extrapolations or even assumptions he has to make in others with an intermediate position as to the nature unverified or perhaps unverifiable of the spent fuel in transit.

Now we'd like to get straightened out the bases for which the witness is able to testify on all of those, so we're going to suggest you back up and take it step one, two and three so that we are able to judge on the record of what the witness can or is willing to testify either upon the basis of assumptions as previously stated, upon the basis of experience or based on data if he has some intermediate position, so I think the record at this point is not clear.

We're going to ask therefore that the questions be propounded to the witness in a sequence which will enable us to find out what the causes of ability or inability to make a reasoned judgment of an expert witness to the best of his expertise and being given data whether observed or observable data on the one hand or assumed, which is a perfectly permissible method of testing the methodology and reasoning of an expert.

So in that sense your objection is sustained

wel/aqp8

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though we indicated that we do want the area explored in a step-by-step fashion.

Proceed.

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BY MR. ROISMAN:

Q Doctor, let's go back to Exhibit 11A and the chart. It's the first column on the chart.

Now the numbers that are there for Transshipment to McGuire, the one-time doses, 30 man-rem for handling the fuel. Now are you testifying to the -- that that number represents, in your judgment, a reasonable estimate, 30 man-rem for handling the fuel?

I understand it wasn't your estimate, it was the Applicant's estimate. Are you saying that that in your judgment is a reasonable number?

A To the extent that it applies to the Oconee pool and the estimate is based upon actual measurements and is not only reasonable but is fact.

Q All right.

A It's a fact. It's not a permanent fact, it's a fact subject to later ALARA action.

CHAIRMAN MILLER: Wait a minute. What's this fact that's not a permanent fact? I'm not following there. And that's why we get off on these diversions, I think.

THE WITNESS: If you make a measurement of the dose rate in the water where the divers have to be, you can make a meaningful and precise estimate of the dose the diver will get, to the extent you know exactly how long it will take to do the job.

WRB/wb2

CHAIRMAN MILLER: Well, the estimate portion of the observable fact lies in having to extrapolate time and continuity of the surrounding circumstances and the like; is that what you mean?

THE WITNESS: Yes, sir. It's relatively precise and it's relatively factual.

CHAIRMAN MILLER: Wait a minute. What do you mean by "relatively?"

You see, part of our problem is perhaps semantic, Doctor, so help me as we go along. Every time you say "relatively" or "for the mostpart" or "significant" you are putting in qualifications which, in order to be precise, I, or whoever is examining you has to explore, perhaps laboriously, before we can go back to the basic premise.

So help me as we go along.

THE WITNESS: I'll try.

Given the estimate of the amount of time the divers have to spend there, and a fairly precise measurement of the dose, if nothing else changed you have a fairly precise estimate of the dose the diver will get.

CHAIRMAN MILLER: Why is it only "fairly precise?"

THE WITNESS: Because you don't know how long he'll be there, and you don't know exactly what positions they will be occupying and for how long. These things develop as you proceed with the operation.

WRB/1

CHAIRMAN MILLER: Well the observation of the facts itself is precise. It's the projection of it, the extrapolation from it where you have varying factors, isn't it?

THE WITNESS: Yes, sir.

CHAIRMAN MILLER: Okay. Go ahead.

BY MR. ROISMAN:

Q Now, what about the McGuire end of the operation?

A In that case, as has been testified, there is no data, there are no data. There is no dose rate to be measured. The applicant-- I assume that the dose rate would be like the Oconee pool. There is no other basis to provide an estimate.

Q Why don't you feel comfortable, then, in using the Oconee pool as your benchmark for measuring how much the exposures would be from reracking the McGuire pool with poison racks if there were already spent fuel in it?

A You mean why did I not provide that information?

Q Why, when you testified about seven minutes ago, did you refuse to tell me that the Oconee experience was a reliable basis for your making some estimate as to the amount of exposures that would be incurred in the McGuire pool if you reracked it with poison racks?

MR. KETCHEN: Objection, Mr. Chairman.

CHAIRMAN MILLER: Overruled.

WRB/wb

THE WITNESS: I don't understand the context of "refused."

CHAIRMAN MILLER: Let's have it restated, then, so the witness clearly understands the thrust of the question.

BY MR. ROISMAN:

Q I was trying to get from you before an estimate as to how much you thought would be involved in radiation exposures to workers for the pool work associated with re-racking the McGuire pool if we assumed that there was already spent fuel in it when it was reracked with poison racks.

As I remember your testimony, it was that there were so many variables that couldn't be measured until you actually had spent fuel in the McGuire pool and took an actual measurement, that you couldn't tell me whether the Oconee number, which is an estimated 76 man-rem for pool work, or the Portland Trojan plant, if they were reracked, their number: too many variables, you couldn't do it.

My question to you is: How come you can't use an estimate based on the Oconee experience for answering that question for me, but you are perfectly willing to use the Oconee experience as a basis for saying that the total of 30 man-rem for handling fuel from a transshipment to McGuire, which includes handling it in the McGuire pool, is reasonable?

CHAIRMAN MILLER: Do you understand the question now?

WRB/wb5

THE WITNESS: I believe so.

CHAIRMAN MILLER: Go ahead.

THE WITNESS: I think it is correct to say that I cannot project what the dose will be at McGuire. It is also correct -- I'm agreeing, I think, with what you said -- that it's reasonable to take a value from a similar pool in the same utility's system as a projection, but it's not any kind of an estimate.

CHAIRMAN MILLER: That's a little paradoxical. I don't quite understand your last clause.

THE WITNESS: It's not an estimate based on reality at McGuire, it's an estimate based on reality at Oconee.

BY MR. ROISMAN:

Q But the estimate is just as weak or as strong as the estimate that's made as to how much exposures will be incurred from handling the fuel when it is delivered to the McGuire pool in the transshipment option, isn't it? It's got the same weaknesses and strengths, whatever they may be?

A Yes, sir, I think it's reasonable.

Q Then I will ask you what I asked you before but which you didn't answer: Is it reasonable for purposes of our analysis today to treat the question of what will be the exposure to workers if you were to rerack the McGuire pool with spent fuel already in it, to use the estimate that

WFB/wb6

is contained in Staff Exhibit No. 11A for reracking the Oconee pool with poison racks, namely, 76 man-rems for the pool work?

A As far as I know, yes.

CHAIRMAN MILLER: It would be reasonable?

THE WITNESS: Yes.

CHAIRMAN MILLER: Thank you.

BY MR. ROISMAN:

Q You've indicated that the variables that affect these numbers, that there are a great number of them and they can have a lot of impact.

What is the basis for your confidence that estimates of what the values will be, rather than actual measurements of what they turn out to be, will tend for the most part to be less than the estimate by a factor of 2 or 3 rather than more than the estimate by a factor of 2 or 3?

A I have not testified to that, sir. What I've testified is that estimates based on measurements before ALARA actions have been taken tend to be high. Estimates based on using numbers from a different unit would have much less value, much less precision.

Q Well, could you tell me, then, if at this point in time the best we can do for the McGuire reracking with poison racks, assuming spent fuel is in the pool, is just to take the Oconee value, the 76 man-rem number, would you give

WRB/wb7

me a factor of how much -- what's the range of uncertainty that you think might be in that number?

A It would be the same as the range in dose rates observed in the pools, and that would be a factor of several, 3, perhaps 4.

Q Up and down?

A Ranging over a factor of 4. I'm not sure what you mean by "up and down."

Q A factor of 4 too low or a factor of 4 too high, or both ways?

A A total of the factors, from the lowest to the highest.

Q Well, for the number 76 would you just tell me -- I don't really fully understand factors anyw . But if the number is 76, what's the upper range? How much higher could it be?

A As I believe I've said, I don't remember any cases where the actual dose significantly exceeded the estimate.

CHAIRMAN MILLER: That isn't the question. If 76 is your factor and you're going to give a range, a probability factor, what's the high and what's the low based upon the number 76?

THE WITNESS: Based on my own experience, I don't remember a case--

WRB/wb8

CHAIRMAN MILLER: We're just talking about arithmetic, now, the numbers.

THE WITNESS: Well the factor I'm giving is my projection of the total variation. I have no example where the actual dose exceeded the projected one.

BY MR. ROISMAN:

Q Let's be clear about that. The number of cases that you've examined is three; isn't that right?

A I personally, yes, sir. But I've discussed the matter with the people who made the other reviews.

Q But as I remember it, you don't remember for how many of them, if any of them, they had the estimated versus the actual.

A Right.

Q So I'm just trying to get:-- Our experience is three reracking on which you are basing your statement that the 76 is probably the upper number, and the factoring, with the uncertainties, is that the number would be lower rather than higher?

A Yes, sir.

Q The variables that enter into the difference between pools that would make the measurements different, I think I would like you now to list them, if you would. You've already listed the water chemistry, and the configuration, I believe, the texture of the surface of the inside of

WRE/wb9

the pool. Could you list the others, please?

A Principally the fuel itself, the condition of the fuel itself, the amount of radioactive material on it and potentially leaking from it.

Q I'm sorry; I didn't hear the last.

A The radioactive material which is on the fuel element, on the outside, and which is likely to come out through the cladding.

CHAIRMAN MILLER: Didn't you say "and potentially leaking from it?"

THE WITNESS: Yes.

MR. ROISMAN: Thank you, Mr. Chairman. That is what I hadn't heard.

BY MR. ROISMAN:

Q If you were trying to get a more reliable estimate, or at least a more reliable range of estimates for what the exposures would be at a pool you couldn't yet take measurements at at all, would you want to know more about how these variables affect the ultimate dose than you now know?

A We have a very large number of measurements on the dose rates above -- in the concentrations of radioactive materials in spent fuel pools. And it doesn't vary a whole lot. In fact we have a standard for it, 2.5 millirems per hour at the surface.

WRB/wb10

Q Why, if it doesn't vary a whole lot, then why is there a factor of 2 or 3 difference in the estimates and the actual experience?

A Because of the uncertain benefit expected from the ALARA action.

Q So all the uncertainties that you're identifying -- not all, but the substantial part, well over 50 percent of the uncertainty, relates not to the variables that you just listed but, rather, to which ALARA actions are taken and how effective they are?

A Yes, sir.

Q Would you assume that in any proposal with ALARA actions that are recommended, say at the Oconee site now, would be pursued by this utility if it were going to the McGuire site or to the Catawba site?

A At whatever site the action is proposed to be taken, we would make an ALARA review. We would expect all ALARA actions to be taken.

Q I'd like to direct your attention to page 5 of Staff Exhibit No. 20, and I'm going to ask you-- The next question is called a "softball," so you can relax. It comes in easy and you can swing at it any way you want.

Do you have anything you want to add to the record that will help us understand better your use of the word "significantly" as it appears in the fifth line down? --anything

WRB/wbll

that you haven't already testified to, to clarify it or give it any more precision? If so, this is your chance; at least for me.

A Well let me read the material contained in the parentheses so I understand-- Is that your question, the item in the parentheses?

Q Yes.

A "For example, reracking or building a new spent fuel pool will significantly reduce doses. . ."

Q Doctor, read that way it sounds like you're supporting my case. You may want to explain what this means.

A Well, what this means in this case is that none of the options discussed, for example, reracking or building a new spent fuel pool, will significantly reduce doses relative to the transshipment option.

Q That's right. I'm just asking if you have anything you want to add to what you've already testified to both today and in your previous testimony last month, or two months ago, about what this "significant" means, what you mean when you use that term, any quantification you want to give us on it?

A I don't think it would be in addition to what I've said before; just the estimates of the doses associated with the different options are in the same low range, but with not much difference among them. There would be no

WRB/wb12

basis on the radiation alone to say that one is ALARA and the others are not.

Q But let me understand: the foundation for that is not the numerical difference between the numbers, but, rather, the uncertainty associated with all of the numbers; isn't that correct?

A Yes, it's correct. But it's also correct that the numbers are low.

Q Let's just take the 30 and the 76 man-rem numbers. If we knew with the same certainty that we know the sun rises in the morning in the east that 30 was one number and 76 was another, would you say the difference between 30 and 76 is significant?

A Yes, sir, if you were certain.

Q All right. I just wanted to understand what makes you feel that the differences are not significant is the absence of certainty in the selection of any of the numbers, not the absolute difference between the values; it's that you don't think those absolute differences represent reliable estimates necessarily?

A Yes, sir.

Q Okay. That's all I wanted. I just wanted to be clear about that.

Go down to the third paragraph on page 5 now, where you begin your hypothetical.

WRB/wb13

By the way, did you come up with that hypothetical yourself, or did someone suggest to you that that might be a good example to use?

A I called Mr. Spitalny to get some information to give the example from.

Q Did he suggest to you that you use the independent spent fuel storage facility as the comparative example, or did you suggest it to him?

A I asked for a basis to compare the two.

Q Now when you figured a projected occupational dose resulting from the handling of 1500 assemblies, etc., you picked the 1500 assemblies because that was the size you were assuming for the independent spent fuel storage facility, is that right?

A I'm sorry, I don't know how that number originated. It was important that they be compared at the same level of operation.

Q Did you at all consider whether or not if the applicant continues to transship without expanding spent fuel storage capability at Oconee to handle all of the Oconee spent fuel, just how much additional handling might actually occur, of spent fuel?

A No, sir.

Q What is the basis for your assumption that if you built an independent spent fuel storage facility at Oconee

WRB/wb14

that what it would displace is only the same number of spent fuel handlings and not more?

A It seems to me to make sense to compare the different operations at the same level of action.

1E fls

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Q But what is your basis for believing that they will have the same level of action? Is it not possible that by having Oconee keep all of its spent fuel on site there will actually be fewer spent fuel handlings than there would be if you assumed the popularly-referred to cascade plan?

A I made no such assumption, sir. I just compared the alternatives at the same level.

Q Well, are you prepared to testify that there will be the same number of spent fuel handlings displaced if you store 1500 additional spent fuel assemblies in Oconee, in other words, that the comparison is a reliable one?

A It's a comparison based on the number of fuel assemblies taken care of.

Q I don't want to go beyond your expertise but let's understand what happens.

Isn't it true that when you ship spent fuel from Oconee to McGuire, you not only move that many fuel assemblies but at some future date you require that there are fuel assemblies from McGuire be moved to some other plant site when McGuire runs out of space because of the presence of the Oconee fuel assemblies at its site, and that that in turn requires the next group of reactors down the line, if they fill up earlier, to move more of their stuff, and so forth and so on?

And therefore isn't it true that if Oconee handled

WRB/eb2

all of its fuel on site and that involved building merely 1500 additional spaces, you would displace more than 1500 offsite handlings?

A You are indeed taking me beyond what I know, sir. These are decisions that somebody would have to make.

Q So you're telling me that you're not trying to testify on your own expertise that-- Well, let me just ask one more question.

If building an independent spent fuel storage facility at the Oconee site for 1500 fuel assemblies would actually result in preventing 3,000 spent fuel handlings, then isn't it true that your calculations here would be different, the numbers would be different, as to what the relative merits of the proposed action and alternatives to it are?

A Depending on what decisions are made among the alternatives, you could get different dose numbers, I agree.

Q What do you mean, depending on what decisions are made?

A About when to transship and what to transship and when to rerack and when to build new pools.

Q No, I'm just asking you to assume that 3,000 assemblies would have to be handled if you didn't build the independent spent fuel storage facility at Oconee, but that you would only have to build a 1500-fuel assembly facility

WRB/ab3

to eliminate the need to ship the 3,000.

My question to you is that if those assumptions are right, then isn't it true that the calculation of the cost of building the independent spent fuel facility versus the cost of transshipping would be different?

A Yes, I agree it would be different.

Q And that the cost of the transshipping in terms of man-rems would be higher?

A I'm not exactly clear in terms of that, sir.

Q If you had to transship 3,000 assemblies rather than 1500, it would be higher; right?

A Possibly so.

Q Possibly? Why not certainly? If I double the number of transshipments, why wouldn't that double the amount of doses?

A I agree if you doubled the number of shipments you would get double the amount of doses.

Q So "possibly" isn't the word? You said "possibly" when I asked you if that wouldn't happen. You mean it is not "possibly," you are saying it will happen?

5.030 A If there was the shipment the doses would rise accordingly, yes.

Q All right.

Now this calculation that you've done here on page 5, when was the first time you performed that calculation?

WRB/eb4

A Soon after we closed the hearing.

Q Was it written down anyplace other than in this testimony?

A I just did the arithmetic with my pencil and put it in the testimony.

Q Did you do a comparable calculation with regard to other options for extending spent fuel storage at Oconee versus transshipment?

A No, sir. This is just an illustration of the way these decisions might be made.

Q Do you consider that doing the ALARA calculations requires you to have in front of you the range of all the reasonably available alternatives? Is that part of it? Do you have to know what all of the reasonably available alternatives to the proposed action are in order to do your ALARA work?

A No, sir.

Q Why not?

A We're evaluating a particular application and deciding whether it is ALARA and whether it's reasonable, whether it's acceptable.

Q But to do ALARA don't you have to compare all the alternative ways of accomplishing the same purpose?

A There are judgments of two different kinds. Before the plant is licensed the Commission concludes that the license

WRB/eb5

is in the public interest, and during that analysis, the doses associated with transshipment of fuel are included.

055

Looking at the various alternatives here is based simply on the doses and the risks associated with each.

Q I understand that.

Let's just assume for a moment that we take out of the equation the alternative that the plants get shut down. Now what I'm saying to you is that the reasonably available alternatives, to do ALARA, don't you have to have all of them in front of you: the reracking, the reracking at McGuire before the spent fuel is shipped from Oconee, if at all, the reracking of Oconee to prevent the transshipment of anything, the building of any independent spent fuel storage facility? Don't you have to have all these alternatives in front of you in order to determine what is ALARA?

MR. MC GARRY: I object. I think the question has been asked and answered a minute ago.

CHAIRMAN MILLER: Well, why doesn't the witness answer it now then? We can't seem to get a square answer. We've had one non-responsive answer to what I consider to be the thrust of it already. The objection is overruled.

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Can you answer that, Dr. Nahamias?

THE WITNESS: I cannot answer it because I do not know what "more reasonable" means. I have no way to know that I have "more reasonable" alternatives before me. I can

W.B/eb6

never be satisfied if he said "more reasonable."

BY MR. ROISMAN:

Q But in principle do you feel that you have to have the reasonable ones in front of you to do the ALARA judgment and yet to rely upon somebody else to tell you what are the reasonable ones, the more reasonable ones?

A It seems to me if I have the principal alternatives that that's enough. At some point I have to stop asking for "more reasonable." I don't know what that means.

Q What is "principal"? How do you decide what are the principal alternatives?

A If there are five different ones, all of which are worth considering, that seems like a reasonable look at alternatives.

Q Well, does it matter to you who generated the five, whether it was Mr. Spitalny or someone from Duke or someone from the Natural Resources Defense Council or someone from the Board? Does that affect what makes up a reasonable list of alternatives?

A I cannot judge the reasonableness of the alternatives.

Q How do you know when you do your ALARA calculation if you have looked at the number of alternatives that might reasonably reduce the radiation exposures?

A I cannot make that judgment.

WRB/ab7

Q Who does?

A An application comes to me with alternatives on it.

Q And you accept the limit of alternatives as spelled out in that application?

A I have no basis to do differently.

CHAIRMAN MILLER: Then your answer is yes; is that correct, Dr. Nehemias?

THE WITNESS: Will you repeat the question, please?

BY MR. ROISMAN:

Q The question was: Do you use the alternatives as they appear in the application for doing your ALARA consideration?

A Yes, sir. I have no basis for questioning it.

Q Well, do you go to anyone else on the Staff with expertise and ask them, "Hey, is this a reasonable group?"

A When it comes to me, the Staff has already had its input.

Q Who is that? Who did that on the Oconee?

A In this case Mr. Spitalny.

Q So it's Mr. Spitalny who defines for you the scope of the reasonable alternatives to look at, and you just looked at those?

A Yes, sir.

Q But do you agree that to do an ALARA calculation

WRB/eb8

properly you do have to have the reasonable alternatives in front of you to compare and that if one of the key reasonable alternatives wasn't there, the ALARA calculation wouldn't have been done properly in your judgment?

A I would have to understand what "reasonable" means. I have no basis to make that --

Q All right.

You have assumed that the five options listed in Staff Exhibit Number 11-A and the chart projected, "Occupational Doses Based on Duke Power Estimates," are the reasonable alternatives. Is that correct?

A Yes, sir.

Q Let's assume that alternative number 2 weren't there. Would you have been able to do an accurate, reliable, in your judgment, ALARA calculation with alternative 2 taken out?

A I would not have realized it was missing.

Q But now if you knew about it would you say -- and someone said to you, "You know, that was one of the reasonable ones," would you have to say "Gee, our ALARA calculation is not complete because we've got to study this other one"?

A If an alternative in that context was presented then we would consider that as well, yes, sir.

Q If you didn't consider it, would the ALARA calculations not be complete in your judgment?

WRB/eb9

A They would be complete in the content in which they were received. They would not be complete in some hypothetical futur context.

Q Doctor, do you make a judgment in doing your work as to whether you are doing it properly?

A Yes, sir.

Q Does it properly depend upon in doing an ALARA calculation whether you have in front of you your concept of what are a reasonable range of alternatives?

A Yes.

Q If you found out subsequently that you didn't have a reasonable range of alternatives, would that then mean that the ALARA consideration that you had conducted would not have been proper in your judgment?

A It would have been proper, based on what was available to me.

Q What does that mean?

A I can't review something I do not receive.

Q No, but you can refuse to review it until you receive everything you need, can't you?

A I have no basis to decide I do not have everything I need.

Q What if you go into a meeting and you hear Mr. Spitalny say to you "I've got five reasonably available alternatives, I want you to look at four of them"?

