# NUCLEAR REGULATORY COMMISSION

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IN THE MATTER OF:

PUBLIC SERVICE ELECTRIC & GAS COMPANY

(Salem Nuclear Generating
Station, Unit No. 1

Docket No. 50-272

(Spent Fuel Expansion)

Place - Salem, New Jersey

Date - 2 May 1979

Pages 317 - 508

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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| In the matter of: | |
| PUBLIC SERVICE ELECTRIC & GAS COMPANY | Docket No. 50-272 |
| (Salem Nuclear Generating Station, Unit No. 1) | (Spent Fuel Expansion) |

Salem County Courthouse,
94 Market Street,
Salem, New Jersey.

Wednesday, 2 May 1979

Hearing in the above-entitled matter was convened, pursuant to notice, at 9:30 a.m.

BEFORE:

GARY L. MILHOLLIN, Esq., Chairman,
Atomic Safety and Licensing Board

LESTER KORNBLITH, Jr., Member,

DR. JAMES C. LAMB, III, Member.

APPEARANCES:

On behalf of Licensee, Public Service Electric & Gas Company:

MARK J. WETTERHAHN, Esq., Conner, Moore & Corber, 1747 Pennsylvania Avenue, N.W., Washington, D.C.

RICHARD FRYLING, JR., Esq., Assistant General Solicitor, Public Service Electric & Gas Company, 80 Park Place, Newark, New Jersey.

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On behalf of the Regulatory Staff:

BARRY SMITH, Esq. and JANICE MOORE, Esq.,
Office of Executive Legal Director, United States
Nuclear Regulatory Commission, Washington, D.C.

On behalf of the State of New Jersey:

RICHARD M. HLUCHAN, Esq., Deputy Attorney General,
State House Annex, Trenton, New Jersey.

On behalf of the State of Delaware:

JUNE D. MacARTOR, Esq., Deputy Attorney General,
Tatnall Building, Dover, Delaware.

On behalf of Intervenor Lower Alloways Creek Township:

CARL VALORE, JR., Esq., Valore, McAllister,
DeBrier, Aron & Westmoreland, 535 Tilton Road,
Northfield, New Jersey.

On behalf of Intervenors Eleanor and Alfred Coleman:

KEITH A. ONSDORFF, Esq., Deputy Attorney General,
520 East State Street, Trenton, New Jersey.

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# P R O C E E D I N G S

CHAIRMAN MILHOLLIN: Good morning, ladies and gentlemen.

On my left is Mr. Lester Kornblith, and on my right, Dr. James Lamb. My name is Gary Milhollin. Together we constitute the Atomic Safety and Licensing Board which operates under the authority of the Nuclear Regulatory Commission. We are responsible for hearing the application by the Public Service Electric and Gas Company to amend its operating license at Salem Unit 1. The amendment would allow the Licensee to expand the capacity of the spent fuel storage area at Unit 1 from 264 to 1,170 spent fuel assemblies.

The Licensee applied for this amendment on November 18, 1977. On February 8, 1978, the Nuclear Regulatory Commission published a notice in the Federal Register which described the amendment.

In response to the notice, the Commission received Petitions to Intervene, and for a hearing.

This Board was then appointed and we admitted two of the Petitioners as parties. They are Lower Alloways Township and Alfred and Eleanor Coleman of Pennsville, New Jersey.

The States of Delaware and New Jersey have also been granted permission to participate.

At this time I will ask the parties to identify

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themselves.

MR. WETTERHAHN: Good morning. Appearing for Public Service Electric and Gas Company, my name is Mark Wetterhahn, with the law firm of Conner, Moore and Corber.

Also appearing for PSE&