WRB/ab1.c

A I would want to know why I would not look at the fifth.

Q Why would you want to know that? You just told me you don't have any expertise to judge what's included or not included. He just told you he's only going to let you look at four. Would you feel that-- And what if his explanation to you were that the hearing is next week and I don't have time for you to mess around with this fifth one?

A I would inquire as to the reason and I would wonder why, if it was reasonable, it should not be considered.

Q In your judgment if it weren't considered and it was reasonable would you have done a proper ALARA analysis?

A No.

MR. ROISMAN: No further questions at this time, Mr. Chairman.

CHAIRMAN MILLER: This would be a convenient time for us to take our lunch break, and we'll resume at 1:30, please.

(Whereupon, at 12:05 p.m., the hearing in the above-entitled matter was recessed to reconvene at 1:30 p.m. the same day.)

AFTERNOON SESSION

1:30 p.m.

CHAIRMAN MILLER: Are we ready to proceed?

Whereupon,

JOHN V. NEHEMIAS

resumed the stand as a witness on behalf of the NRC Regulatory Staff and, having been previously duly sworn, was examined and testified further as follows:

Mr. McGarry, you may proceed.

MR. MC GARRY: Applicant has no questions, Mr. Chairman.

CHAIRMAN MILLER: Oh, I thought you wanted to examine.

MR. MC GARRY: No, I just wanted to get my point on the record.

CHAIRMAN MILLER: All right.

MR. KETCHEN: Mr. Chairman, I take it you're not waiting for Mr. Roisman or Mr. Riley?

CHAIRMAN MILLER: Well, he announced he was through before the lunch recess.

MR. KETCHEN: That's correct, but he's not here at this moment.

CHAIRMAN MILLER: Well, that's true, but we are.

MR. KETCHEN: Okay.

CHAIRMAN MILLER: I imagine he'll be along soon.

MR. WILSON: Mr. Chairman, I would note we have no questions, either, but just by way of, I guess, further clarification for the Board, Mr. Riley did note that by the clock on the club house wall here we were two minutes ahead of what they usually run by here in Charlotte, and I believe he was about two minutes behind when we first started today. And I would expect him to come in about two minutes behind now, if that pattern holds true.

CHAIRMAN MILLER: All right.

MR. KZ'TCHEN: We're waiting a couple of minutes, then?

CHAIRMAN MILLER: Two minutes.

(Pause.)

CHAIRMAN MILLER: All right. Mr. McGarry, are you ready to proceed?

(Mr. Riley and Mr. Roisman entering the hearing room.)

MR. MC GARRY: Applicant has no questions.

CHAIRMAN MILLER: Mr. Wilson?

MR. WILSON: The State has no questions, Mr. Chairman.

CHAIRMAN MILLER: Mr. Riley, what do you say?

MR. RILEY: I have some questions.

CHAIRMAN MILLER: All right. Proceed.

BY MR. RILEY:

Q Dr. Nehemias, it's pretty much the state of the art in most of the sciences where numerical measurements can be obtained to deal with them in terms of a rather well developed probability theory.

Are you familiar with probability theory and expressions that it uses?

A I have studied probability theory in college. I have never used them in this context.

Q In terms of relating, then, the measurements that are obtained with respect to possible dosage, you do not deal in terms, then, of such as the standard deviation, the variance, the coefficient of variation, the confidence limit?

A On the basis of the number of data available to data, I wouldn't expect the result to be significant, sir.

Q In the universe of three, it wouldn't be. But you do have a larger universe to which you referred in some of your other testimony based on comparable measurements in other aspects of the nuclear industry. Would that not be quantifiable?

A My inclination is to say that the data base is not sufficient now to be worth the analysis.

Q Aren't there even any insights that you might get from the probability theory which would be helpful in interpreting the data, where you say I think the range is on

the order of 2, or between 2 and 3? Could you assign any probability to the likelihood of that range being the case?

A Well, as I say, my training in statistics is decades old. I can't give you a competent mathematical response. The number of cases is of the order of a dozen.

Q On page 1 of Exhibit 20, your testimony, you discuss the anticipated doses to people working on reracking the Oconee spent fuel pool.

Does the NRC define or require the placement of the badge, the radiation detection badge, on an individual?

A Yes. It's normally placed, unless there's a specific reason to believe that the radiation will be to the back, it's normally placed on the front of the chest, sir.

Q Will the people involved in reracking be working with any heavy mechanical equipment and any heavy tools?

A I've never watched the process, but they obviously have some tools to use, yes, sir.

Q Will these tools have a shielding coefficient that is different from that of water?

A Yes, sir.

Q Would that have a bearing, then, on the badge reading in the event the tool were interposed between the wearer and the radiation source?

A The kind of tools that I'm envisaging are like hammers and wrenches, which wouldn't shield much of the volume

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wal 5

represented by the radiation source.

Q On page 2, in the middle paragraph, reading the first sentence in the second paragraph:

"The projection of occupational doses in advance of a planned operation is a matter of informed guesswork."

And I think your previous testimony has made clear why you've so stated.

Would you say that the doses to the public in the transport of spent fuel from Oconee to McGuire is also a matter of informed guesswork?

A Yes, sir.

MR. KETCHEN: Objection.

CHAIRMAN MILLER: Objection overruled.

BY MR. RILEY:

Q Have you any basis for saying whether the factor -- because at the end of that paragraph you refer to using vacuuming the pool as an example, that it's not possible to predict the effect of an action within a factor of 2 or more, would you be able to assign an uncertainty factor in regard to the dosage estimates from routine transport?

A No, sir. There are assumptions about where people will be placed and how long they'll be in those places. These are unknowables.

Q And again we're in the informed guesswork category?

A Yes, sir. I'm not prepared to put a number on the upper bound of the estimate.

Q Right.

On page 3, the third paragraph down, I'd like to read a bit of it:

"In the case of applying the ALARA concept to occupational radiation exposure, the situation is quite different. In the first place, there are not single, simple processes which will work in all instances in a predictable manner, such as filtration or ion exchange can, in reducing effluent concentrations."

Would you please explain your reasons for this distinction?

A There's been many decades of experience with ion exchange systems. One can buy off the shelf an ion exchange system with a predictable decontamination factor. You know how much it will cost, you know how much reduction you will make in the concentrations for radioactive materials in the water. You can figure the dollars and you can figure the dose quite explicitly.

The contrast is with the benefit in reduction of dose, say, for vacuuming the bottom of the pool. You know that you're removing radioactive material. You know that the dose rate will be reduced. But how much it will be reduced depends on unknowables.

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Q All right. That, to me, is a helpful clarification.

If I understand you correctly, then, you're saying that you know that the dosage rate at the top of the pool surface will not exceed 2-1/2 millirem per hour if ion exchange resin is properly used for circulating the pool water, that that's quite well established?

A That's one of the requirements for routine operation.

Q Right. But you really don't have as much basis for knowing what will happen when you're trying to absorb materials off the walls of the fuel pool?

A Exactly.

Q If you will please refer to page 4, this is simply confirming what you have in the testimony.

We have seen in the prior examination the reasons for your stating that -- quoting the last paragraph --

"As a result, the ALARA process, as applied to occupation situations is principally qualitative in nature,..."

and I take it that you mean we can see a reduction in dose-- dosage. We don't expect an increase, but just how much it will be -- and I think by your use of as little as 10 percent or as much as 90 percent, you're uncertain?

A Yes, sir.

Q Now, moving on to the area of Question 3, in

trying to deal with significances of differences, you've said before that a difference between 0 and 50 man rem exposure would be significant, because the ratio would be infinite. On the other hand, a difference between 100 and 50 would be pretty much the limit of what you would think to be actuality versus prediction of a factor of 2.

If a person receives -- now we're going into individual person doses -- a dose of 175 rem, what would the possible consequences of that exposure be?

MR. KETCHEN: Objection.

CHAIRMAN MILLER: What grounds?

MR. KETCHEN: Well, this witness has testified before that he was here to evaluate ALARA from a dose standpoint.

The basic objection is it's beyond the scope of his testimony. He's never been offered as one who is testifying on the consequences or health effects of whatever doses are presented.

I think that's getting over into that area.

MR. RILEY: The question goes to methodology, and whether we talk about increments of dosage or ratios of dosage.

MR. KETCHEN: An additional ground is I don't understand what the word "consequences" means. If we could maybe have a definition of that, it would clear it up.

CHAIRMAN MILLER: All right, can we have a definition of the sense in which the term "consequences" is used in this interrogation?

MR. RILEY: Yes. It would be the general area --

CHAIRMAN MILLER: Ask the witness.

BY MR. RILEY:

Q It would be the general area, Dr. Mehemias, of morbidity and mortality.

MR. KETCHEN: Based on that definition, the objection stands as to its being beyond the scope of his direct testimony.

CHAIRMAN MILLER: Did you answer the question?

THE WITNESS: No, sir, I'm not competent to answer that question.

CHAIRMAN MILLER: He pleads incompetance. Do you want to accept the plea?

MR. RILEY: I have difficulty with that, Mr. Chairman. I mean the witness is presented as an expert in dosage. We wouldn't be talking about dosage if it didn't have biological consequences, and it seems a rather amazing dichotomy to cut off at exactly the point where consequences set in. The public is only interested in consequences.

MR. KETCHEN: That may be true, Mr. Chairman, but this witness is offered to evaluate the relative doses of an ALARA proposal.

MR. MC GARRY: Mr. Chairman, if I might jump in --

CHAIRMAN MILLER: Go ahead.

MR. MC GARRY: It's my understanding that Dr. Parsont is the witness for the Staff who discusses the biological effects of doses, and that Dr. Nehamias is the individual who calculates the doses.

So if there are questions in that regard, they are more appropriately addressed to Dr. Parsont.

CHAIRMAN MILLER: It might be more appropriate, but what we're concerned with is the proper scope or area of cross-examination. We wouldn't want to cut it off, if there were an artificial distinction made whereby you had a categorization of witnesses, where you're having multiple witnesses. But at the moment we're not certain whether this is impairing or impinging a fair scope of cross-examination of a witness whose chief competence is not in this field, and another's whose is.

But it's a gray area of which the Board is not certain, and we'd like to have more information.

MR. KEYCHEN: I think he's answered the question. The answer was he can't answer the question. Mr. Riley may have trouble with that answer, but that's an answer, it seems to me, that sort of cuts it off. You can't get blood out of a turnip, it seems to me.

CHAIRMAN MILLER: All right.

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Well, the pending question has been answered. That is beyond his competence.

Now what's your next question?

MR. RILEY: Well, I would like to challenge his answer.

CHAIRMAN MILLER: What's your next question?

BY MR. RILEY:

Q And that is, Dr. Nehemias, how could you be an employee of the NRC, a health physicist, and not know such matters as the dose level related to radiation sickness and 50 percent mortality level because the place where I was clearly headed was this --

CHAIRMAN MILLER: Well, now wait a minute. You're getting multiple questions, arguments, conclusions, and all manner of things. Now back up. You're asking questions, one at a time, and you have to put on your lawyer's cap, Mr. Riley.

MR. RILEY: I have to try to find one.

CHAIRMAN MILLER: All right, ask the questions, one at a time, and let us classify them and see what the witness can testify here.

BY MR. RILEY:

Q Dr. Nehemias, are you familiar with general statements about the relation between dosage and probable morbidity/mortality consequences? I --

WEL/ab2

CHAIRMAN MILLER: No, don't explain now. Let the witness answer.

THE WITNESS: As a health physicist, I am reasonably aware of what's in the literature and what's in the public discussion. Under no circumstances could I be considered an expert.

BY MR. RILEY:

Q Do you know what a 50 percent mortality dose is taken to be?

A About 500 rems I believe.

Q And 250 would obviously be half of that.

CHAIRMAN MILLER: Your arithmetic is impeccable.

THE WITNESS: Well, that doesn't necessarily mean that the percentage of fatality would be half.

MR. RILEY: I wasn't so arguing, Dr. Nehemias.

CHAIRMAN MILLER: No, don't argue. Just ask your next question.

MR. RILEY: Thank you.

BY MR. RILEY:

Q The difference there is a factor of two.

MR. KETCHEN: Objection. Objection. I don't understand that question.

CHAIRMAN MILLER: Let's see if the witness does.

Do you agree with that, Dr. Nehemias, or not?

THE WITNESS: That the difference is a factor of

WEL/mb3

two? Yes.

CHAIRMAN MILLER: All right.

Go ahead. Next question.

BY MR. RILEY:

Q All other things equal, using an appropriately large statistical sample, would you expect there to be a difference in the significance of a 500 rem dose and a 250 rem dose?

A Yes, sir, at that level of dose I would.

Q Would that relate then to the incremental amount of the dose, namely 250 rem?

A The magnitude of the dose relative to expected observable effects is large enough to expect a significant probability of an observable effect.

Q All right.

Now we're discussing here dose levels of the order of 50, 100, 150 man-rem. Is that correct?

A Yes, sir, that's total over the whole working population.

Q Do you make any distinction between the integrated consequences of, say, 150 man-rem distributed over an undefined number of workers, which is the present case, and applied to one individual?

MR. KETCHEN: Same objection.

CHAIRMAN MILLER: Do you understand the question,

WEL/gb4

Dr. Nehemias?

THE WITNESS: I'm sorry, could you repeat the question?

CHAIRMAN MILLER: Let's have that either rephrased or made a little more clear, if you please, Mr. Riley.

BY MR. RILEY:

Q Would you anticipate a difference in significance between 150 man-rem dosage applied to an indefined number of workers as in this context and applied to one individual?

A Yes.

Q Would you please elaborate?

A The people who support the linear no-threshold hypothesis specifically limit the argument to doses of the order of occupational levels or less. They do not recommend applying linearity to very large doses to individuals.

Q What would the smallest "very large" dose be?

A As I meant to testify, the people like ICRP who recommend the linear no-threshold projection basis talk about doses within the regulatory limits of 5 rems per year on the average or less. They do not recommend it for higher levels.

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Q In the present context for the doses that you have referred to in, I believe it's your Exhibit 11A, how many individuals were involved in, say, 30 man-rem doses, 76 man-rem doses, et cetera?

A I don't remember specifically.

Q Is it correct, then, that you would not be able to arrive at a distinction between an excessively large individual dose and an acceptably large individual dose?

A No doses in excess of our limits are acceptable.

Q You referred to five man-rem. Are there not dosages levels higher than five man-rem per year permitted in the industry?

A To an individual?

Q To an individual.

A Yes, sir.

Q Would you please describe fully what those higher dosage levels are?

A We do not have an annual limit. We have a quarterly limit of 1.25 rems in the quarter.

Under certain circumstances, specifically if you know the person's dose history and that dose history permits going higher into an equation of 5 x N - 18 where N is the number of years since the age 18, then a person can get up to three rems in a quarter or, technically, 12 in a year.

Q Do you see any carryover between what we've just

wel/wgb2

said about the significance of incremental doses in the higher range and incremental doses in the lower occupational range?

A No, sir. Just as I've said before, the people who recommend the use of linear hypothesis for projecting dose effects do not apply that process to doses significantly higher than the occupational limits, they recommend against it.

Q What is your own personal judgment or position with respect to the linear hypothesis?

A I think it's conservative to the extent that there are many data showing recovery of tissue from radiation damage and the assumption of the linear no threshold effects is that there's no recovery.

Q Somewhere there is then a gray area, would you agree, between occupational and permissible doses and doses that you would consider to have more significant health consequences?

A I think it's reasonable to presume that the risk of getting a dose, whether it be below or above a radiation limit, increases with increase in dose. Whether it increased linearly or not is the question I understood you to be asking.

Q Well I wasn't addressing the matter of linearity. I was addressing the matter of the significance of an increment.

MR. KETCHEN: Objection, Mr. Chairman, that's

wel/agb3

argumentative. I think we should just get the questions.

CHAIRMAN MILLER: Well he's trying to explain, he hasn't finished it.

First let's hear the completion of your question.

MR. RILEY: In past hearings, Staff counsel has --

CHAIRMAN MILLER: Now I believe you are getting into other matters now, I'll sustain the objection. Rephrase your question.

MR. RILEY: I'm seeking some guidance here, Mr. Chairman. That is, in the past, I have had objections posed for my procedure for not giving a sufficient basis for asking a question. I'm trying here to provide some basis for the question.

CHAIRMAN MILLER: Well why don't you just try asking the questions. We won't worry about other proceedings or other Staff counsel or whatever, but just go ahead and ask your question, we'll go from there.

MR. RILEY: All right.

CHAIRMAN MILLER: So far you've been making yourself understood by the witness and he's given you rather direct answers and I don't think you've had that problem but go ahead and we'll see how far you can take it.

BY MR. RILEY:

Q We have brought out at this point, will you agree, that in the high range level the incremental dosage is

wel/agb4

significant, but your position is that in the occupational dosage range ratio instead of increment is significant, is that correct?

A If I understand the question, I don't believe you quoted me correctly. An incremental dose of 250 rems to one person is certainly significant. An incremental dose of five rems is a great deal less significant.

Q Well is it your testimony that an increment of 50 man-rem, between zero and 50 man-rem is significant whereas an increment between 50 man-rem and 100 man-rem is not?

A I was defining significance in the terms of ratios. Zero, of course, made the question hard to deal with.

Q Do you perceive this as a fault of the definition of proceeding by ratios rather than increments?

A If I see a scatter of data about a number by a factor of two, data with the uncertainties inherent in these data, I don't belies the differences are significant.

Q Well that wasn't quite the question I asked. If you really have some firm numbers now and you don't have a lot of variance associated with them -- this is a hypothetical -- would you consider that a dosage of 50 man-rem per year in relationship to zero was significant whereas the incremental increase from 50 man-rem to 100 man-rem was not?

A I can only say again that I was thinking in terms

wel/agb5

of ratios, I couldn't handle the zero in that content.

Q Well let's try to handle it in terms of incrament, incremental dose.

A Incrementally, they're both the same, 50 man-rems difference.

Q There was discussion a little earlier about the state of the surface of the fuel pin and the fact that it picks up reactor crud. Do you know the chemical composition of that crud?

A No, sir. I know that the deposits vary significantly among different situations.

Q Is it your testimony that that reactor crud is dislodgeable when the fuel assembly is moved?

A No, sir. That's an assumption based on the fact that during movement those rates go up in the water. That's one way of explaining that phenomenon.

Q You have alternative ways of explaining it that you think are equally satisfactory?

A That seems to be the most likely explanation.

Q That postulate is the one that you would go with then?

A Yes, sir.

Q What is the mechanism by which that crud then is dislodged from the surface of the fuel pin and enters the pool?

wel/agb6

A I'm not a chemist, sir, it's just a hypothesis.

Q Well in answering questions earlier, it was your testimony that when the fuel was placed -- spent fuel was placed in the cask, there would be no dislodgement in the transport process, is that correct?

A My concept was that the assembly would be resting firmly on the bottom of the cask space and wouldn't be moving around relative to the space it was in.

Q Do you know whether fuel pins are mechanically scraped in the manner of lifting the assembly out of its position in the fuel pool and replacing it in another?

A No, sir.

Q Would you contemplate the possibility that a more rapid flow of water, possibly a turbulent flow in the process of moving the assembly might dislodge some crud?

A It seems to me that's possible, yes.

Q Now I'm not trying to be facetious here, I'll assume that sometime or another you've been a passenger in an automobile.

A Yes, sir.

Q And as a physicist you are familiar with the conservation of momentum?

A Yes, sir.

Q And if a car makes a rapid acceleration or deceleration, you found your body experiencing some forces

wel/agb7

that it would not experience in the state of resting or for motion.

A Yes, sir.

Q What would you think the water -- well, one other question -- is any water drained out of the cask before the assembly is ready for shipment?

A I don't know.

MR. RILEY: Mr. Chairman, I think it's part of the record, may I resort to it, that 24 gallons to 25 gallons have been drained from the cask before the assembly is shipped, will everybody stipulate to that?

CHAIRMAN MILLER: Well why don't you ask the witness? It may be that he'll agree with you.

BY MR. RILEY:

Q Let's assume, Dr. Nehemias, that 24 to 25 gallons of water is drained from the cask before it moves, that would create a vapor space, is that correct?

A Yes, sir.

Q And that would make it possible for water to move freely in response to inertial changes, would it not?

A The kind of motion that comes to mind is if you have, let's say, a vertical cylinder, is that --

Q This is a horizontal cylinder on a trailer, Dr. Nehemias.

A So there's a space in there, the water could slosh

wel/agb8

like on a lake. I don't think that's totally free motion. I don't see any basis for circulation.

Q I'm not --

A You said free motion.

Q Well let me rephrase it then.

You see the possibility for relative motion of the coolant water in a cask in regard to the fuel pins which are contained in the cask during transient?

A Yes, I can --

MR. KETCHEN: Objection. You mean fuel assemblies?

MR. RILEY: Fuel pins are in the assembly.

CHAIRMAN MILLER: I believe the witness understood that and you got an answer.

THE WITNESS: I can picture this kind of motion in the water. (Witness making rocking motion with folded arms.)

BY MR. RILEY:

Q Would this motion not be comparable with the swishing motion that would occur when the assembly is lifted up from the fuel pool, moved and reinserted?

A It would be qualitatively the same kind of motion, but I think it would be much less quantitative.

Q You say you would think, is that based on a measurement of accelerations and decelerations encountered in the two processes, including the hypothetical transport

wel/agb9

process?

A No, sir, based on my memory of college physics.

Q Could you elucidate that a little more firmly? I mean, addressing the question of what sort of accelerations, decelerations are involved in a very rapid stop of a vehicle?

A No, sir, I could not give you any quantitative response.

Q On page five in your response to the same question, the first paragraph of the page there is a sentence that:

> "What this means in this case is that none of the options discussed, for example, re-racking or building a new spent fuel pool, will significantly reduce doses relative to the trans-shipment option."

In so stating, did you assume that the transshipment would be a routine transshipment in which there were no physical releases of radionuclides from the cask?

A I did not take into account possible leakage from the cask.

Q You did not consider then possible accident conditions?

A No, sir.

Q Going two-thirds of the way down the page, or more nearly half, you testify that the cost of an independent spent fuel pool at Oconee to hold 1500 assemblies would be

wel/agb10

$51,750,000. You obtained this number through Mr. Spitalny?

A Yes, sir.

Q Did you have an awareness that a Stone and Webster proposal for this type of storage came to a different number?

A I have a general awareness. I don't specifically remember the number.

Q Would you accept my number as the costs per position of $34,500 for the example that you used where $51,750,000 is spent?

A I have no basis to criticize that number.

Q Do you recall what the magnitude of per position cost was in the Environmental Impact Appraisal statement?

A No, sir. I have not been party to those calculations.

Q Have you read the Environmental Impact Appraisal?

A Yes, sir.

Q Is your testimony you don't recall the figure there used?

A No, sir.

Q You used the figure $3,691,000 for the trans-shipment of 1500 assemblies. Now the assemblies are moved once, they're going to have to be moved at least a second time toward a permanent repository, the trip may be longer or shorter.

Does the $3,691,000 figure refer to one-way

wel/mgbll

transportation only?

A That's my understanding, yes, sir.

Q That figure works out, if you'll accept my numbers, to $2,460.67 per assembly.

Would you like to calculate it?

A No, sir. I just was not party to these calculations, I got them from another source just to be an illustration.

Q Would you accept my arithmetic?

A I have no basis to criticize it.

Q Are you aware that earlier in this proceeding that higher numbers per individual shipment were mentioned, as much as $3,000 per assembly shipped?

A I'm sorry, I didn't pay a lot of attention to the dollar testimony.

Q You were not aware then that you were using the highest cost for the independent fuel storage option and the lowest costs for transshipment?

A No, sir.

Q You have indicated that estimates of dosage may vary over a full range of as much as a factor of four. Have you familiarity with the range and variance in cost estimates for various parts of the nuclear construction process?

A No, sir.

wel/agb12

Q Would you please turn to your response to question four which is on page six? I'll read the last sentence in your first response paragraph.

"Again there will be no basis for selecting any other alternative compared with transshipment on the basis of health physics considerations alone since none of the others would reduce dose significantly. This conclusion again assumes that there will be no substantial accidental releases."

The only radiation to which the population will be exposed will be gamma and neutron that comes through the cask, is that correct?

A Yes, sir.

Q That is all. Thank you.

CHAIRMAN MILLER: Anyone else wish to examine the witness?

If not, thank you, Dr. Nahemias.

MR. KETCHEN: Mr. Chairman, would you give me a couple of minutes. We may have some redirect.

CHAIRMAN MILLER: All right.

(Pause.)

MR. KETCHEN: I believe I have two questions, Mr. Chairman.

wel/agb13

REDIRECT EXAMINATION

BY MR. KETCHEN:

Q The first question is a clarifying question. You were asked a series of questions, Dr. Nehemias, about comparing 40 man-rems versus 76 man-rems from your testimony. Would you care to comment on your table from Staff Exhibit 11A, I believe.

When you got the sense of those questions, shouldn't the comparison have been between 45 or possibly 46 versus 76, or do you have any problem with usingthe 30 instead of the 45 when comparing it with the 76, or did you mean to compare it to the --

MR. ROISMAN: Mr. Chairman.

CHAIRMAN MILLER: I take it you want to object.

MR. ROISMAN: The testimony just presented by Staff counsel is a little bit leading, Mr. Chairman.

CHAIRMAN MILLER: Well it is a little bit leading. We might take more time to unlead.

Do you understand the thrust of the question?

THE WITNESS: No, sir.

CHAIRMAN MILLER: Sort of?

(Laughter.)

CHAIRMAN MILLER: Well we'll have to sustain the objection. I think it could be put in a different form, though, that you're entitled perhaps to get your specific

wel/ajb15

negative.

BY MR. KETCHEN:

Q Dr. Nehemias, in your cross-examination, you were directed to your table in Exhibit 11A and you were specifically, I assume, to the transshipment to McGuire. Under one-time doses there are a number of doses listed and then added up. You were asked to compare 30 with 76.

Would it be your testimony that the proper comparison would be between 45 and 76?

MR. ROISMAN: Objection.

CHAIRMAN MILLER: Sustained.

Why don't you just let him explain, Mr. Ketchen, we'll permit him to do that.

BY MR. KETCHEN:

Q Would you explain your basis for using -- when you were asked the question, for using 30 rather than 45?

A I'm sorry, I don't recollect using that 30. These are the estimates based on what Duke Power has submitted.

Q In this case, during the cross-examination you were asked a series of questions about your ALARA evaluation. Could you explain your testimony in this case -- is this case any different than any other case you look at for ALARA purposes?

A No, sir. We do ALARA review for all kinds of

wel/agb16

applications, specifically including applications for licenses to operate or permits to construct. The same principle applies to this kind of operation, which would be one small part of the whole.

Q What I'm trying to get at -- and I don't know whether I'm leading or not and I'll ask it anyway: Was there two levels, or is there two levels of ALARA evaluation going on in this case?

A Well the basic review of an application, in this case a specific application to rerack, is to assure that the doses that --

Q Let me cut you, do you mean rerack when you said rerack?

A Well no, thank you. In this case, we're reviewing an application for transshipment, and the main concern of the ALARA review is to assure that whatever dosages result are ALARA, andall ALARA considerationshave to be taken into account.

Q Okay. But then there's another level of ALARA analysis that was done in this case --

MR. ROISMAN: Objection.

CHAIRMAN MILLER: He hasn't finished his question.

MR. ROISMAN: I thought he just made a statement.

CHAIRMAN MILLER: Well, he did.

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BY MR. KETCHEN:

Q Would you describe any other ALARA evaluation that was done in this case?

A Well if it turned out that there were very large differences in the doses that might result among the alternatives large enough from any other differences involved, than any other ALARA comparisons, then those might be --

Q Well you're getting a little ahead of me, Doctor, but that analysis, that was a different level of analysis than the actual proposal itself.

A Yes, sir.

Q Now on the second level of analysis where you did an analysis of alternatives, my understanding from your testimony is that Mr. Spitalny came to you and gave you the information which you analysed, is that basically a paraphrase of what happened in this case?

A In terms of the ALARA considerations for each of the alternatives, yes.

Q So you did no independent search for yourself?

A For other alternatives?

Q Right.

A No, sir.

endwel/5

Q On page 5 of your Exhibit Number 20-- You just testified with respect to the numbers you used in this illustration here that they were supplied by Mr. Spitalny. Your testimony states "according to the Applicant's figures" in the third paragraph there.

Would you explain that difference in your testimony

A Would you repeat the question, please?

Q In response to Mr. Riley's questions a moment ago you were asked where you got the dollar figures. It's my understanding that you testified Mr. Spitalny supplied them to you.

Your paragraph starts out "According to the Applicant's figures." Would you explain that apparent discrepancy?

A As I recall the conversation, it was a telephone conversation. As I recall, Mr. Spitalny said they were the Applicant's figures, or at least were based on the Applicant's figures.

MR. KETCHEN: No further questions, Mr. Chairman.

CHAIRMAN MILLER: Thank you.

Anything further?

MR. ROISMAN: Nothing.

CHAIRMAN MILLER: Thank you, Dr. Nehemias. You may step down.

(Witness excused.)

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CHAIRMAN MILLER: The next witness.

MR. ROISMAN: Mr. Chairman, I wonder if I might just raise two matters that may relate to future testimony or the possibility of future testimony.

CHAIRMAN MILLER: Yes.

MR. ROISMAN: According to something as unreliable as a trade publication it's my understanding that the scheduled completion dates for the McGuire units and other units in the Duke system that are under construction have -- the schedule has slipped. I believe earlier in the hearing we had testimony as to what the schedules were. If I'm correct that there's been a change in that, would it be possible for the Board to request the Applicant to simply provide us with dates if there is a change so we'll have them correct?

CHAIRMAN MILLER: I think so.

You have no objection, do you, Mr. McGarry?

MR. MC GARRY: No objection. In fact we were going to provide that.

CHAIRMAN MILLER: All right. The information will be supplied.

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MR. ROISMAN: That might be helpful if that were done earlier rather than later so that in cross-examination of the Staff panel, if we get into the questions of when McGuire might or might not be available, then....

CHAIRMAN MILLER: Let me inquire, Mr. McGarry, when it can be conveniently provided?

MR. MC GARRY: In about thirty seconds.

CHAIRMAN MILLER: Well that's a quick solution to the problem.

MR. KETCHEN: I might point out also that when Mr. Spitalny gets back up with the witness panel that he'll be making changes to his testimony to reflect that information as well.

CHAIRMAN MILLER: Very well. We're going to be updated, then, on any developments since our last hearing, which could include such matters as the Commission's decision relating to the impact of Minnesota versus NRC, for example.

MR. ROISMAN: The other question, Mr. Chairman, had to do with what is the status of the sabotage. You remember we have a contention that is dependent upon the sabotage issue being resolved.

CHAIRMAN MILLER: Yes. We were going to ask both you and the Staff to give us an update report on that situation also. And I think there are several other matters that were left hanging.

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MR. ROISMAN: Is there a time we can set aside for those things to happen?

CHAIRMAN MILLER: Are you capable of doing it now?

MR. ROISMAN: I have nothing to update. No one has consulted me about the sabotage issue since the last hearing.

CHAIRMAN MILLER: Then I guess it is unilateral. And we'll turn to the Staff for that.

MR. KETCHEN: We can do that at an appropriate time, Mr. Chairman.

MR. RILEY: Mr. Chairman, it's my understanding that the route question has been materially changed by a Commission action made last Thursday or Friday. And my understanding is -- and certainly Staff can further enlighten us about it. --is that the Applicant has a choice of three transport routes now, none of which is to be publicly defined. That certainly is going to have a bearing on the potential hazard to the population groups. I would like to pursue that.

CHAIRMAN MILLER: Yes. I understand that such matters at least were taken up.

How does that fit into your contention, Mr. Riley?

MR. RILEY: Well, we're concerned about dose to population due to an accidental release.

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CHAIRMAN MILLER: Yes.

MR. RILEY: And certainly the route is going to determine what population is there to be exposed.

CHAIRMAN MILLER: In terms of traffic accidents?

MR. RILEY: Exactly.

In other words, if you never go near a major city you certainly have a different situation than if you do.

MR. KETCHEN: I have a suggestion, Mr. Chairman. It sounds like this is getting kind of complicated.

We have a response and we have witnesses here who can address those questions as matters of fact. I would suggest that we proceed in this fashion:

I would like to take Dr. Parsont and complete his correction of the record,, which will be a very short type of thing. And then go back to the panel for cross-examination, the panel that was on the witness stand when we ended last time, complete that, and then after that start in to the loose ends, which I would term the sort of loose ends, the sabotage thing, the status of that. And we have witnesses who can talk about that, and how the updates affect our previous testimony. We can answer the Board questions which are outstanding, some of the questions that I think Dr. Luebke raised.

I would propose that we complete the panel that was on the witness stand, then maybe counsel could get

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together and suggest some order in which we take up these other items that are sort of hanging, and maybe start out with that the first thing in the morning.

CHAIRMAN MILLER: The Board has no objection provided that it not be supposed there can be some impact from the revelations to be made by you subsequently upon the examination of the panel which is to take place prior thereto.

MR. KETCHEN: Well, Mr. Chairman,--

CHAIRMAN MILLER: It's like the chicken and the egg. If you all say the egg comes later, that's fine with the Board.

MR. ROISMAN: I don't agree with Mr. Ketchen's suggestion. (1) his panel won't be finished today; secondly, if I understand what Mr. Riley said, if it is true that the route is really going to be different, while it does not affect directly the cross-examination for that panel, it may affect substantially someprevious direct testimony about accident probabilities. We've been dealing with interstate routes and hazards associated with traveling on those. Now maybe we're talking about substantially more non-interstate routes. We had higher population densities before, now maybe we're going to have lower ones. We had to keep certain distances from the route, now maybe they'll be closer.

It seems to me if there's something about routes

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it ought to be coming in fairly quickly.

CHAIRMAN MILLER: Yes; the Board is inclined to agree with the possibility -- we don't know the facts, Mr. Ketchen, but inasmuch as there have beenchanges, why should we guess or speculate about whether or not they may impact upon the examination of any witness; why don't we have our record updated in terms of the current situation, and then we can all go from there?

It seems to the Board that that would be a more logical way to proceed, and one we would prefer.

MR. ROISMAN: If Mr. Parsont is so quick -- I don't have anything for him -- perhaps we should get him up and out.

CHAIRMAN MILLER: That may be true, getting him up and out.

Really, we're trying to see what will enhance the logic of our proof, rather than getting one witness in or out.

MR. ROISMAN: The panel is going to take a long period of time. If there's something new coming in on sabotage that we need to ruminate about, the earlier we get it the longer we have to think about it and decide what we want to do.

CHAIRMAN MILLER: Mr. McCarry, we haven't given you a chance. Do you want to jump in on this?

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MR. MC GARRY: Not really.

CHAIRMAN MILLER: Okay.

The Board does think we'd better get some updating at least on those matters which could conceivably have some bearing upon either the panel or subsequent witnesses. So let's get the information updated. We know the first one has to do with the question of routes, the sabotage issue, and the like.

Are you ready, Mr. McGarry, with your 30-second schedule?

MR. MC GARRY: I sure am, Mr. Chairman.

McGuire Unit 1, which had been--

MR. ROISMAN: Excuse me. Are we going to stipulate that this is testimony, or are we going to get a witness?

CHAIRMAN MILLER: He's proffering it at your request.

MR. ROISMAN: But I didn't request that he proffer it.

CHAIRMAN MILLER: Who would you like to proffer it?

MR. ROISMAN: I don't know what it is. If it is a simple--

CHAIRMAN MILLER: It's the slippage, I believe.

MR. ROISMAN: If it's very simple I don't have any problem with it. If it is any more complicated-- I don't

WRB/wb7

want to cross-examine Mr. McGarry any more than I want him to cross-examine me.

CHAIRMAN MILLER: The Board may end up cross-examining both of you.

Let's have the information that you have, Mr. McGarry. Then we'll see whether or not it's going to be necessary to have testimony.

MR. MC GARRY: McGuire Unit 1 which had expected to begin commercial operation in early 1980 is now scheduled for fuel loading in May and full power operation by August of 1981.

Initial operation of McGuire Unit 2 has been delayed from 1981 to 1982.

The two units of the Catawba Nuclear Station are now scheduled to begin operation in 1983 and 1985, rather than 1981 and 1983 as previously scheduled.

CHAIRMAN MILLER: Thank you.

Does that answer the question on the factual nature, Mr. Roisman, that you asked?

MR. ROISMAN: If they can give us the months on this it would be helpful. The only one we have a month on is McGuire-1.

Are the months available on McGuire-2 and Catawba?

CHAIRMAN MILLER: Mr. McGarry?

MR. MC GARRY: I think we can get those.

WRB, vb8

I made one mistake. I said that McGuire unit 1 was August of 1981. It's August of '80.

CHAIRMAN MILLER: Now could we get some months, or as close an approximation as possible on the balance of the units?

MR. ROISMAN: He went very fast. I didn't get the dates originally scheduled. If we could get them here.

CHAIRMAN MILLER: We'll try toget the original scheduled dates, and then the amount of slippage which will be reflected by the new projected dates.

MR. MC GARRY: It might speed things along-- I don't have the months, Mr. Chairman. I'll get them.

CHAIRMAN MILLER: All right. We will take the years now and we'll get the months a little later.

Now what next can we do of a factual nature to get the record updated to enable us to proceed with the examination of the witnesses?

MR. KETCHEN: Well I assume we could put on the witnesses that you request about routes and have them indicate how that changes their testimony, if at all.

CHAIRMAN MILLER: All right. It would seem the route testimony would be next. Mr. Riley and Mr. Roisman have asked for it, and Mr. McGarry does not object to it. So it would be logical to proceed with that.

MR. HOEFLING: Mr. Chairman, may I speak to the

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route question?

CHAIRMAN MILLER: Yes.

MR. HOEFLING: What I would like to do:-- I don't have all the Staff witnesses present now that I would like to suggest to the Board eventually take the stand to address the route question. What I would like to do is to just give you the Staff's update, if you will, of where we see the sabotage and route question at this time, and make a proposal to the Board as to what we have in mind in terms of witnesses.

CHAIRMAN MILLER: All right.

MR. HOEFLING: By way of background, where we were at the last hearing, the Commission had put into place a set of regulations dealing with security related to transportation of the spent fuel shipments. At that time the Staff had not yet received detailed information from the applicant and completed its review of the applicant's proposal to see whether those regulations were met.

Since that time, in actuality last Friday, the Staff has completed its review of the applicant's proposal and has made several findings. The regulations call for certain requirements in the area of training, communications and route selection. The Staff has made findings in all of these areas. But I think the germane area for our discussion is route selection.

The situation we had in the last hearing was that

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the applicant had proposed a route which would have required a shipment to pass, in part, through the city of Charlotte. That route was proposed by the applicant again in response to the Staff's request for information relating to these regulations, and that route has been found by the Staff to be unacceptable.

The applicant proposed several additional routes which did not involve shipment through the city of Charlotte. The Staff has reviewed those routes and has found several of those routes to be acceptable.

The specific route -- and by this I mean the roads that these shipments will travel, and what-have-you, are considered by the Staff to be confidential information within the meaning of 10 CFR 2.790(d), I believe, information which is not to be released to the public for security reasons.

The situation is: we have, then, a number of routes that have found to be acceptable. These routes are essentially to be treated as confidential. In terms of handling those in a hearing, if that type of information is to be placed in the record, the Staff would suggest that we consider some form of in camera proceeding and a protective order to keep that information confidential.

The Staff EIA and the analysis that was performed there was based upon the original proposed route which involved

WRB/wb11

shipment, at least partially through Charlotte. Circumstances have changed in that that increment of the route is not now acceptable, but several alternatives are.

In the Staff's view the gentlemen who worked on the EIA and the supplemental testimony that discussed impacts which could be labeled as route-related, should be recalled to the stand and, for the sake of a complete record and to have the most current information, should be interrogated as to the effect that this change in routing would have upon the calculations and conclusions that were reached in the EIA. And the Staff would propose to place those individuals on the stand. We could do this as early as tomorrow morning. One individual is coming in this evening, so the Staff panel would be ready to go tomorrow morning on this question.

As I understand the posture of Mr. Roisman's contention -- and this is a little bit hazy -- he had a concern in the sabotage area related to shipment of the spent fuel material through Charlotte, and as these shipments are now not permitted to go through Charlotte I'm not clear what that does to Mr. Roisman's contention, but I have the impression that he may entertain withdrawing it. But, again, I think we should hear from him on that point.

That's basically where the sabotage and routing situation is right now.

One additional point, Mr. Chairman. The Staff's

WRB/t b12

review of this information will be documented in a supplement which will contain several other items which are presently open and intended to be closed out by the Staff in the near future. So there will be a supplement coming out at some point.

CHAIRMAN MILLER: A supplement to what?

MR. HOEFLING: A supplement to the EIA and the SER.

CHAIRMAN MILLER: Is that to be done during this week of hearing?

MR. HOEFLING: No, Mr. Chairman.

CHAIRMAN MILLER: In other words, you're asking for the hearings to be kept open?

MR. HOEFLING: Well, the record must be kept open in a sense,--

CHAIRMAN MILLER: Is there any alternative?

MR. HOEFLING: When you have an area where there's a contention at issue, certainly the record must be kept open to bring the information in, in the sense that there has to be a record before the Board. If there is no contention in an area, much as in an operating proceeding, when the issues have been treated in a hearing and there are several open items which remain which were not in controversy, then a supplement issues at a later date documenting what the Staff has done. And that would be the close of the record. In other words, there would be no additional hearings. The record

WRB/wb13

would be kept open to receive that document completing the Staff's review. So in that sense the record will be kept open until that supplement is provided.

CHAIRMAN MILLER: Well, provided everybody stipulates. But if everybody doesn't stipulate certainly it would be susceptible to interrogation and probing.

The Staff, you're telling me now, is not capable of completing the evidentiary hearing at this time?

MR. HOEFLING: Well, Mr. Chairman, the point I want to make is that there is a great number of areas which have not been placed in controversy in this proceeding.

CHAIRMAN MILLER: Like what?

MR. HOEFLING: Well,--

CHAIRMAN MILLER: Shipment of spent fuel from Oconee to McGuire will be vulnerable to sabotage and other malevolent acts.... Contention 6. That's prettyclear.

MR. HOEFLING: I'm moving away from that issue now. What I'm suggesting is that there are a number of issues in this proceeding, as in any other proceeding, which are not in controversy and which the Staff treats in an SER which becomes a part of the record and for which there need be no evidentiary hearing.

For example, in this supplement the Staff will address physical security at McGuire. This is not an issue in this proceeding. We will address cask handling at McGuire.

WRB/wb14

This is not an issue in this proceeding.

CHAIRMAN MILLER: Don't you think it could become an issue if you start adding things or changing things in your Environmental Impact Appraisal, where originally you have said you don't have to make an environmental impact statement, or study, and that has been challenged as an issue. That in and of itself has been challenged as an issue. But when you start making changes do you suppose that this doesn't open up the opportunity to people who are intervenors at least to contest the nature and extent and effect of such changes?

MR. HOEFLING: Well I want to make a distinction again. I agree that in the area of the routing where there has been a change, clearly the Staff wishes to put witnesses up on the stand who can speak to the changes that are effected by these routes.

CHAIRMAN MILLER: Well, now, look: we're not talking about the routes. You've covered that. What we're saying is, you tell the Board for the first time you're contemplating a supplement to your Environmental Impact Appraisal, which is the first time that the Board was aware of any such intention on the part of the Staff. Certainly that impinges on some of the matters that were argued this morning where we inquired as to whether or not there was rebuttal testimony, redirect, or what. We indicated we were going to treat all

parties fairly and equally; which is why we suggested the consideration of the Washington appearance. But now you're telling us there is at least a good likelihood that we're going to have the opportunity for further evidentiary hearings because the Staff now is going to bring forth some kind of supplements, the nature and extent of which we don't now know, on a document itself which has been subjected to challenge.

MR. HOEFLING: I think I have not been clear with the Board.

CHAIRMAN MILLER: All right. Proceed.

MR. HOEFLING: The supplement will address both safety and environmental issues that remain open. It will address cask handling, which is a safety issue, which is open. It will address security plans at the McGuire facility which are open, both of which have no effect upon the Environmental Impact Appraisal. These are safety questions which have not been in this hearing and which the Staff has been reviewing for the purposes of issuing this license. And it will also address the Commission's new regulations on sabotage and transport of spent fuel. That is an issue that is in this proceeding, and that is an issue that would affect the Environmental Impact Appraisal, and this is why the Staff proposes to place witnesses on the stand to speak to the effects that implementation of these regulations would have on

WRB/wb16

the appraisal. So that that question can be treated at this hearing this week.

The only remaining question, if it is a question, is the existence of a contention on the part of NRDC, the specific sabotage contention, whether that remains in the case. We would not be prepared to go forward with that this week. We just completed our review last Friday, and that would require additional preparation.

7.150

CHAIRMAN MILLER: Is it the Staffs contention that safety considerations could not have environmental consequences or impacts?

MR. HOEFLING: I'm not saying that they couldn't have environmental impacts or effects, Mr. Chairman; what I am saying is we've got two issues here -- cask handling and security -- which have been in this case from Day-1 which people have had an opportunity to raise contentions on, which people have had an opportunity to relate to environmental effects. It has not been done. These items have remained open by the nature of the review process and now are being closed out. They don't relate to a controversy before the Board and, in the Staff's view, would not necessitate additional evidentiary hearings.

CHAIRMAN MILLER: Well, we'll take these questions up one at a time. When you're talking about whatever changes there are in the Environmental Impact Appraisal we'll see what

WRB/wb17

they consist of and what they do.

What I'm suggesting to you is that the Staff quite clearly has indicated we're not going to close the evidentiary hearing at this session. Well, we'll take things as they come, one at a time. But the more you talk the more you convince us that you can't say some things are closed forever and don't trouble us, and then on others say, Well leave it open and we'll make studies. You've got to get together with yourself.

MR. SOFFLING: I'm suggesting, Mr. Chairman, that this is no different than an operating license proceeding.

CHAIRMAN MILLER: I'm suggesting that this whole proceeding is different from any operating license proceeding we've been in. We've been trying to make that point clear from Day-1 when there were certain questions raised by the Staff to the Board. We've had, if you want to view it that way, a continuing difference of opinion. It is different. Recognize that. And let's go from there. Don't proceed by rote on something that we don't regard as being squarely analogous.

Now let's take up where we are.

At what point is the Staff going to reveal to us the full extent of whatever changes, additions, supplements are proposed, whether here or at a later time, to the Environmental Impact Appraisal? When?

WRB/wb18

MR. HOEFLING: Well, Mr. Chairman, we would propose to place the Environmental Impact Appraisal into the record, as we discussed this morning at the Bench. The Staff is in the process of preparing corrections to that document which would then be placed before the Board. And, in addition to that, we would propose to place on the stand the individuals who are in a position to speak to the impacts that this route selection process would have, or have had on that document.

That would be the extent of ihat we would propose to do with the Environmental Impact SAppraisal. To be followed by a supplement which will pick upon the Part 73 requirements.

CHAIRMAN MILLER: A supplement to what?

MR. HOEFLING: To the Staff documents in the case.

CHAIRMAN MILLER: A supplement to what staff document? A supplement to what? It doesn't just stand there inthe air.

MR. HOEFLING: To the Safety EValuation Report and the Environmental Impact Appraisal.

CHAIRMAN MILLER: You keep telling me what you're going to do, and then you tell me what else you're going to do. And I'm suggesting, let's get it all in one package. Calling it a supplement isn't going to change the nature of what it is you propose to do which affects the Environmental

WRB/mb19

Impact Appraisal as a totality.

We would like to know now, as soon as the Staff could tell us, the full extent of what you are considering. The full extent: not part. Reveal to us the whole package, because we need it now for our future scheduling.

Now when can you be prepared to do it fully? --not partially, but fully.

MR. HOEFLING: Excuse me, Mr. Chairman. I'm not clear on what you mean by "prepared to do it."

DR. LUEBKE: Could I ask: My understanding of this conversation so far is that tomorrow morning you're going to supplement the EIA with witnesses and a written errata?

MR. HOEFLING: That's correct.

Let me back up one step here.

It is the goal of the Staff -- and we think a goal that can be accomplished -- to complete the evidentiary hearings in this proceeding here in Charlotte.

CHAIRMAN MILLER: This week?

MR. HOEFLING: This week.

That goal is based on the theory that in a proceeding you have contentions and parties raise contentions, evidence is presented, and when the parties are satisfied that they have a record on those contentions the evidentiary hearing terminates.

TRB/wb20

The Staff's view is that there are issues related to the routing question that should be addressed at this evidentiary hearing, and that we would propose to put witnesses on the stand to address those issues. We have a contention, or several contentions in this area. That would satisfy the Staff in terms of a record, and the Staff would be prepared to file papers on the issues that have been placed before the Board.

There are other areas of review which are not in controversy. Coming back to the cask handling and the security plan, the requirements of Part 73 that are not related to the environment, the people who operate the trucks, the communications equipment:-- these are not related in the Staff's view to the EIA, they're not in controversy. We don't need an evidentiary hearing to deal with them. And they would be documented in a supplement to the EIA and the SER, much as in an operating license proceeding. And that would present a full record upon which to issue the licenses or make a decision as to whether those licenses should issue.

DR. LUEBKE: That will come in later this week?

MR. HOEFLING: No, that will not be prepared this week.

DR. LUEBKE: Will it come later?

MR. HOEFLING: Yes.

CHAIRMAN MILLER: We'd like to hear from counsel

WRB/wb21

on this.

Who wants to go next?

MR. RILEY: I would be glad to.

CHAIRMAN MILLER: All right.

MR. RILEY: In our contention we indicated that

"There is likely to be an unacceptable incremental burden of radiation dose to persons in the vicinity due to an accident or delay in transit."

As Mr. Hoefling postulates it, cask handling is independent of transit. In my view some cask handling is independent of transit. But I would say that transit could be defined as starting the moment that the assembly leave the Oconee fuel pool on its way to a cask, and finishes when it's reposed in the McGuire fuel pool.

In our view, cask handling is part of the transit process. We have done discovery in the area. We'd like to go forward on it.

CHAIRMAN MILLER: Anyone else?

MR. ROISMAN: Mr. Chairman, I'm not at all clear. I think I started with the premise also, unaware, as you were, of the supplements to the written documents, that we ought to get the sabotage information out get it onto the record so we would be able to analyze it, so we could get it out of the way. And I was prepared to do that. But I certainly am not prepared to sign off on the sabotage issue until I see the

WRB/wb 22

last written document that the Staff wants to put into evidence. And as I understand it, they will prepare some time after this week a supplement to both the Environmental Impact Appraisal and the Safety Evaluation Report which will address the question of sabotage. I will not prejudge whether or not that will make it possible for me to dismiss our contention or leave the contention in. And I'm sure the Board would not expect me to do so.

I also seems to me, in light of that, that we inevitably will have to cross the Rubicon of the sabotage ruling, and so forth, in the context of the supplements, and that it may not make any sense now to start some cross-examination or inquiry into the routing question at this hearing and then have to resume it again after the Staff writes something down which may -- almost certainly will -- be different from what they say orally during the course of the hearing.

I do think we could fruitfully address the question -- for which I don't think I understand the Staff basis for it at all, but the three alternate routes that have been suggested by the Applicant. And Mr. Hoefling was somewhat ambiguous as to whether all three are acceptable or only some of the three are acceptable alternate routes; why those routes are secret.

The original route was not only not secret but

WRB/wb23

was contained in, analyzed in, and thoroughly discussed in the Environmental Impact Appraisal, and I don't understand what has changed that makes the routes themselves secret, subject to the in camera proceedings. And I would like the Staff -- and I would think that this week, at a minimum, we could at least do that -- to lay in the record the basis for their claim that it should be secret, and have the Board try to resolve whether we're going to have to have an in camera session on it or whether that portion of the hearing will be open, as it has been previously open, with regard to the route.

I might point out that I assume that a great part of the route is as it originally was, and that therefore whatever security advantages there are to keeping the route a secret, or only keeping a little piece of it a secret, the piece that will allow you to avoid Charlotte, and not the whole route. . . I think it would be useful to go ahead with that part.

2A fls

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fls. C 11

Third, I just want to be clear that if the Staff produces new information in the form of Supplements to the SER and the EIA we reserve whatever rights we would have had, whether they called the evidentiary hearing closed, open, or sustained or suspended, that we would have had at any other time in the hearing to raise a contention based upon something contained therein.

That is not to say that we have now any reasonable feeling we will have a contention but we don't want to have the Board rule the record closed and force us into a motion to reopen the record which carries a heavier burden than we would have to carry normally if the Staff comes up with something that looks to us like a relevant contention.

I guess the bottom line is I don't see any way to avoid a hearing after the end of this week. I hope we may be able to agree to have that hearing in Washington to accommodate other concerns which we discussed earlier this morning, and I'm prepared to suggest some dates whenever the Board is.

But I've talked a little bit with the Applicant and we'll be glad to do it again in the next recess to see if we can accommodate the Board's desire that we come to agreement rather than present you with yet something else to resolve.

CHAIRMAN MILLER: Mr. McGarry, I think, for

WRB/ab2

varying reasons, if all other Counsel are saying things which look like we're not going to conclude this week, and you've expressed a desire to see if we can close the evidentiary hearing this week, I think that it is only proper that you be permitted to address all of these timing situations.

MR. MC GARRY: It's a tough act to follow, Mr. Chairman, but let me start.

Yes, it is the Applicant's desire to finish the hearing this week. Let's just try to dissect what the Staff has just informed us of.

CHAIRMAN MILLER: Didn't you know about it either?

MR. MC GARRY: Obviously the Applicant was aware of the on-going route information. We're familiar with the various matters that Mr. Hoefling has discussed. I was not aware that it would come out in that form.

But be that as it may, first to talk about the transportation -- I mean the route and the sabotage issue, it seems to me that if the Staff is prepared to put on testimony this week on the sabotage, I would anticipate that that would be indeed the Staff's position and that any further document would simply set forth the Staff's position on sabotage and route in writing.

So that seems to me to be a formality and if that's the case I see that there's no reason why we cannot address the sabotage/route question.

WRB/eb3

I believe-- For the record and the Board's edification, I believe Mr. Roisman is correct. What we're talking about here is avoiding Charlotte. For all intents and purposes, the route that has been provided the Board previously in the EIA for all intents and purposes is the same route except for that bypass, at least in one or two of the alternatives. Three alternatives have been approved.

CHAIRMAN MILLER: Well, do you agree that there is no need for secrecy or confidentiality either in the balance of the route or bringing the materials in or through Charlotte, but that now there is a need for it when you are eliminating passage through Charlotte? If there is some reason, will you enlighten us, please?

MR. MC GARRY: Let me give you the Applicant's position.

We identified a route at the outset of this proceeding back in March of '78, and that route was public knowledge. Since that time, indeed as we were entering the very first phase of the hearings in June of 1979, the Staff promulgated regulations and it's the Staff's position that for sabotage purposes that the route shouldn't be disclosed.

Now the Board will recall prior to these regulations it was the Applicant's position that a sabotage contention was impermissible as an attach on the regulations.

CHAIRMAN MILLER: We recall that.

WRB/eb4

MR. MC GARRY: Now the groundrules have flipflopped on the Applicant in that regard, so we defer to the Staff's position. As we understand it, it's the Staff's requirement for sabotage purposes, not that there's any reason to tell the members of the public but for sabotage purposes.

So we will defer to the Staff in that regard and we will treat the matter as it is to be treated, but we would hope that we could dispose of the sabotage/route question this week, and we see no reason why we cannot.

Now I believe that there are two other items on the table, and that is the cask handling matter and the third is the physical security. I haven't given thought to those two; I was more concerned with the first one.

CHAIRMAN MILLER: We're going to recess pretty soon and you'll have a chance to think about some of these things, some of the implications.

MR. MC GARRY: This might be a good time.

CHAIRMAN MILLER: It probably will, because we'd like to find out the suggestions of Counsel. We would like to accomplish as much as we can, say, between now and let's say Thursday, since we're not going to be able to finish anyhow. But we'd like to accomplish what reasonably can be done.

We therefore encourage Counsel, all Counsel, to get together in a recess to see what we can agree that we can go forward on. And on some areas where some can agree

8.040

WRB/eb5

we undoubtedly cannot, at least let us have the reasons, and the scheduling, the potential scheduling of all witnesses for the balance of the week.

MR. MC GARRY: May I say the Applicant's position in this get-together at the recess would be one of trying to get the testimony before the Board on all the outstanding issues, so perhaps we can resolve the matter this week.

I don't know the status of the physical security but indeed if that is fairly well wrapped up perhaps we can get a witness on that. So that's where I will be coming from.

But if that fails then we'll have to pursue it further.

CHAIRMAN MILLER: All right, Counsel will confer. Let's have full disclosure of all potential issues, witnesses, evidence, changes, modifications, supplements of any kind. At least first of all among yourselves have complete disclosure, and then, say in 10 or 15 minutes, let us know how you're coming along. And then disclose to the Board where we stand and what your recommendations are for the most fruitful kind of evidentiary exercise, say through Thursday.

We'll be in recess.

(Recess.)

8.075

CHAIRMAN MILLER: Are we ready to resume?

MR. MC GARRY: Yes, Mr. Chairman. Perhaps I can make a statement, and perhaps other Counsel also wish to make

WRB/eb 1 a statement, perhaps not.

2 I spoke with the various Counsel in the proceeding
3 and I suggested that if we could take up whatever matters
4 we can from now until five o'clock and perhaps with the
5 Board's permission, adjourn the hearing at five, it will at
6 least afford the Applicant time to think the situation through
7 and then I would submit that if the parties could meet to-
8 morrow morning at the Education Building at eight o'clock
9 and try to work the matter out between eight and eight-thirty
10 so that we can come with a position to the Board at eight-
11 thirty rather than airing our dirty linen before the Board
12 at eight, and then start with the hearing at eight-thirty
13 tomorrow morning --

14 CHAIRMAN MILLER: That makes sense. Does anybody
15 disagree?

16 (No response.)

17 CHAIRMAN MILLER: Very well. We will adjourn
18 today at five and we'll resume tomorrow -- instead of the
19 scheduled time, the Board will resume at eight-thirty to give
20 Counsel the opportunity to convene, meet and make whatever
21 recommendations you are able to make to the Board at eight-
22 thirty.

23 Very well. Who do you wish to start with now by
24 way of a witness or witnesses?

25 MR. KETCHEN: That is a problem, Mr. Chairman.

WRB/eb7

We anticipated that we would continue with our Alternatives panel. We have those people here, save Mr. Carter, which brings us back to the chicken-and-egg problem.

We can go ahead with them, subject to any recall based on what the sabotage panel would say. The sabotage panel will not be available until tomorrow morning because we didn't anticipate that we would have to have him here today so he's coming in this evening and will be here tomorrow morning.

Once again we have Mr. Parsont for a very minor matter so if we could get around the chicken-and-egg problem we have the Alternatives panel here, and that's really all we have. So I don't know whether we can proceed with them or not.

CHAIRMAN MILLER: Well, let's take Dr.Parsont. I understand it's for a limited purpose and he's here.

Dr. Parsont, will you come forward, please?

Whereupon,

MICHAEL PARSONT

resumed the stand on behalf of the NRC Regulatory Staff and, having been previously duly sworn, was examined and testified further as follows:

CHAIRMAN MILLER: Dr. Parsont, you have been sworn before. You remain under oath, sir.

Will you please proceed?

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WRB/eb8

DIRECT EXAMINATION

BY MR. KETCHEN:

Q Dr. Parsont, do you have a copy of a document before you with a cover page entitled "Supplemental Testimony of Michael A. Parsont"?

A Yes.

Q And does that consist of a cover page and one page of question and answers?

A Yes.

MR. KETCHEN: Mr. Chairman, I would like to have this document which I will hand out copies of to the Board and the parties marked for identification as Staff Exhibit Number 21.

CHAIRMAN MILLER: Very well, it will be so marked.

(Whereupon, the document referred to was marked as Staff Exhibit 21 for identification.)

MR. KETCHEN: At the end of the last hearing, we called to the attention of the Board the day after Dr. Parsont testified that during one of the colloquies between the Board and [illegible], Dr. Parsont made an answer which was not recorded, and he so informed me, and the suggestion was made that he prepare a piece of written testimony in order to correct the record in that respect. And that's

WRB/mpl

the purpose of this testimony, to record the answer that he gave that should have been recorded.

It's not that easy sometimes to go back and re-create the situation. That's why we have some preliminary questions that precede the ultimate question that we want to get into the record.

With that explanation, this completes the-- Well, let me ask Dr. Parsont:

BY MR. KETCHEN:

Q Do you adopt this testimony entitled "Supplemental Testimony of Michael A. Parsont" as part of your testimony in this case?

A Yes.

Q Do you have any corrections to that testimony at this time?

A No.

Q Is it true and correct to the best of your knowledge?

A Yes.

MR. KETCHEN: At this time, Mr. Chairman, I would present Dr. Parsont and his direct testimony, Staff Exhibit Number 21 for identification, for cross-examination.

CHAIRMAN MILLER: Very well.

By the way, I believe the previous witness, Dr. Nehemias, Staff Exhibit 20, you offered that I think at

WRB/eb10

the conclusion of the identification of the written testimony, didn't you? But I don't believe you renewed your offer at the conclusion.

MR. KETCHEN: I would like to offer that and have it bound into the record as though read.

CHAIRMAN MILLER: Any objection?

MR. ROISMAN: Other than the objection originally stated, no additional objection.

CHAIRMAN MILLER: Very well. Staff Exhibit 20 then will be admitted, and will be bound in the record.

(Whereupon, Staff 20, having been previously marked for identification, was received in evidence.)

(The document follows:)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DUKE POWER COMPANY	)	Docket No. 70-2623
	)	
(Amendment to Materials License SNM-1773 for Oconee Nuclear Station Spent Fuel Transportation and Storage at McGuire Nuclear Station)	)	

Testimony of John V. Nehemias

Question (1)

In Staff exhibit 11.C you mentioned the value of 20 man-rems in the discussion of the occupational radiation exposure projected to result from re-racking of the Oconee spent fuel pool. In Staff Exhibit 11.A you used the value of 76 man-rems in the same context. During your prior oral testimony you were asked to compare the relative "reliability" or "accuracy" of these two values (on pages 2597-98 and pages 2715-18 of the Transcript). Is there any firm basis for concluding, in advance of the actual re-racking operation, which of these values is likely to be nearer to the total dose that actually results from completion of that operation?

Response

The figure of 20 man-rems appears on page 2 of Staff exhibit 11.C, and in the Table attached thereto, in the "Exposure" column. This value represents, to the best of my knowledge, the highest occupational radiation dose that has resulted from prior actual spent fuel pool re-rackings. It is not, and was not intended to be, a projection of the dose that might result from the Oconee re-racking.

The figure of 76 man-rems appears on page 2 of Staff exhibit 11.A, and in the Table attached thereto, in the "one-time Doses" column. This value represents the applicant's best estimate of projected doses from the Oconee re-racking, using then-current measurements of dose rates and occupancy times. If these measured dose rates were present during the actual operation, the resulting occupational dose would be expected to be approximately 76 man-rems.

However, based on some of the applicant's proposed actions to assure that occupational radiation exposures would be as low as is reasonably achievable (listed on page 2 of Staff exhibit 11.A), for example:

vacuuming the pool floor, we could confidently expect that occupational exposures would be well below 76 man-rems. In this sense, the applicant's value of 76 man-rems, although based on actual measurements at the plant, was intentionally higher than what would be expected, and therefore conservative. As I stated on page 2717 of the Transcript, the figure of 76 man-rems is "...more accurate based on the data in hand but it is indeed conservative because we knew they were going to take further ALARA precautions".

The projection of occupational doses in advance of a planned operation is a matter of informed guesswork. It is typically not possible to determine dose rates and occupancy times within a factor of two or more, prior to the actual start of the operation, if then. Similarly, it is generally not possible to predict the effect of an ALARA action such as vacuuming the pool floor, within a factor of two or more.

Taking the above considerations into account, I would conclude that there is no basis for determining which of these values is likely to be nearer to the total dose that actually results from completion of that operation. The dose that finally results from that re-racking may well lie between the values of 20 and 76 man-rems; but could also lie below 20, as have those experienced so far, or higher than 76, as was projected initially by the applicant.

Question (2)

Is there a qualitative difference between ALARA considerations as applied to occupational radiation exposure versus reactor effluents?

Response

Yes. The initial formal application of the ALARA concept to the regulatory process addressed control of radioactive effluents to the environment. Appendix I of 10 CFR Part 50 provides design objectives and limiting conditions for effluent releases.

The development of these provisions was based upon extensive experience with equipment designed to reduce concentrations of contaminants in effluent air and water. The state of the art is well developed. Proven techniques and equipment are available at the market place, capable of accomplishing a known degree of cleanup at a cost which can reasonably be known in advance. Thus, it is a relatively straight-forward matter to calculate costs of reducing radioactive releases and the resulting public doses that would be saved. A reasonably precise cost-benefit analysis can be obtained.

In the case of applying the ALARA concept to occupational radiation exposure, the situation is quite different. In the first place, there are not single, simple processes which will work in all instances in a predictable manner, such as filtration or ion exchange can, in reducing effluent concentrations.

Typically, there are a number of ALARA actions to be considered in addressing a proposed action, such as a fuel pool reracking; see those listed on page 2 of Staff Exhibit 11A. In general, it is not feasible to estimate precisely what the dose-reducing impact of such actions will be. There is no long history of similar experiences; and there is much less standardization of equipment and techniques.

For example, in the reracking case, the applicant committed to vacuum the fuel pool floor prior to reracking. We could confidently expect that a dose reduction would result, but could not estimate the amount of dose that would be saved. Depending on the physical nature of the contaminants, the vacuuming might reduce the dose from that source (radioactive debris at the bottom of the pool) by, for example, as little as 10%, or by as much as 90%. Clearly, a dose estimate based on uncertainties of this magnitude is not a useful basis for detailed, quantitative cost-benefit analysis prior to an operation. In the actual case, the dose was reduced by 40%.

As a result, the ALARA process, as applied to occupation situations is principally qualitative in nature, and is concerned with assuring that all reasonable actions to reduce radiation doses are considered.

Question (3)

In your prior oral testimony, you testified on a number of occasions (e.g., on page 2536, line 24 and on page 2611, line 13 of the Transcript) that, if projected radiation doses from a number of alternative ways to accomplish an objective did not differ significantly among themselves, the choice among them would be made on the basis of factors other than radiation. Explain how that decision process might work.

Response

In this case, the applicant's projected radiation doses from the various alternatives varied from 30 to 76 man-rems, as listed in the Table attached to Staff Exhibit 11.A, in the "One-time Doses" column. These values are within a factor of 3 of one another, which is not a significant variation, given the inherent uncertainties in making such projections, as discussed in the response to Question (2) above.

If projected radiation doses from a number of options turn out to be in the same general range of values, the decision as to which alternative is to be selected is determined by factors other than radiation dose. What this means in this case is that none of the options discussed (for example, reracking or building a new spent fuel pool) will significantly reduce doses, relative to the transshipment option. Therefore, there is no reason to pursue other factors, such as social or economic considerations, and no reason based on radiation dose considerations, to approve the transshipment application.

To illustrate the point, we will consider a comparison of two of the options, taking into account cost considerations.

According to the applicant's figures, which the staff believe are reasonable, construction of a new spent fuel pool for storage of 1500 assemblies at Oconee would cost $51,750,000. Projected occupational dose resulting from handling 1500 assemblies would be 150 man-rems (30 X 5). For comparison, the transshipment option, for 1500 assemblies would cost $3,691,000. Projected doses resulting from these 1500 transshipments would be (45.6 X 5) or 228 man-rems.

Thus, the new spent fuel pool option would save 78 man-rems (228 minus 150), at an additional cost of $48,059,000 ($51,750,000 minus $3,691,000). This dose saving would thus be accomplished at a cost of about $616,000 ($48,059,000 ÷ 78) per man-rem. A cost per man-rem this large is generally not considered reasonable.

Question (4)

In your prior oral testimony, you testified on a number of occasions (e.g., pages 2550, 2566, 2586, and 2603 of the Transcript) that given a hypothetical situation in which there were about 10 times as many fuel assemblies to be stored or transshipped, and given a comparable degree of attention to ALARA considerations, you would probably have approved the application. Explain the basis for this decision, and how that decision might relate to the review of the license amendment application.

Response

In the stated hypothetical situation, involving transshipment of about 10 times as many fuel assemblies, the relative magnitudes of the projected doses of the various alternative actions would increase proportionately. The projections do not become more accurate; they are still in the same general dose range relative to one another. Again, there would be no basis for selecting any other alternative, compared with transshipment, on the basis of health physics considerations alone, since none of the others would reduce dose significantly.

ALARA review addressed in my testimony relates to a minor action in the history of the plant. The occupational radiation exposure resulting would be a minor contribution to the total exposure caused by the plant. Regulatory Guide 8.8 describes the ALARA process. I have described the staff ALARA review, which determines that doses associated with particular actions will be ALARA.

WRB/ab1

CHAIRMAN MILLER: Now we're addressing Staff Exhibit 21, the testimony you have before you. Are there any questions?

(No response.)

CHAIRMAN MILLER: Dr. Parsont, I think you just disclosed to us the shortest cross-examination in history. Thank you, sir. You're excused.

(Witness excused.)

CHAIRMAN MILLER: Staff Exhibit 21 will be admitted and bound into the record.

(Whereupon, Staff 21, having been previously marked for identification, was received in evidence.)

(The document follows:)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DUKE POWER COMPANY	)	
	)	
(Amendment to Materials License SNM-1173 for Oconee Nuclear Station Spent Fuel Transportation and Storage at McGuire Nuclear Station	)	Docket No. 70-2623

SUPPLEMENTAL TESTIMONY OF

MICHAEL A. PARSONT

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Q. What change do you wish to make in your testimony?

A. I should like to correct the record regarding two statements made by Dr. Leubke my responses to which do not appear in the transcript.

Q. To which of Dr. Leubke's statements do you refer and where are they located in the transcript?

A. Dr. Leubke's comments are located on page 2602 lines 23 and 24 and page 2603 lines 4 and 5.

The statements were "His heart and mind isn't in it. He doesn't believe it.", and "No, but his beliefs are different from what he does.", respectively.

Q. What was the response to Dr. Leubke's statement which does not appear in the transcript?

A. Following the statement, "No, but his beliefs are different from what he does.", I made the statement "not true, not true," which was not recorded.

Q. Would you please clarify why you made this statement?

A. I assume the use of the linear no threshold dose effect hypothesis in my calculations recognizing that there is some question about the actual shape of the dose response curve for low doses. However, it is my belief that the linear hypothesis overestimates the number of health effects in the low dose region, and that its use is prudent for regulatory purposes. Therefore, I should like to assure Dr. Leubke that in using this hypothesis my personal views and my practices do not conflict.

WRB/eb1

MR. KETCHEN: I was going to save this for the end of the day but I would like, just as a very brief matter, to bring it up at this point in time.

When Dr. Parsont completed his testimony, I believe it was on Thursd y, June 28th, and also Dr. Nehemias, either on Thursday, the 28th, or Friday, June 29th, his testimony was moved for admission into the record and accepted into the record as evidence as a Staff exhibit. However, it was not bound into the record.

We would like to ask that the Board direct that the testimony that was admitted be bound into the record.

CHAIRMAN MILLER: Have you furnished the requisite number of copies to the Reporter?

MR. KETCHEN: Yes.

CHAIRMAN MILLER: In that event we will ask that it be bound into the record.

(Whereupon, the testimony of Dr. Parson and Dr. Nehemias submitted in the June hearing follows:)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DUKE POWER COMPANY	)	
	)	
(Amendment to Materials License SNM-1173 for Oconee Nuclear Station Spent Fuel Transportation and Storage at McGuire Nuclear Station	)	Docket No. 70-2623

AFFIDAVIT OF DR. MICHAEL A. PARSONT

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AFFIDAVIT OF DR. MICHAEL A. PARSONT

My name is Michael A. Parsont. I am Chief of the Radiological Health Standards Branch of the NRC Office of Standards Development.

As part of my duties in this position I am responsible for directing an NRC program to evaluate and assess the radiological health impacts to the public from NRC proposed and licensed facilities. A copy of my Professional Qualifications is attached.

My affidavit responds to Petitioner's contention 4 Part b. which refers to residual health risks from the dose resulting from transshipment of spent fuel from the Oconee facility as major costs tipping the balance against the proposal to transship and store Oconee spent nuclear fuel in the McGuire, Unit 1 spent fuel pool.

Contention 4 is as follows:

> The proposed action increases the exposure to radiation of workers and the general public beyond what is ALARA.
> a. ALARA can be achieved by on-site expansion of spent fuel storage capacity at Oconee, including building another spent fuel pool.
> b. The residual health risks which remain even if the present NRC regulations on exposures to workers are met are major costs of the proposed action which tip the balance against the proposed action (Tr.77-85).

In the context of my testimony, Residual Health Risks from exposure to ionizing radiation are genetic risks and may be expressed in subsequent generations as congenital abnormalities, constitutional and degenerative diseases and overall ill-health (other illnesses having

some degree of genetic determination). In addition, the cancer risk from exposure to ionizing radiation is of concern to Petitioner.

My response to this part of Contention 4 is based on the following considerations:

1. Somatic risks (i.e. the risk of cancer) and a significant portion of the genetic risks of health effects from ionizing radiation are directly and linearly proportional to radiation dose and dose rate.

2. There are 2 viable options, both of which will be taken, for Duke Power Company to resolve its immediate shortfall in spent fuel storage capacity--these being the expansion of storage capacity of Oconee Units 1 and 2 Spent fuel pool by re-racking and at other nuclear stations owned by Duke Power.

I have estimated the genetic effects for the range of doses involved in the 2 options for resolving the Oconee spent fuel storage capacity shortage based on the 1972 National Academy of Science Report of the Committee on the Biological Effects of Ionizing Radiation, BEIR.[1] (The recently published update of the BEIR Committee, BEIR-III,[2] presents information on genetic effects which does not significantly differ from the 1972 BEIR Report.) I have estimated risk to cancer from BEIR-III data because it represents more recent considerations of radiation effects.

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1) Advisory Committee on the Biological Effects of Ionizing Radiation. "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," National Academy of Sciences-National Research Council, Washington, D. C. November 1972.

2) Committee on the Biological Effects of Ionizing Radiations. "The Effects on Populations of Exposure to Low Levels of Ionizing Radiations, National Academy of Sciences--National Research Council, Washington, D. C. 1979.

The range of doses used in my calculation of the genetic effects is based on several considerations as follows:

1. The upper end of the range of population dose is based on estimates of the applicant. This was presented as 150 person-rem in Table 10-1 of the Environmental Impact Analysis for expanison of the Oconee spent fuel storage pool capacity by re-racking. This estimate was subsequently reestimated at 125 person-rem.

2. Mr. Glen of Battelle Northwest Laboratories estimates that re-racking could start at about 60 person-rem but would unlikely range upward to 150 person-rem.

3. Dr. Nehemias states that, based on actual experience, re-racking dose would be closer to 20 person-rem.

4. The applicant's reestimated re-racking dose and the population dose from transshipment (120 person-rem) are effectively the same from the standpoint of effects.

Therefore, the range of doses from the 2 options extend from 20-150 person-rem based on whichever information is accepted. In addition, for perspective, these doses are quite small (.004%-.03%) compared to the expected normal operation occupational exposure at Oconee 1, 2 and 3 over the assumed 30 year facility lifetime.

The estimated genetic effects from BEIR[1)] and from the re-racking and transshipment options are presented in Tables I and II, respectively. The range of doses brackets the dose estimates given above.

Although there is general agreement that a significant proportion of somatic and genetic health risks are directly proportional to the magnitude of the radiation dose, there is controversy over the magnitude of the dose-effect response at low-radiation dose and dose rate. This controversy is based on the results of studies of various exposed populations. These studies report that exposure to low-level radiation

may be about an order of magnitude (about 10 times) more effective in producing health effects than the estimates given in the BEIR Report.[1] Applying the factor of 10 to the estimates of genetic effects given in Table II results in a maximum equilibrium estimate of 0.3 effects. In my opinion, because of the small number of genetic effects, even if the BEIR estimates were low, this action does not represent a major genetic health cost.

Although contention 4 does not specifically refer to somatic effects, I have calculated the range of total and fatal cancers which might result from the options considered. I have used the risk estimate presented in BEIR-III which are summarized in Table III. The estimates for the option are given in Table IV. For a single exposure the maximum estimate of total cancers, assuming BEIR-III was low by a factor of 10, would be 0.8, and the estimate for fatal cancers would be 0.2.

Table I. ESTIMATED GENETIC EFFECTS

Disease Classification	Natural Incidence (per 10^6 live births)	Effects per 10^6 live births[a] of 5 rem per generation[b]		Estimated Risk per 10^6 person-rem[c]	
		First Generation	Equilibrium	First Generation	Equilibrium
Dominant diseases	10,000	50 to 500	250 to 2500	6 to 60	30 to 300
Chromosomal and recessive diseases	10,000	relatively slight	very slow increase	relatively slight	very slow increase
Congenital anomalies	15,000				
Anomalies expressed later	10,000	5 to 500	50 to 5000	0.6 to 60	6 to 600
Constitutional and degenerative diseases	15,000				
Human Illness having genetic component			0.25 to 250		0.03 to 30
TOTAL	60,000	60 to 1000	300 to 7750	7 to 120	36 to 930
Risk per 10^6 people	1,200[d]/year				
			Geometric Mean	29	183

(a) From the 1972 BEIR Report[1/] Table 4 p. 57. The Human Illness entries (.005x50 and .05x5000) and new totals are my estimations.

(b) A generation is assumed to be 30 years.

(c) Risk per 10^6 person-rem = (cases/10^6 live births) x (30 years/5 rem) x (4 x 10^6 live births/year per 2 x 10^8 people) = 0.12 x cases/10^6 live births.

(d) Cases/10^6 live births x (4 x 10^6 live births per year/ 2 x 10^8 people).

Table II. GENETIC EFFECTS COMPARISON
FOR TWO OPTIONS

Option [1/]	Dose (Person-rem)	Genetic Effects First Generation	Total Genetic Effects at Equilibrium
1	20-150	0.0006 - .004	0.004 - 0.03
2	120	0.003	0.02

[1/] Option 1 is reracking at Oconee.
Option 2 is transshipment to McGuire.

TABLE III

Comparative Lifetime Cancer Risk Estimates for the General Population from Exposures to Low-Dose, Low-LET Radiation, Single Exposure* and Continuous Exposure**, Both Sexes Combined [a]

Source of Estimates	Single Exposure (per million population exposed per rad)	Continuous exposure (per million population exposed per rad)
BEIR 1979		
Incidence		
Relative Risk	636-1031	592-946
Absolute Risk	268-399 (525)[b]	254-373 (490)[b]
Mortality		
Relative Risk	177-353	150-293
Absolute Risk	70-124 (157)[b]	68-119 (141)[b]
BEIR 1972 Factors**		
Mortality		
Relative Risk	621	568
Absolute Risk	117 (270)[b]	115 (256)[b]
UNSCEAR 1977		
Mortality	100	100

* The BEIR 1979 single-exposure estimate was based on a 10-rad dose and was divided by 10 for comparison with the other values; the estimate for continuous exposure is based on a lifetime exposure of 1 rad/year.

** BEIR 1972 post-natal, age-specific risk factors used with 1969-1971 life-tables, with plateau extending throughout the years of life remaining after irradiation, estimate (b) in the 1972 BEIR Report.

The average age of the 1969-1971 life-tables is older than that of the 1967 U.S. population used in the 1972 BEIR report. For this reason, the numbers obtained here for continuous exposure are larger, on a per rad basis, than those obtainable from Tables 3-3 and 3-4 of the 1972 BEIR report.

[a] Taken from BEIR-III, Table 5, p.342

[b] Geometric Mean (my addition)

Table IV. CANCER CASE COMPARISON FOR TWO OPTIONS
(Single Exposure)

Option 1/	Dose (Person-rem)	Total Incidence	Fatal
1	20 - 150	.01 - .08	.003 - .02
2	120	.06	.0002

1/ Option 1 is reracking at Oconee.
Option 2 is transshipment to McGuire.

I hereby certify that the above statements are true and accurate to the best of my knowledge and belief.

Dr. Michael A. Parsont

Subscribed and sworn to
before me this 11th day of May, 1979.

Notary Public

My Commission Expires: July 1, 1982.

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PROFESSIONAL QUALIFICATIONS

of

Dr. Michael A. Parsont

My name is Michael A. Parsont, I am Chief, of the Radiological Health Standards Branch in the Office of Standards Development of the U.S. Nuclear Regulatory Commission. I have served in this position since November 1978. In this capacity, I supervise and direct the activities of six staff professionals in areas concerning the determination of health risks and effect from exposure to ionizing radiation, radiation epidemiology and regulation of the use of medical devices and pharmaceuticals containing radioactivity. In addition I am responsible for developing radiological health standards and guides and for the evaluation and assessment of the radiobiological health impacts on the public from proposed and licensed facilities. Such efforts include the determination of relationships between low-level radiation exposure and health effects from direct radiation and radioactive materials emitted from planned or existing nuclear facilities and from the medical use of radioactive materials. I am also responsible for directing, coordinating and evaluating technical support research performed by national laboratories and industrial contractors to establish the bases for regulations, standards and guides. I serve as an advisor and coordinator in radiobiology for technical assistance contracts. I represent the NRC at international symposia, and other meetings in areas of radiological impact assessment.

From September 1972 until November 1978 I served as a radiobiologist and an environmental scientist on the staffs of the Office of Standards Development and Nuclear Reactor Regulation, respectively. In these positions I performed evaluations of the health effects of ionizing radiation; prepared the Radiological Assessment and Radiological Monitoring Sections of Environmental Impact Statements; and performed numerous studies related to the impact of NRC proposed and licensed facilities on the environment.

I received a B.S. in Public Health from the University of California at Los Angeles (1955), a M.S. in Radiology from Colorado State University (1962) and a Ph.D. in Radiation Biology from Colorado State University (1967). I completed additional undergraduate studies in genetics and endocrinology at the University of California, Berkeley and graduate studies in Sanitation Engineering and Public Health at the University of California at Berkeley and Los Angeles, respectively.

I have more than 13 years of professional experience in Public Health, Radiation Biology, Environmental Sciences, research evaluation and coordination and standards development. This experience was gained at the Alameda County Health Department, Alameda, California; Sandia Laboratories, Albuquerque, New Mexico (Aerospace Nuclear Safety); NUS Corporation, Rockville, Maryland (Environmental Studies); and the AEC-NRC.

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DUKE POWER COMPANY	)	
	)	
(Amendment to Materials License SNM-1173 for Oconee Nuclear Station Spent Fuel Transportation and Storage at McGuire Nuclear Station)	)	Docket No. 70-2623

AFFIDAVIT OF DR. JOHN V. NEHEMIAS

I, Dr. John V. Nehemias, being duly sworn, do depose and state:

1. I am a Senior Health Physicist in the Division of Site Safety and Environmental Analysis, U.S. Nuclear Regulatory Commission (NRC).

2. I have prepared a statement of professional qualifications which is attached to this affidavit.

3. This affidavit addresses in part, Natural Resources Defence Council Contention 4(a).

Contention 4(a): ALARA can be achieved by on-site expansion of spent fuel pool storage capacity at Oconee, including building another spent fuel pool.

This contention addresses the fact that the proposed transshipment of Oconee spent nuclear fuel to McGuire Nuclear Station for storage will involve some radiation exposure to the public and to workers involved in the transshipment. Intervenor's point is that these radiation exposures could be entirely eliminated by simply expanding the spent fuel storaage cap ity at Oconee, either by re-racking the present spent fuel pool to permit storage of a larger number of fuel elements, or by building another spent fuel pool at Oconee.

We understand that re-racking the present spent fuel pool at Oconee would provide only enough additional fuel storage capacity to accommodate about two years' supply of spent fuel. At or before that time, additional spent fuel storage capacity would be require either by building another spent fuel pool at Oconee, or by transshipping the spent fuel, utilizing available space at McGuire.

(a) Re-racking the present Oconee spent fuel pool

Two prior fuel pool modifications have occurred involving underwater use of divers. Total occupational radiation exposures were 18 man-rems at GINNA and less than 3 man-rems at Zion.

Duke Power has estimated, we believe conservatively, that occupational doses during modification of the spent fuel pool at Oconee would be 76 man-rems. Based on experience with similar modifications at other plants, we would expect that actual doses may be somewhat lower. In addition, subsequent operation of the pool would involve about 18.6 man-rems per year. Estimated doses would be about the same for re-racking the Oconee pool with poison racks.

The Applicant has taken appropriate actions to assure that occupational radiation exposures will be as low as is reasonably achievable, including:

- using the spent fuel pool cooling system filters and demineralizers to clean up pool water at their available capacity;

- transferring identified leaking spent fuel assemblies to the Unit 3 spent fuel pool;

- removing extraneous tools, components, and testing equipment from the pool or providing shielding;

- vacuuming the pool floor and other underwater surfaces likely to be contaminated with radioactive materials before work begins;

. using low exposure areas for waiting and travel paths to the extent feasible.

The Staff concludes that occupational radiation exposures resulting from the proposed spent fuel pool re-racking at Oconee will be ALARA.

(b) Transshipment of Oconee spent fuel to McGuire

The radiation doses to public resulting from the transshipment to McGuire are estimated in the Environmental Impact Appraisal to be 0.1 man-rem. This relatively minor portion of the total dose could be eliminated by construction of a new spent fuel pool at Oconee.

The principal radiation dose resulting from this transshipment, however, would be delivered to workers. Duke Power has estimated that drivers would receive about 16.6 man-rems during 300 shipments. Occupational doses resulting from activities related to transfer of the spent fuel into a shipping cask, movement of the cask from the spent fuel pool to the new location, and transfer from the shipping cask to the new storage facility are estimated to be about 30 man-rems. Except for possible differences in the distances to be shipped, estimated doses would be about the

same for shipment to other undetermined sites. In addition, subsequent operation of the pool would involve about 9.3 man-rems per year.

The applicant has taken appropriate actions to assure that occupational radiation exposures will be as low as is reasonably achievable, including:

. retention at Oconee of any fuel element known to be leaking;

. storage of fuel for a minimum of 270 days at Oconee prior to shipment;

. routine treatment of pool water at Oconee by operation of fuel pool purification equipment, to reduce concentrations of radioactive materials in the water being transshipped.

The Staff concludes that occupational radiation exposures resulting from the proposed transshipment of Oconee spent fuel to McGuire will be ALARA.

(c) Construction of a new spent fuel pool at Oconee

The actual activities involved in construction of a new spent fuel pool at Oconee would not involve any radiation exposure to the public, or to the personnel involved. However, when the new spent fuel pool has been constructed, as in the case of transshipment to McGuire, fuel transfer

would still be required. The spent fuel would have to be transferred, one fuel assembly at a time, from the existing spent fuel pool into a shipping cask, moved in the cask from the spent fuel pool to the new location, and transferred from the shipping cask to the new storage facility. These activities will involve radiation exposures to the personnel taking part in the transfers. Duke Power has estimated the doses resulting from these activities to be about 30 man-rems per year. In addition, subsequent operation of the pool would involve about 9.3 man-rems per year.

The total man-rem doses projected to result from the three actions being considered would be in the same general dose range over a period of years. Therefore, because of the inexact nature of the estimating process, there would be no basis for concluding that any of the three is clearly to be preferred from the point of view of radiation risk, nor that any significant dose saving would be expected to result from the selection of any one of the three. See attached table.

We conclude that the exposures likely to result from the transshipment of Oconee spent fuel to McGuire or from re-racking the pool at Oconee, as described by the applicant, would be ALARA. Each aspect of the proposed actions have been considered from the point of view of keeping radiation exposures ALARA, eliminating unnecessary exposures, and taking all reasonable precautions to reduce exposures. Similarly,

if the applicant proposes in the future to construct a new spent fuel storage facility at Oconee, we will review any such application with regard to ALARA considerations.

While the NRC has not issued specific guidance related to ALARA considerations involved with fuel storage or transfer, we have issued Regulatory Guides 8.8, "Information Relevant to Ensuring That Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As is Reasonably Achievable," and 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable." These guides spell out our ALARA philosophy and describe the ALARA approach to reduction of exposures. These considerations have been applied in our review of the applicant's proposals ragarding spent fuel transfer and storage at Oconee and McGuire.

I hereby certify that the above statements are true and correct to the best of my knowledge and belief.

_____
John V. Nehemias

Subscribed and sworn to
before me this day of
May, 1979.

_____
Notary Public
My commission expires _____.

Projected Doses Based on Duke Power Estimates
(per 300 fuel assemblies)

Alternative	One-Time Doses	Doses Per Year Thereafter
Transshipment to McGuire	30 man-rems (handling fuel) 15.6 man-rems (driving) 45.6	9.3 man-rems/yr (operating pool)
re-racking Oconee pool	76 man-rems (pool work)	18.6 man-rems/yr (operating pool)
re-racking Oconee pool (with poison racks)**	76 man-rems (pool work)	18.6 man-rems/yr (operating pool)
new pool at Oconee	30 man-rems (handling fuel)	9.3 man-rems/yr (operating pool)
new pool at any other site	30 man-rems (handling fuel) 15.6 man-rems (drivers)* 45.6	9.3 man-rems/yr (operating pool)

* would depend upon distance to be travelled.

** would involve extensive time delays.

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John V. Nehemias
PROFESSIONAL QUALIFICATIONS
Radiological Assessment Branch
Division of Site Safety and Environmental Analysis

I am a Senior Health Physicist in the Radiological Assessment Branch, Division of Site Safety and Environmental Analysis, Office of Nuclear Reactor Regulation.

My formal education consists of study in Physics at Rensselaer Polytechnic Institute where I received a B.S. in 1948 and at Columbia University where I received an A.M. in 1949. I received a Ph.D. in Environmental Health (Radiological) from the University of Michigan in 1960.

Before joining AEC/NRC, I served three years at Brookhaven National Laboratory as a health physicist, six years at the University of Michigan as health physicist and assistant director of a radiation effects laboratory, and three years as Director of Radiological Health Surveys for the National Sanitation Foundation. In the latter position, I designed, organized, and directed the environmental survey for the Enrico Fermi nuclear plant.

I joined the AEC in September 1960, as a health physicist in the Office of Health and Safety. My principal duties there related to development of radiation protection standards. With the two exceptions noted below, I have continued with AEC (and NRC) since that time. My principal responsibility was in the development of Standards until September 1974; during most of those years I served as a branch chief-through several name changes and reorganizations-most recently as Chief, Occupational Health Standards Branch, March 1972 to September 1974.

Since September 1974, I have served as Senior health physicist in the Radiological Assessment Branch. My principal function is the review of power reactor applications, both at the construction permit and operating license stage, to determine the adequacy of proposed occupational radiation protection programs and the related efforts proposed to assure that occupational radiation exposures will be maintained as low as is reasonably achievable.

From June 1963 to September 1965, I took a leave of absence from AEC and served as principal member of the Occupational Safety and Health Division of the International Labor Office in Geneva, Switzerland. My work was principally in the development of international standards.

In December 1971, I was transferred to the Criteria and Standards Division, EPA, serving as Chief, Criteria and Standards Branch, until my return to AEC in March 1972.

I have published about 40 technical articles in professional journals and other publications in the general areas of low-level counting, environmental monitoring, radiation effects on biological systems, and control of occupational radiation exposure.

I have been a Certified Health Physicist since 1960, and am a Charter member of the Health Physics Society and of the Baltimore-Washington Chapter.

CHAIRMAN MILLER: Call your next witness.

MR. KETCHEN: At this time I would like to call the panel of witnesses back to the stand that were on the stand on June 29 when we recessed.

CHAIRMAN MILLER: With the exception of?

MR. KETCHEN: With the exception of T. Jerrell Carter.

CHAIRMAN MILLER: Very well. The panel will come forward, please.

Whereupon,

JOHN P. ROBERTS,

DARREL A. NASH,

R. DANIEL GLENN,

and

BRETT S. SPITALNY

resumed the stand on behalf of the Regulatory Staff, and, having been previously duly sworn, testified further as follows;

MR. MC GARRY: While the panel is coming forward perhaps I could just complete the record with respect to the old schedule and the new schedule dates.

CHAIRMAN MILLER: Very well.

MR. MC GARRY: McGuire 1, old schedule, October '79 to load fuel.

CHAIRMAN MILLER: Mr. Roisman, are you getting this down?

wrb/agb2

MR. ROISMAN: I'm sorry, Mr. Chairman.

CHAIRMAN MILLER: Start over.

MR. MC GARRY: McGuire 1, this is the load fuel date, the old schedule October '79, the new schedule, May 1980. The commercial operation date: old schedule, January '80, new schedule, August '80.

McGuire Number 2, load fuel date, old schedule September '80, new schedule, January '82. Commercial operation date: old schedule, March '81, new schedule, April '82.

With respect to Catawba Unit 1, the fuel load date: old schedule, February 1981, new schedule, April 1983. THe commercial operation date: old schedule, July 1981, new schedule, July 1983.

Catawba Unit 2, fuel load date: old schedule, August 1982, new schedule, October 1984. Commercial operation date: old schedule, January 1983, new schedule, January 1985.

CHAIRMAN MILLER: Thank you.

Any questions?

MR. ROISMAN: No questions.

CHAIRMAN MILLER: Thank you.

Gentlemen, you were all sworn before. You have testified in part, you have been cross-examined, your oath remains, you will proceed to answer the questions.

Mr. Roisman, who was cross-examining?

wrb/agh 3

Mr. Blum, I think, had finished and we reverted to you, is that not correct?

MR. ROISMAN: That's correct.

MR. KETCHEN: Mr. Chairman, may I have a point of information for the Board and the parties. With the exception of Mr. Hodge, Mr. Glenn and Mr. Spitalny would be on the panel involved or affected by the route selection question. They could update the EIA in their expertise at least to the extent that there might be questions of them.

What I am saying is if we get to a point where anybody wants to talk about how the route affects their prior testimony, they can answer those questions. The only hole will be any questions that might have to be, -- any gaps that might have to be filled in by Mr. Hodge when he gets here. I just point that out for the information of the parties.

CHAIRMAN MILLER: Very well.

CROSS-EXAMINATION (Resumed)

BY MR. ROISMAN:

Q Messrs. Glenn and Spitalny, we were looking at Staff Exhibit 19B, so let's go back to that if you would, please.

I direct your attention to page nine of that where you were discussing the options available to the Applicant to deal with the spent fuel storage problems other than the

wrb/ajb4

building of an independent spent fuel storage facility.

When did you become aware of the changes in the scheduled date of commercial operation for McGuire Units 1 and 2 and Catawba Unit 1 and 2 which Mr. McGarry just advised us of, when did you first become aware of these, Mr. Spitalny?

A (Witness Spitalny) The approximate data was somewhere around the middle to thelatter part of July.

Q Of?

A Of '79. Just a week or two ago.

Q Mr. Glenn?

A (Witness Glenn) I learned of the changes after returning from vacation, and that was late last week.

Q Since the time that you learned of it, Mr. Glenn, have you done any further analysis of any part of the work that you had previously done on the consideration of alternatives in this case?

A Not specifically. The only thing that I could say. —

MR. ROISMAN: Mr. Chairman, I'm going to want the witnesses to give yes or no's and then I will let them do their explaining.

CHAIRMAN MILLER: Yes, gentlemen, please try to listen to the question and respond to the manner it is asked. Please give your answer yes or no if you can. You'll then be permitted to explain.

rtb/ag63

WITNESS GLENN: No.

BY MR. ROISMAN:

Q Have you done an analysis of your prior testimony to see whether some further analysis might be warranted in li of this new information?

A (Witness Glenn) I've analyzed it to see if there is a need, in my own mind, to see if there's a need, yes. The only thing that I can see --

MR. ROISMAN: Mr. Chairman, please, it's going to make it move more smoothly and hopefully even more rapidly if they will just give me yes' and no's and then if I want more, I'll ask them for more.

CHAIRMAN MILLER: Or if in fairness they are required to give more, we will give them the opportunity.

MR. ROISMAN: What he's doing is proceeding to tell me what he did and I only asked if he had done anything.

CHAIRMAN MILLER: Very well. Respond directly first.

WITNESS GLENN: Except mentally, no, I have not done anything.

BY MR. ROISMAN:

Q And when did you do something mentally?

A (Witness Glenn) Late last week after learning it.

Q How long did you spend on it?

wrb/agb6

A Just a few minutes.

Q Just a few minutes?

A Yes.

Q Mr. Spitalny, since you learned of this new information, have you done any additional analyses of the alternatives with respect to these plants?

A (Witness Spitalny) Yes, I have.

Q Is it a written analysis?

A Yes.

Q Where is that written analysis?

A It's in front of me.

Q Is it typed, handwritten?

A Handwritten.

MR. ROISMAN: When would it be possible for us to get a copy of that, Mr. Ketchen?

MR. KETCHEN: Well I'm not sure I'm required to give a copy.

CHAIRMAN MILLER: You can ask the witness right now to see if the witness has it before him and is using it.

MR. KETCHEN: I assume it's just handwritten notes.

CHAIRMAN MILLER: Whatever it is, interrogating counsel is entitled to see it.

MR. ROISMAN: I asked you when I could get a copy.

wrb/agb7

are you telling me never? I just want to know so I know whether I'm going to see it.

CHAIRMAN MILLER: He's saying you can step up and have a copy right now.

MR. KETCHEN: We're not proposing this as testimony. I assume the witness has --

CHAIRMAN MILLER: If the witness is referring to notes, then counsel--

MR. ROISMAN: I just want to be clear whether they were going to offer us a copy or if I should do it this way.

WITNESS SPITALNY: May I make a comment?

CHAIRMAN MILLER: Yes.

WITNESS SPITALNY: I know for a fact on one of these pages that there happens to be an error which I haven't corrected here. I could do that -- I don't know if I'm going to be held to -- if he's going to criticize what I've done, I'd like to make sure that it reflects the actual facts.

CHAIRMAN MILLER: He's going to examine what you have, but we want to treat you fairly. We want to be sure that you and all witnesses are treated fairly, if there's anything on there that you wish to mark for correction, you may do so now before you turn it over to him.

MR. MC GARRY: Mr. Chairman, I wonder if I might

rcb/acb

8.300

gat a glance at that also.

CHAIRMAN MILLER: Step right up, please.

And I'm sure that Mr. Ketchen will make available some copies when he gets an opportunity.

Isn't that right, Mr. Ketchen? Or is it right? Do you want to caucus on that one?

MR. ROISMAN: I'm not taking the witness stand, but it's three or four pages here, it's small handwriting, I might as well see it right.

CHAIRMAN MILLER: All right.

Any other counsel who wish to examine -- Mr. Ketchen, you might want to make sure they're not messing around with your witness' notes. You're all of you free to gather around to examine.

(Pause.)

MR. ROISMAN: Mr. Chairman, I'm ready to proceed.

CHAIRMAN MILLER: Have other counsel also had a chance to see the notes that Mr. Spitalny referred to?

MR. MC GARRY: Yes, Mr. Chairman.

MR. ROISMAN: The problem I've got is it's a complicated three pages to talk intelligently, and we'd like to sit here with him unless the Board has some problems.

CHAIRMAN MILLER: We have no problems. We'll give you leave to sit beside the witness. We're sure that neither one of you will take advantage of the situation.

wrb/agb9

And if you have only one copy, you may proceed.

BY MR. ROISMAN:

Q Mr. Spitalny, would you briefly describe what it is you've done in these pages that we've looked at, these three pages?

CHAIRMAN MILLER: Let's have them marked as an exhibit for identification at least first. The Board's exhibit, if necessary.

MR. ROISMAN: Does the Staff want to mark it as an exhibit?

MR. KETCHEN: It'll be Staff Exhibit 22 for identification.

CHAIRMAN MILLER: It may be so marked.

(Whereupon, the document previously referred to as Staff Exhibit 22 was marked for identification.)

BY MR. ROISMAN:

Q Mr. Spitalny, can you briefly describe what it is that Staff Exhibit Number 22 purports to be?

A (Witness Spitalny) Yes. It is a small analysis of a discharge schedule for the Oconee-McGuire-Catawba-Cherokee and Perkins facilities.

In this analysis, it takes into consideration both with and without Cherokee Number 3 and the Perkins

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facility in that Duke now has said for planning purposes only they are retaining -- discussing those but they're not committed at this time to construct these, so it covers them both ways.

The analysis was done assuming a design capacity factor of 80 percent. It was also done assuming a capacity factor based on experience that has been seen at Oconee. The bottom line is it comes up with a number of fuel assemblies which are produced through the year 2007, and it also shows what the capacity is for storage through the year 2007.

CHAIRMAN MILLER: Why did you select that date, Mr. Spitalny?

WITNESS SPITALNY: It's the expiration of the operating license for Oconee.

CHAIRMAN MILLER: Thank you.

BY MR. ROISMAN:

Q What assumption have you made about the capacities of the spent fuel pools at each of those plants, have you assumed that they are as they are now or as they will be at some different level?

A (Witness Spitalny) I have assumed what the capacity of the pools could be with poison racks.

Q Why did you do that?

A I used the one alternative that seems to be readily available for increasing spent fuel capacity in addition to

wrb/agb11

the alternative of transshipment.

Q Does the chart you prepared there make any assumption about the use of transshipment?

A Yes, it does. It assumes it is available.

Q Does it assume that it is used? Do you attempt to show precisely when each facility will or will not need to put in poison racks or will or will not need to transship, and if so, where it's going to go?

A This particular analysis does not show that, although I have a mental picture of when they are required. And if I happen to be questioned on it, in a short period of time I may be able to come up with that date. This particular analysis the way it is now does not show that.

Q Why did you prepare this?

.390 A I basically wanted a pictureof where we were, what everthing was showing, basically what the entire record has shown so far as we've discussed alternatives. This is identical to the type of analysis I've done in the past. I've probably done half a dozen if not more of these exact analyses. As the parameters change, i.e., a unit comes online two years later, it changes the numbers that you're working with. So again, as I say, I've done a number of these. This one happens to be the most current that I am familiar with.

Q Does the postponement of the McGuire and Catawba

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units operation dates impact at all on the spent fuel storage problem at Oconee and, if so, how?

A Yes, it does. It alleviates part of the problem.

Q Could you explain that, please?

A Yes, I can.

If McGuire 1 is delayed in operation from its four months, I believe as was shown, McGuire 2 -- if I may, this may be an appropriate time or not.

CHAIRMAN MILLER: Go ahead.

WITNESS SPITALNY: Staff Exhibit 19B, I believe it was -- yes, Staff 19B furnished a table of the units and operation dates and I had wanted to update that to reflect the current numbers that Mr. McGarry has given us.

CHAIRMAN MILLER: Do you have that in written form? Could it be marked for identification?

WITNESS SPITALNY: I have it here. It has scratched figures on it, but it's in front of me.

CHAIRMAN MILLER: Very well. Let's have that marked as an exhibit and you may use it in your testimony if you wish.

MR. ROISMAN: Mr. Chairman, I'm looking at it. It's virtually impossible to read. Mr. McGarry's statement in the record is clear, with all due respect to Mr. Spitalny, I just don't think what he's got there -- why don't you show that to the Board?

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MR. KETCHEN: He has just scribbled -- he just has the dates of his prior testimony.

WITNESS SPITALNY: That's all it is.

MR. ROISMAN: I would rather the witness not daviate to that, I do not consider the chart in that case to be crucial at this point and I would rather stick with Staff Exhibit Number 22, if I could.

CHAIRMAN MILLER: All right.

WITNESS SPITALNY: Let me back up to the question what impact does the delay of these units coming on-line have?

If McGuire is delayed four months --

BY MR. ROISMAN:

Q Excuse me, Mr. Spitalny. Is it eight months from what Mr. McGarry told us? January '80 to August '80?

A (Witness Spitalny) I'll refrain from saying dates because this does not reflect the dates Mr. McGarry gave. Hypothetically, if McGuire is delayed a year or two years, if Catawba is delayed for a year or two years, the total delay of two to four years means that that could be four years of time in which we are not producing spent fuel. If a facility is producing fuel at the rate of 100 assemblies a year, that could conceivably be 400 assemblies that they do not have to deal with.

The fact that the pools are there or could be

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there, even the dates they are delayed to, will not impact the shipping schedule. The pool capacity doesn't change. What that means is you may have a pool capacity of 15,000 assemblies, looking at Duke as a system, and if at one time they are producing -- 15,000 assemblies being produced over a given period of time. The fact that you delay operation of the plants may mean you're only going to produce 14,000, which means you have an excess capacity. It's that type of impact we see by the delay of McGuire and Catawba.

Q So the morethat Duke postpones the operation dates of any of its scheduled nuclear units, the better it is for Oconee's spent fuel storage problem, is that the essence of your testimony?

A That's true to the extent that it doesn't delay the operation of the spent fuel pool.

Q All right. I was going to get to that in a second, but let me ask you one additional question.

These benefits that come from having McGuire and Catawba's dates for commercial operation postponed are benefits that relate exclusively to the option of transshipment, is that correct, they don't affect any of the other options, do they, making them moreor less viable?

A If we are only talking Oconee fuel, these dates only affect Oconee. If we're talking McGuire and Catawba fuel as well, then it could affect them, could affect other

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options.

Q I'm talking only about Oconee. Is it the case that it's the transshipment that you have to assume is going to occur before the postponement of the operation date of McGuire has any beneficial effect on Oconee?

A I believe, if I understand correctly the underlying assumptions that transshipment would have to be available, if McGuire was to be postponed and you were not allowed to transship, obviously there is no gain.

Q Okay.

DR. LUEBKE: Can I interrupt here?

What are the regulations with respect to being able to use the McGuire pool absent the operating condition of McGuire?

WITNESS SPITALNY: Basically it requires an evaluation of the license to determine that indeed the pool is capable of receiving the fuel. What that would allude to would be the same as any other, before a license is issued in any case there would be an ISE inspection to determine the fact that the system required for that particular facility or in this case the spent fuel pool are in operation.

DR. LUEBKE: But there's a stay on the McGuire operating license decision, and the stay might be on the back burner now because of the delay in schedule.

MR. KETCHEN: If I may interject, our position is

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that under a Part 70 license, that that's the underlying rationale for this proceeding, that if McGuire doesn't have an operating license and it meets the criteria for possession at McGuire that it can be stored at McGuire, even though McGuire doesn't have an operating license.

DR. LUEBKE: Upon the Staff making that decision?

MR. KETCHEN: Yes, that it meets the criteria for a Part 70 license.

BY MR. ROISMAN:

Q Let me follow up on that.

Mr. Spitalny, is the Staff now altering the nature of its review with respect to McGuire to focus now on just the question of McGuire being approved as a possession facility with respect to spent fuel?

A (Witness Spitalny) We're not altering the position at all. From receipt the application March 9, 1978, we made the assumption McGuire would not have an OL which was the purpose of handling this under Part 70.

Q You mean that McGuire would not have an OL at the time that you were making a decision as to whether transshipment should be allowed?

A That's correct.

Q So you're not relying upon any findings in the OL proceeding as the basis for a conclusion that McGuire is an

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acceptable place to store Oconee spent fuel?

A No, this is independent.

Q And, in effect, McGuire--the approval of this application for transshipment includes in it a de facto approval of McGuire as an away-from-reactor storage facility for spent fuel? Is that correct?

A Yes.

I would qualify that. When you say spent fuel, obviously this case only for Oconee. Because we issue them a license for spent fuel, we're not issuing them a license to store Carolina Power and Light spent fuel, for example. We're not giving them a generic license to store anybody's fuel, we're giving them a license to store Oconee fuel.

Q But if the fuel that somebody proposed to store at the McGuire site were comparable in design and burnup to the fuel from Oconee, would the Staff's analysis of the proposal to transship from some other utility and some other site differ vis-a-vis the analysis on the McGuire side of the equation? I understand about the transshipment part that you're looking at, but on the McGuire side.

MR. MC GARRY: MR. Chairman, if I may interpose an objection, I believe the record is fairly clear that what is before the Board here is the request to ship 300 spent fuel assemblies from Oconee to be stored at McGuire over and out. And any questions that go beyond that framework we

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would object to, and I believe the question that was asked went beyond that framework, so that's the basis for the objection.

CHAIRMAN MILLER: The objection is noted and it's overruled.

BY MR. ROISMAN:

Q Do you have the question, Mr. Spitalny?

A (Witness Spitalny) I'm not sure.

CHAIRMAN MILLER: Restate it.

BY MR. ROISMAN:

Q What I'm trying to find out is if you had an application in front of you, let's say from Carolina Power and Light, to ship fuel comparable in design and burnup to the fuel that is now being proposed to be shipped to Oconee and they wanted to ship it to store it in the McGuire facility, looking only at the recepient pool, would there really be any additional analysis that you would need to do that you haven't already or won't already have done with respect to the shipment from Oconee to McGuire?

A The analysis at McGuire basically goes to the physical makeup of the spent fuel as identical or very much the same would be very similar to the analysis already done. There may be some other obstacles that would have to be at least evaluated first, circulation-wise.

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Q Like --?

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A Well, maybe it's administrative. I don't know if I mean regulation.

Duke would in turn have to take possession of Carolina Power and Light's fuel -- would take title to it to allow storage of their fuel in McGuire under Price-Anderson. Whether because of regulatory or administrative procedures that would be it.

Q But essentially from an environmental and health and safety standpoint, what we're now looking at here is a satisfactory review vis-a-vis McGuire to receive spent fuel from other utilities with comparable fuel design and burnup? Is that correct?

A Yes, it's a comparable analysis.

Q Let me just try to get it very clear.

For instance spent fuel shipped from the spent fuel pools at Three Mile Island, Unit 1, another Babcock and Wilcox plant, assuming that it is comparable in design and burnup to Oconee, could be stored at the McGuire facility with the safety and environmental considerations as they relate to McGuire having already essentially having been completed by the Staff in this proceeding, and the only issue being the transshipment questions that are involved in moving it from Pennsylvania down to North Carolina. Is that correct?

A I am concerned in responding because it may be a legal area. Safety-wise, so far as the safety review goes

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of storing spent fuel at McGuire, regardless of its source, the safety review we have done would be similar to the safety review or environmental review that would be done for storage of any fuel.

But because of the legal implications --

CHAIRMAN MILLER: We'll take your answer as excluding any legal matter.

BY MR. ROISMAN:

Q I'm talking about you, as you understand the practice to be, not what the law might or might not require.

A (Witness Spitalny) I don't want to give the idea that I'm licensing something for TMI.

Q I understand. Let's go back to Staff Exhibit 22.

The way this exhibit is set up, along the left-hand side you have the dates 1979 and each year through 2007, and in the first column Oconee, and a series of numbers listed under there.

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Will you just describe to me what these numbers represent? The first one in 1979 says 601, and then 1980, '81, '82 and '83, a slightly different column says 177. What you tell me what the numbers are?

A Basically what it is, I took a snapshot of where we are right now today and there 601 spent fuel assemblies stored in the Oconee 1 and 2 and the Oconee 3 pool.

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The numbers which continue on down the line are 177 for each year. That is to represent discharge of one third of the core of three units or a full core every year.

Also I would note that the discharge of 177 assemblies in one given year would require an operation capacity factor of about 80 percent which experience has shown Oconee is not operating at. That is the design capacity factor which is what the number 177 is. The real number is somewhat less than that.

Q Do you know what the real number is? Did you figure that number out?

A Yes.

Q What would that be?

A I have figured it out basically on a total basis through the year 2007. I've said there will be 5600 assemblies discharged at a capacity factor of 80 percent.

At a capacity factor of 68 percent, I believe the numbers work out to be, which is -- even that number is a little bit higher than what experience has shown at Oconee -- the number is 4800 assemblies.

Broken down on an annual basis that number 177 changes to approximately 150 --

Q I was more interested in the bottom number anyway.

A -- in a year.

WRB/eb2

Q Now the columns marked for McGuire, Catawba, Cherokee and Perkins, are those design to similarly provide simply the calculation of how much spent fuel would be discharged each year from the units using the operational dates that are now being used in those facilities?

And I see you've got operational dates for the Perkins units and for the last Cherokee unit in here as well, and that the numbers at the bottoms of the columns then give us the total spent fuel that those combined units would have discharged as of 2007. Is that correct?

A It shows the total number both ways. It shows-- In the year 2007 it shows what the total discharge would be if only Cherokee 1 and 2 were on line.

It also shows what the total discharge would be if Cherokee 1, 2 and 3 and Perkins were on line.

Q Do I understand the parentheses numbers along the total column are the numbers if we assume the Perkins units on the one hand and the Cherokee 2 unit on the other hand are counted in the totals?

A That's correct.

Q Well, then do you have another column down here where you've calculated a lower number of discharges assuming a lower capacity factor?

A That's correct.

Q That's the 68 percent capacity factor. You've

WRB/eb3

assumed that for McGuire, Catawba, Cherokee and Perkins?

A That's correct.

Q Now you've got a number down here, 14,910. Is that total discharge from all now-committed-to units? Is that what that number represents through the year 2007?

A Yes.

Q And 12,780, is that the number adjusted for the capacity factor for all the scheduled units?

A That's correct.

Q And 19,070, is that the number that you've calculated assuming all the units and assuming an 80 percent capacity factor, even the ones not committed to? That would be all of Perkins and the third Cherokee unit?

A Yes.

I would make one other statement here.

I have gone through Duke's management of their operating techniques, that all units are required to go through an in-service inspection which requires the shutdown of that plant for approximately three months for the inspection.

At Oconee by itself, for example, there would be three units and I also-- That in-service inspection is every ten years which means in a ten-year period of time Oconee 1, 2 and 3 are all shut down for a three-month period of time, which means nine months is lost of operating time for each

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in-service inspection at a facility. Oconee would be subject to about three of them.

So theoretically there are 27 months of operating time the units would not be operating. Now I did not go into that much detail to incorporate the lack of that because it's being speculative to include that, and not only-- Obviously there's a lot of unplanned, unscheduled maintenance that also shuts the plants down.

So these are round figures that give you a pretty good judgment. The bottom date that I come up with as to what the capacity is may fluctuate by two years, give or take-- I would say probably it would go a little bit longer than what I've shown. This was assuming they were not shut down.

Q So this tends, particularly when you use the 80 percent capacity factor, to give us a maximum discharge rate, a maximum number of spent fuel assemblies that one would anticipate, assuming no major accidents or untoward events that these plants would discharge in this period of time?

A That's correct.

Q And you would expect that it would actually be less when you adjust capacity factors and take into account in-service inspection that requires a fair amount of outage while they take place?

A That's right.

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Q Now looking at the second page of the document, you've listed, under a column called "Pool Capacities with Poison Racks," and then you've listed the numbers beside the plants.

Now is it correct that you are calculating approximately 2100 spent fuel assembly spaces in the Oconee 1, 2 and 3 combined pools if poison racks were used?

A That's correct.

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Q And on McGuire 1 and 2 you are calculating about 2100 also for the two units if poison racks were used?

A That's correct.

Q Now, looking back at page 1 of Staff Exhibit 22, did you attempt to calculate when the Oconee units would need to utilize the poison racking if they were to avoid any transshipping to McGuire? Did you attempt to make a calculation of that?

A I haven't done it here. I've done it in previous similar analyses.

Q Do you remember offhand when that has to be in place if they did not want to do any transshipping to McGuire?

MR. KETCHEN: Mr. Chairman, I think I'm going to object. That's obviously, I think, been asked and answered. That's what the witness is reflecting in the prior testimony. The record will reflect that.

MR. ROISMAN: It may be. I'm not going to go on the line long, but I'd like to fit it in at this place if he's got it handy. If not, I can look it up in the same time he can, I guess.

CHAIRMAN MILLER: Do you have it - -

WITNESS SPITALNY: I believe the date was June of 1982 they will be at a full core reserve capacity at Oconee.

BY MR. ROISMAN:

Q So that it would have to be by June of 1982 that

poison racks were physically installed, if you were to avoid the transshipment, assuming you wanted to retain a full core reserve?

A That's correct.

Q Now, have you done any analysis of the time that it would take to make the McGuire pools have poison racks, assuming you wanted to have poison racks in the McGuire pools as soon as possible? Have you made a calculation? How many months? If the Applicant tonight at 5:00 o'clock decided they wanted to do that, when would they be able to have poison racks in the McGuire units, assuming your reviews were at the normal rate that they take place, and the construction were based upon typical experience for those sorts of things? Have you done any such calculations?

A I haven't done such calculations for McGuire specifically, exactly the way you stated, outside of, again, bringing up the point I think that we had mentioned, that we said it was about a year to install racks.

Q You're talking now about the physical labor, or about the application, review, approval and physical labor?

A We initially came out with an assessment of about 15 months, which would include everything. My only difference that I would make in this case is if they were to do it right away it would be possible to do it without any fuel in the McGuire pool, and they could possibly save some time.

But I would still anticipate preparation of the documents and so on would take about a year.

Q Now, I remember that during the hearing on the 29th of June we discussed at some length the question of decision dates, and as I remember one of the points that you made at transcript 2763, which I'm now going to show you so you can see that, was essentially that keeping the alternatives open and making your commitment to courses of action at the last possible minute was an advantage in terms of the way one handled spent fuel, so that it would be possible to take advantage of any new breakthroughs that came about, whether it was the building of a government away-from-reactor storage facility, or the pin packing technology being current and available, or any other things that might come along.

And I just want you to look at 2763, beginning at line 8, and see if I correctly characterized what your point was, and then I'll ask you a question about it in the context of our discussion here.

A (Witness reading document.)

Okay.

Q Am I characterizing your position correctly? I realize that one there happens to be talking about pin packing in independent spent fuel storage.

A Yes. My reason for smiling, I guess, is --

Q You didn't remember you said it so well?

A I'm not -- no, no. Well, yeah, that's a very good statement.

(Laughter.)

Well, I have not read enough of the background to determine the context that we were discussing it here. But until I hear what your next question is going to be, I may want to reserve --

Q Well, no, my next question isn't going to be tricky or complicated. It's going to be the question:

If you want to keep open the option of reracking the McGuire with poison racks without having spent fuel in the pool, is it reasonable to say that the date on which you would want to do that would have to be before the date on which Oconee would have to start transshipping to McGuire? Those two things sort of overlap? There's a relationship between the two?

A Yes.

Q Okay. And that that date would be something like 15 months to a year in advance of June of 1982 that you would want to -- that would be the decision date, if you would, for the decision to go with the poison racks in McGuire?

A Making two assumptions, yes.

Q Pardon?

A Making two assumptions.

Q Okay.

A One, Duke wanted to maintain a full core reserve at

Oconee. Two, they have not done any study or analysis at all for what would be required to put in poison racks at McGuire.

The fact that I know that they have looked at poison racks a little bit, they've considered a number of alternatives, would lead me to believe that they might be able to shorten the time frame, only due to the experience they're getting from reracking Oconee and anything they may already have in house.

Q Okay. In other words, they might conceivably cut it down to nine months, maybe, or --

A Well, what I'm saying, if they have not done a thing and they have no knowledge of putting poison racks in McGuire, then, yes, 15 months from June of '82, assuming they want to maintain a full core reserve.

Q Okay.

A -- or prior to June of 1982, rather.

Q All right.

Now, given your position as I think you've said it at transcript 2763, and in the pages surrounding that, why doesn't the Staff take the position that any proposal to transship from Oconee to McGuire must take place after McGuire has been reracked for poison racks, in order to avoid the possibility that in the future McGuire would have to be reracked with poison racks already having spent fuel in its

pools?

A The Staff is not in a position to tell Duke they must put poison racks in the pool.

Q Staff is in a position to condition the transshipment option, though, isn't it?

A To impose license conditions, yes.

Q All right. One of the license conditions could be you may not transship to a facility that has not already done the maximum amount of pool compaction through reracking in order to reduce the ALARA consequences, assuming we're dealing with a pool that's never had any spent fuel in it, isn't that true?

A I don't believe the impacts are of significant magnitude which would warrant the Commission or the Staff to tell Duke that they cannot ship until they rerack McGuire.

Q You did hear Dr. Nehemias say today that if the difference were between zero on the one hand and 50 man rem on the other, he would call the difference significant from an ALARA consideration, assuming all other things were equal? Do you remember that testimony?

A Yes, I do.

Q All right. Now, would you tell me, in your judgment --

A May I comment?

Q Yes, I'm going to give you plenty of chances to

comment, but let's get this all clear first.

Number 1, do you disagree with Dr. Nehemias?

A No, I do not disagree, but --

Q All right.

Secondly,

A I was going to continue and say I don't know if it's my area to comment on that, but I would say that I don't disagree with it.

Q All right. Good. I'm glad you had that clarification. Thank you.

Secondly, do you feel that there are some conditions which are not equal that would make it imprudent to require that as a condition, and that, therefore, the differences shouldn't be treated as significant between zero and a hypothetical 50 man rem?

A I don't believe in reality -- I don't think we're talking about zero versus 50.

Q Okay, would you explain what your basis is for that? What aspects of it make you think that it's not zero?

A Let me back up a minute, if I may.

The zero versus 50, are we saying strictly reracking? Or are we --

Q I'm just assuming that you've got McGuire; you want to put poison racks in the McGuire facility -- and I understand that we could dispute -- and I'll give you a chance

to dispute the validity of my assumption.

But my assumption is that McGuire is going to have poison racks installed. The question is: If you install them before any spent fuel comes from either Oconee or McGuire, then the impacts in terms of the pool work is zero in terms of man rems. If you install them after there's spent fuel in there, the number could be in the neighborhood of 50 man rem. We'll take that again as an assumption. It might be that the proper assumption, given Dr. Nehemias' testimony this morning, may be 76. But frankly, until I read what he said, I'm not sure what he said.

MR. KETCHEN: Can I have the question? I'm lost. What is the question?

MR. ROISMAN: Well, wait. Did you understand the question?

CHAIRMAN MILLER: Did you understand the question, Mr. Spitalny?

WITNESS SPITALNY: I believe I do.

MR. KETCHEN: Well, I'd like to have the question so I can make a judgment about whether I want to object to it.

CHAIRMAN MILLER: Well, the witness understands it. What's your problem?

MR. KETCHEN: I don't know what the question is. It's a very long, involved statement of fact, and --

CHAIRMAN MILLER: Allright. We'll back up and rephrase the question, and Mr. Spitalny, you be sure that you understand it.

BY MR. ROISMAN:

Q Mr. Spitalny, I was merely trying to lay out for you where we get what's zero? Zero is the assumption that you are going to rerack with poison racks at McGuire, and you do it before there's ever any spent fuel in the pool at McGuire.

And so my question to you was:

If you start with that assumption, that's zero, you said to me, I don't agree with you, and I want you to tell me what it is you don't agree with me about with regard to starting with zero, because you said I don't agree it's the choice of zero or 50.

A Okay. I don't believe that -- I understand that's a hypothetical number, but I don't think it's realistic, even though it is hypothetical.

I think if we were to look at a realistic number, the distinction between zero and what that realistic number might be, I don't believe is that great.

That is my number one comment.

Q Can you hold number two and let me ask you a question about number one?

A Okay.

Q Okay, do you want to scribble that down? Okay.

Isn't your number one comment one that you would concede is in Dr. Nehemias' area of expertise, and not in yours; namely, calculation of what doses would occur as the result of reracking a pool that already had spent fuel in it?

A No.

Q What area does it fall into?

A I believe that Dr. Nehemias' area is to determine what the exposure would be and what could be done to reduce the exposure, and calculate the total numbers.

But I believe just as strongly that it's my position to evaluate the alternatives, what experience has been gained from alternatives, and what is anticipated to be received as a result of employing those alternatives.

Q Well, do you agree with Dr. Nehemias's testimony this morning regarding the variables and factors that are involved in attempting to calculate what might be the exposures from reracking a pool that would have spent fuel in it, when you couldn't actually take a measurement in the pool with spent fuel in it? Did you agree with all of his testimony about the uncertainties involved in that?

A I believe there's a lot of uncertainties, but I think that there's a point that should be brought out.

Q Okay, wait. I'll let you bring it out, but I want to know if you agree with Dr. Nehemias, and then I'll let you

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bring that out.

Do you agree with him about those uncertainties?

A There are uncertainties, yes.

Q Do you agree with his testimony as to what they are, and their magnitude, and how difficult it is to make calculations without having made the actual measurements?

A I don't know if I recall everything he said with regard to all those specific uncertainties.

I would agree that there are uncertainties with estimating something that you don't have -- in his position... let me back up and start over again.

In his position, in trying to evaluate ALARA, he is usually using an estimate which is supplied by the applicant. The applicant says we are going to receive "x" amount of man rem. He then looks to see if there is any way to reduce that number, or if they have employed proper methods of reducing the number.

But I think what we're seeing . . . so he has nothing to draw off of at McGuire, because the Applicant hasn't been able to give them a number that he can look to see if they've used the proper techniques, which I think was his line of response.

My position now is that based on experience, what has been seen in reracking spent fuel pools, the numbers are down on the order of 20 man rem. They are not on the order

wal 17

of 50. And those numbers that are at 20 are usually there because there is an older pool that is being reracked. There may be crud on the walls, on the floor, in the racks. There are reasons for the dose rates being higher.

Q So then --

A Let me finish, please.

We have our range, our spectrum of experience ranges from a low of about 2 man rem to 20, which means I would be not surprised at all if McGuire had Oconee fuel in it which was now aged fuel, they have clean systems, the pool is presently uncontaminated, there could not be much of a buildup of anything, if there is. I would expect that to rerack McGuire after the storage of Oconee fuel, we would see a total dose very small.

Q But let's be clear about what the basis is of that.

You're not testifying as an expert on what doses occur given certain amounts of radiation in the pool, are you?

A No, I'm not.

Q All right. And you're not testifying as an expert with regard to what the sources of radiation are in the pool, such as crud or chemistry or leakers, and so forth, are you?

A No, I'm saying --

Q No, let me -- I'm trying to get some yesses and no's --

MR. KUTCHEN: Mr. Chairman, I think --

MR. ROISMAN: Mr. Chairman, I cannot cross-examine the witness if he's butting in all the time.

CHAIRMAN MILLER: Now, let's settle down.

MR. KETCHEN: I think, Mr. Chairman, that he should be entitled to explain his answers.

CHAIRMAN MILLER: Now, do you wish to state an objection?

MR. KETCHEN: Yes, I do, Mr. Chairman.

CHAIRMAN MILLER: State it, please.

MR. KETCHEN: Mr. Chairman, the witness gets asked a question, and under the procedures he's entitled to give a yes or no answer with explanation.

I think that this witness on a lot of occasions has an explanation for a yes or no, and gets cut off and not permitted to fully explain his yes or no answer. Then he gets way down the road and never gets a chance to go back.

I understood that was the procedure we were following. I think this witness does have an explanation many times and is being pushed into answers and not allowed to explain.

For example, there was a point he wanted to make some minutes ago, two points. We went to the first point and he was told to save the second point. Now we're way away from that, and he hasn't been allowed to explain the second point. I think that we're pushing this witness. As I

understood your ruling this morning, if he gives a yes or no and indicates that he wants to explain it, he should be allowed to do so at that time, and not much later.

CHAIRMAN MILLER: I think that the ruling this morning was that the witnesses, all witnesses, are requested to give yes or no answers,or indicate they cannot answer yes or no first, then if explanation is deemed to be necessary he will be given the opportunity.

Now, there's a difference -- a subtle difference, perhaps -- but a difference between that and witnesses who say yes, but, and then launching into a long explanation time after time. Because the latter is cutting down the true right of a cross-examiner to disclaim as unresponsive answers which go beyond the requirements.

Now, in order to be fair to both the examiner on the one hand and the witness on the other, we're going to have to exercise judgment or discretion. And I will instruct the witness, if you feel that it's reasonably necessary to explain, tell the Board and we will permit you. But it isn't an automatic right, and we don't expect you to have an explanation every time. We're trying to get a middle ground, and I want to be very clear that we don't have automatic rights either way. We're trying to get one which is fair, but which keeps the examination moving.

There's a difference between cross-examination and

examination.

Now, do any of you have any questions about the nature of the ruling?

We'll try to be fair to all witnesses and to all counsel, particularly in cross-examination. After all, we want to be very clear about the Board's ruling, because sometimes we're not sufficiently clear as to the nuances of the right of counsel to disclaim unresponsive answers and not be required to wait five minutes in order to make such a disclaimer.

But still, we want to be basically fair to the witnesses.

MR. KETCHEN: Yes, I'm not --

CHAIRMAN MILLER: You may be right. I'm not sure about the particular example you cited.

MR. KETCHEN: Yes. I just want to make sure the witness understands that when a question is not one of those that is not a clear yes or no, that they have an opportunity to --

CHAIRMAN MILLER: They have a right to tell the Board, "I can't answer that yes or no," and we will say why not and give them a chance.

Yes, a witness doesn't have to say yes or no if, in his honest judgment, it can't fairly be answered yes or no. But he may tell the Board and we'll so instruct the witnesses

right now.

All right. Proceed.

DR. LUEBKE: I think there's an item 2 missing still, if I recall correctly.

MR. ROISMAN: Yes. But I'd like to finish item 1, which -- I've forgotten. He's got it marked there on the page, and --

CHAIRMAN MILLER: All right. We'll see that he'll get back to that note he made.

BY MR. ROISMAN:

Q In fact, I'll ask you this question, Mr. Spitalny: Have I prevented you in any substantial way in all the cross-examination we've done to give ultimately the explanations you wanted to give on your testimony? Are you having difficulty with that?

A (Witness Spitalny.) Well, . . .

Q Answer fairly. I mean I sometimes go through a line of questions and then at the end I give you a shot at it, but I want to get them so I can read them in the record. I don't want to read 55 pages and get 4 yassas.

A Okay. My truthful answer is there have been occasions in which I have to respond to a question, and I don't think it makes as much of an emphasis as it would if I had responded at the time I was talking.

CHAIRMAN MILLER: Now, that brings up a point that

I want to instruct you on: Forget the emphasis. None of you is an advocate. You are witnesses. Don't worry about emphasis.

WITNESS SPIRALNY: Well, no, my point --

CHAIRMAN MILLER: The lawyers can worry about -- listen to me, now, because this is part of the problem. You come up here and you swear to death I'm going to defend something, and you're not really testifying. You're taking a position and arguing it.

Now, I want to have the very best out of all of you. You're experts. Let us have your expertise, but let us not have your advocacy.

Now, I'm not saying this because it came up in your remark. This is true of all witnesses. And it's very natural, expecially in dealing with experts. But I want to make it clear to all witnesses.

Okay. Proceed.

BY MR. ROISMAN:

Q All right. Now, the next question I was going to ask you is: Is the basis for your position that you think the number would be -- actually, it wasn't that the number wouldn't be zero in the rerack case where there was no radioactive fuel in the pool; it was that the number at the other end wouldn't be as high as 50 or 75, but would be 20 or even lower. Is the basis for that experience that you have

learned of involving other reracks? Is that the principal basis for that?

CHAIRMAN MILLER: Do you understand the question?

WITNESS SPITALNY: Yes, sir.

CHAIRMAN MILLER: All right. You may answer.

WITNESS SPITALNY: Yes.

BY MR. ROISMAN:

Q Now, tell me: Is your experience broader than the experience that Dr. Nehemias testified to this morning he had; namely, three specific plants where he had examined the estimates and the actual dosages experienced?

A My experience is in discussing reracking as an alternative, is similar to part of the experience that he said he had in discussions with other members of the Staff to determine what experience has been seen.

My experience is numerous discussions with other members of the Staff who have done the evaluations and who followed the rerack applications, just to get the experience from what the final numbers have been.

I do have more than seven numbers.

Q Okay. How many numbers have you got?

A About 15 or 20.

Q How many reracks have there been that have been completed, where someone in the Staff has available the numbers as to what the actual exposures were that were

experienced in those reracks?

A There have been 42 reracks.

Q Completed?

A I'm not sure of the various stages. I think it's 42 approvals. I don't know if they've all been completed.

And I would say that I had 50 percent of those numbers to take a look at.

Q All right. Now, how did you get those numbers? In

WEL 8 what form did you see the numbers?

A I basically went to one of the reviewers, one of the members of the Staff, sat down in his office, and he pulled out his files in which he has the application and all correspondence.

I don't know if it's all correspondence, but he has a whole file on all of the reracks that have gone on.

Basically, I asked him for what experience has shown us. He went through his file and said, well, at such and such a facility we've had 15; at another we've had 18; at another we've had 6. And he was pulling up documents in his file from all of these, and I was jotting them down, as to what the experience has shown for reracking.

Q All right. The numbers he was giving you were the numbers that were actually obtained as the result of doing the reracking in pools that already had spent fuel in them, is that correct?

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A That's correct.

Q Do you have that list? You said you made a list.

A I may. I may.

Q Okay, would that be something -- we're going to recess in about 35 minutes -- that you might look for tonight? Is it possible you have it here, or is it something you have in Washington?

MR. KETCHEN: Mr. Chairman, I'm going to have to object. If it's leading to the position of producing more paper, I'm going to object to that. Why can't the witness just be asked questions on what he knows or doesn't know, without having suddenly to get into a discovery situation?

CHAIRMAN MILLER: Well, if the witness is basing part of his testimony that he has broader experience than the witness this morning, and the reason was, as he said, that he'd talked about it, he'd seen files of others and made lists from the files, it's obviously got to be part of the record. You can't cut off cross-examination by saying don't look any further.

Let me ask you, Mr. Spitalny: Could you either reconstruct or give us the list so that it would be available in the morning for further interrogation, or find it, if such a list exists? Overnight?

WITNESS SPITALNY: The list that I actually compiled was done on two separate occasions. They are two independent

lists, which may or may not have crossed.

I could reconstruct that list, but I don't know if I could do it by morning. To reconstruct that list I would call the same person that I talked with, and say, "PLease give me the same numbers you already gave me."

To have to produce the exact documents that I was scribbling on -- and it basically was scribbling -- I don't know if I could do that.

MR. ROISMAN: I don't have any quarrel with that. If you'll testify, so we know what the source was, and can see it -- and let me just say, with regard to Mr. Ketchen's point, I assumed -- and maybe unfairly, to Mr. Spitalny -- that he could not give us the 20 numbers with regard to the 20 or so plants.

But --

CHAIRMAN MILLER: All right. Let's not take any more time. Do the very best that you can, Mr. Spitalny. I mean attempt to reconstruct it from memory, and make calls if you have to, and give us the best that you can tomorrow so that we can see what the ones are that you looked at. It's an important matter. We want to be fair to you. But give us the best information you can.

Very well. Proceed.

BY MR. ROISMAN:

Q Now, Mr. Spitalny, did you at the same time ask

what the estimates had been, of what the exposures would be before the work had actually been done, so you'd have a basis to compare between estimate and actual experience?

A I did on a random few.

Q How many?

A I think maybe six. I'm not sure. I was able to draw a conclusion, though, from the same person that was giving me the numbers, that I believe in all cases -- and I believe it was all cases -- actual exposure was less than that of the estimate.

Q Do you remember what the differences were? Dr. Nehemias said in his three the differences had been a factor of 2 or 3 lower. What about in your six?

A They varied. The most extreme that I recall was Ginna, which had estimated in excess of 100 -- I believe 105 man rem. The final exposure was 19. That, as I recall it, is the extreme. There were others that estimated 40, 45, and the numbers came in at 30.

Q Okay.

Now, is statistics or statistical analysis an area in which you've had any training or experience?

A I have had numerous courses, both graduate and undergraduate levels. But I do not apply statistics here.

Q Well, that's what I was going to ask you. Has the Staff attempted to make a statistical analysis of the

validity of the data that you've got, the results that you've obtained, so that we could have some -- in the context of statistics -- some statistically reliable statement as to the likelihood that the McGuire rerack would or would not look like the reracks that have happened previously, that we're trying to figure out how much exposure you might get if McGuire were reracked after there was spent fuel in the pool?

A We have not calculated a standard deviation or variance of what the range of numbers have been, nor do we see a need to, as far as I'm concerned.

Q Well, would it make a difference to you if the McGuire rerack were 50 man rem versus 15 man rem in calculating whether that was a substantial or not a substantial difference between reracking with spent fuel in the pool or without it?

A If McGuire was to come in at 50, my first assumption is that something has to go drastically wrong.

The experience that we've gotten so far from the Oconee rerack shows Oconee probably will not hit 50. And Oconee is an older pool which has had a lot of fuel in it.

So I'm saying if it comes in at 50, I'd be extremely surprised.

Q But, Mr. Spitalny, isn't it true that the way in which you can test the validity of your analogy to the Oconee situation or to the Ginna situation, or to any other situation, is either to prove that it's statistically likely or

that it is substantively so comparable that you would expect it to be equal to or less? And isn't it true that you've not done either of those with regard to your assumption that McGuire wouldn't hit 50?

A I have not done either of those. And the reason is that the exposure of 20 man rem to me does not warrant that consideration.

Q But what about the exposure of 50 man rem?

A If we're assuming that McGuire had reracked and they had used 50 - - in other words, that was history now -- and we had ranges from 2 man rem to 50 man rem, I still would probably not see any need for a statistical analysis.

Our feeling is while we have a range from 2 to 50, the difference on how you go about evaluating the next one is comparing the parameters of the next pool to those of the ones that range from 2 to 50; that being was it a clean pool, was it a dirty pool, what's the size of the pool, is it a PWR, BWR? What are all the parameters involved?

What I'm saying is if McGuire comes in at 50, there has got to be some reason to be that high. If you're considering the next utility that comes in with an application you could ask yourself: Is it possible that this utility may see the same thing that McGuire saw?

What I'm saying is you can evaluate these things to get a feeling of where on this spectrum which now ranges

from 2 to 20, where the next licensing action falls on that spectrum.

Q Wait a second. How do you know the McGuire will fall within 2 to 20 until you've sat down and either made a statistical analysis to prove that your 2 to 20 range gives you a reliable range, or actually compared the parameters of what might exist at the McGuire facility with the parameters of what did exist at all those other facilities?

A Statistically, if I was to input my sample, and I had a sample of 40 reracks, of which the maximum of that was 20, I would probably come out with a 99.9 percent confidence level of not going above or not seeing the 50.

Q Now you're giving me a new probability, a probability that if you did a probability analysis, that probability of 99.9 percent.

I want to know what you did that's statistically competent? You told me you've got experience in statistics.

Have you done a statistically competant analysis of the reliability of using 20 plants out of 40 to make a prediction as to what will happen at McGuire?

A I have said numerous times that I have not done a statistical analysis, nor did I see a need to.

The method that I would go about evaluating it is looking at the parameters, what caused it to be 50.

Q All right. But wait a second. Why don't you look

at the parameters in advance to find out whether it's likely to be 50?

A I don't see, outside of your asking me to do it, any need to do it.

Q Well, then, how do you know until you look at the parameters whether or not McGuire is likely to fall between the 2 and 20 range if it were to be reracked with spent fuel in its pool? Do you know how many of the plants of the 20 that you have numbers on have spent fuel pools with configurations like McGuire's?

A I have not looked to see how many pools are very similar to McGuire's. A spent fuel pool in most cases is a spent fuel pool.

Q But didn't Dr. Nehemias say this morning that the configuration of the walls is one of the factors that affects it, and that those were different?

A There are different penetrations, possibly, in the pools. The penetrations may be the same type of penetration, but the quality of the weld, even though it passes QA, may be a little different, such that crud may be able to get into a spot on a weld, even though there are no holes or cracks, or anything.

Because of those things, I believe, is what Dr. Nehemias was going to. The configuration of a wall, whether or not it is -- how well you're able to clean it, for example.

But basically a spent fuel pool is a hole in the ground that has a stainless steel liner, and you put some assemblies in it.

Q My question to you still comes back -- I mean I think we started with, and I think you testified that you have not analyzed the parameters of the McGuire compared to the other 20, and you've not done a statistical analysis to see how reliable the number of 2 to 20 is.

Now my question to you is: What forms the basis for your confidence that McGuire, if it were repacked with spent fuel in the pool already, wouldn't exceed the number 20?

A The basis for my confidence is that of experience, and talking to individuals who are familiar with that particular action. And I believe that that is enough.

I guess I'm really flabbergasted here. I don't know what a statistical analysis will show you.

Q I guess it would show you whether or not your instincts are right.

CHAIRMAN MILLER: I think we've probably explored this as far as we can. I think it's apparent that his experience is based on the information of others, and I think we're going to have to get that information at least in summary form, and he'll attempt that overnight and reconstruct it. Is that correct?

WITNESS SPITALNY: Yes, sir.

CHAIRMAN MILLER: I think that's as far as we can go.

BY MR. ROISMAN:

Q Now, Mr. Spitalny, what was number two? That's for you, Dr. Luebke.

(Laughter.)

A (Pause.)

Q With reference to the note that you made.

A Yes, I know. I'm just trying to get the discussion reconstructed.

Q All right. The discussion -- the question that was on the table, of which there were two lines, was:

I had presented the hypothetical that if you put spent fuel into the McGuire pool before you reracked it with the poison racks you could see as much as 50 man rem exposures; and then if you put it in there before you had any spent fuel the number would be zero. And why wasn't that a significant difference? You had indicated that you thought it wasn't. Reason one, as I understand it, is because the experiences with which you were familiar indicate to you that 20 reflects the top number, and now you were going to give me the second reason.

A I said 20 looks like the top number we've seen, but for McGuire it would be much lower. And the second reason

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is ALARA considerations are not strictly focused on exposure. There are economic considerations that also enter the picture, one of which is the fact that McGuire is presently -- McGuire Unit 1 is presently racked at this time.

What the real picture, then, is: Is what is the cost of pulling those racks out and doing something with them, plus the cost of purchasing a new rack, and for that given cost the exposure might be possibly zero on the one hand, or 2 or 3 on the other.

So I'm saying it could be possible at a later date with McGuire to make the decision to put in poison racks, and the cost at that time might be better spent putting in poison racks in 1984 or '85, because of the savings that they're able to get at this time, which would be the savings of not having to go to an alternative of building a new pool or something.

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Q How do we get to the building of the new pool? Where does that come into the discussion? Did I bring that up?

A I just mentioned that to you.

Q But I wasn't presenting that as one of my --

A I'm saying another alternative was spending the money. For instance, I'm saying if we couldn't put in poison racks or if they didn't, or if they were able to take an option now which is transshipment and they were able to use transshipment in lieu of another alternative such as building another pool, they would save money today; the cost of putting in the McGuire racks in 1984 with the exposure that may be received may not counter what they can save presently.

Q Is that an analysis which you've done prior to the last five minutes that you just testified to?

A I've thought about it, that same sequence of events; through interrogatories and discovery I believe we were asked questions by NRDC, when would be the latest date that we could do a certain option, when could Duke do those options. Duke may have been directing those question. The Staff was asked similar questions.

And at that time in responding to the questions I realized what path we were taking and thought about it at that time.

Q How much was your earlier thinking about it

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influenced by the assumption that Oconee and the McGuire facility would begin to discharge its own spent fuel into its own pool at a date earlier than it now appears it will do?

A Well, from the beginning we've just been using the dates that Duke keeps feeding us and as they change, we change our thinking. But it hasn't made any difference in anything we've done. It has alleviated the situation if anything.

Q Let's see. I'm a little unclear as to what you mean by "alleviated."

Isn't it true that if you assumed that McGuire was going to begin to contaminate its own spent fuel pool from its own reactors at an earlier date then there would be -- and that was a sufficiently early date that poison reracking became from a time standpoint not reasonably available, wouldn't that make you reject poison reracking at McGuire prior to allowing any spent fuel to go in the pool as a relative impossibility?

A I really lost track of the question.

Q If the McGuire pool, under the earlier assumptions of when McGuire was going to go operational, were contaminated with an earlier discharge from its own reactors so early that you couldn't reasonably expect to be able to rerack with poison racks in the time available, wouldn't that then have influenced an earlier judgment on your part as to when -- as to whether poison reracking at McGuire was feasible in an

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uncontaminated pool?

A Well, yes. The dates by which you must decide to put in poison racks prior to having a contaminated pool are directly proportional to the date of operation, so as we move one date down you're moving the other date down.

Q So just in terms of McGuire's own contamination of its own pool, the more you postpone the operational date of McGuire Units 1 and 2, the more time you have to put poison racks into McGuire into an uncontaminated pool, if we assume there's no transshipment to McGuire from Oconee. Is that true?

A That's true.

Q Now you indicated that these other factors might enter into your consideration of whether you would require that the spent fuel pools at McGuire be reracked before anything be transshipped to them, like economic considerations.

In this analysis that you did in Staff Exhibit 22 you did assume that McGuire would be reracked for poison reracks, didn't you?

A Yes, I did.

Q All right.

Now is it your testimony that the reasonable next step that McGuire would pursue to handle its own spent fuel storage problem is to rerack its pool with the poison racks?

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A That is a reasonable step. I don't know that it is the reasonable step. I haven't evaluated Duke's position if they can come up with some position, some argument as to why they might not consider it reasonable.

My opinion is that it's a reasonable step.

Q Have you really done an analysis of what is, from the perspective of economics, exposures to workers, exposures to the public, the need to keep the plants on line and retain a full core reserve, have you really done an analysis of what is the best course of action to follow with regard to the McGuire pools for the purposes of studying the alternatives that we've just been discussing?

A I have a feeling for what the costs are to employ the alternatives of poison racks. I agree that poison racks are a good idea. I don't know that I would be willing to say that Duke should consider putting in poison racks in all of their pools now because I believe they would be foreclosing -- the same thing again about foreclosing alternatives.

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If they're not at a point where they have to do that then I would say wait until they're at that point.

With respect to McGuire 1 which presently has racks in it, I think that needs a little more evaluation which may have been done but it has not been done by myself as to exactly what the costs will be of postponing putting

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poison racks in after the receipt of Oconee fuel versus the cost of putting it in today. That's an option that I leave to them.

I don't think it's an extremely -- an expensive option that would require us to say do it. As far as options go, poison racks are relatively economical, I mean in contrast to the other alternative of building a new pool, the third alternative being transshipment.

Q Are you through with your answer?

A I think so.

Q Could you now answer my question? I asked you if you dhad done an analysis.

A I thought I had answered that.

Q No, you didn't. You just gave me a lot of conclusions. I asked you, have you done an analysis?

A My response I believe-- I thought I said that I have not done an evaluation of what the cost was for McGuire 1 for Duke to install poison racks now versus the cost considerations that they may have later on. And I also stated that I was aware of what the cost is to employ poison racks now, and to employ them in McGuire 2 and Catawba and Cherokee and so on down the line.

Q Well, what are all the other factors? I also asked you about exposure considerations, the retention of full core reserve, all the factors that go into deciding

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whether one alternative course of action is preferable to another, and I asked you, have you done a analysis-- Tell me what you haven't done since you've already given me a lot of testimony about what you think you have done.

A I think I only know what I've done.

CHAIRMAN MILLER: I think the question was to tell whether or not there's been an analysis in depth, considering at least four or five of the factors that were described. I don't think that your answer, while it may have been helpful on other aspects, I don't think it has really addressed that question which is simply whether or not you have made that analysis.

We're going to recess very shortly. If you have done it, fine. If you haven't done it, say so. It won't shake the earth, but I would like to have a direct response.

WITNESS SPITALNY: I have done similar analyses like I had on a piece of paper which is figures that were scratched down, and where I wrote down what the costs of alternatives were and where I dug up the variables for pursuing alternatives.

I have not done an in-depth analysis of installing poison racks in McGuire 1 now.

CHAIRMAN MILLER: All right. I think this is a convenient point.

MR. ROISMAN: If I could be indulged for ten minutes

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it's not much but a couple of points it seems to me that tie into this point.

CHAIRMAN MILLER: All right. If we're going to accomplish something and reach a logical point to terminate for the evening.

MR. ROISMAN: That's my hope, that that will be the case.

CHAIRMAN MILLER: All right. Let's settle down and let's have the questions cut short and direct and let's have the response in the same measure.

BY MR. ROISMAN:

Q If you had in front of you an application of Duke proposing to rerack McGuire Unit 1 with poison racks and you were examining the option of whether you should require the reracking to be done before the pool had spent fuel in it or after, would the nature of your analysis be different than what you have done in this case, evaluating the alternatives that we've been discussing today, namely, the same alternative with respect to transshipment from Oconee?

A (Witness Spitalny) The evaluation might be slightly different but the STaff normally would not be posed with that type of evaluation.

Normally, if I can explain, the Applicant makes the decision as to when they're going to do something and the Staff will review it and determine that it is indeed

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acceptable or it is not acceptable. That ends up being part of the review process where we uncover the details and whether or not there are problems that may result in employing the alternatives, but usually it's the utility that makes that decision prior to coming in with an application.

Q But wouldn't reracking-- if McGuire were capable of being reracked either before it got contaminated or after it got contaminated and they proposed to either rerack it before, would you mean to tell me you would not evaluate the alternative ways of reracking the pool differently than you've evaluated them for purposes of -- to the extent to which they have committed the discussion here in the Oconee application?

A Yes, I said the obligation would be different.

Q I'm sorry, I thought you said it may be different. I'm sorry.

A The evaluation, if we knew there might be fuel in it, we would have to evaluate their method of installing the racks with fuel in it. It would have to be an installation done under water.

If the pool was clean and empty I would imagine they would drain the pool and change the racks, which is a completely different technique.

Q No, but in terms of evaluating which one of those courses you want to approve, would you do a more in-depth analysis than what you've done so far in deciding which one

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of those courses of action you should approve?

A I think if I were faced with that decision in front of me I would have to ask the Applicant more questions as to why they have chosen or why they have not ruled out putting in the racks prior to installing fuel. It seems to me it would be an obvious recommendation if they had the alternative of delaying shipment for six months and they knew that they could rerack and they had wanted to rerack that they should do it prior to shipment.

If they were not making that decision I would certainly go back to them and ask why they had not made that decision.

MR. ROISMAN: I'll stop for now and start there tomorrow.

CHAIRMAN MILLER: We will recess until 8:30 in the morning. Let me remind you now that we're going to be meeting in a different room, the Board at 8:30, Counsel at 8:00.

(Whereupon, at 4:55 p.m., the hearing in the above-entitled matter was recessed to reconvene at 8:30 a.m. the following day.)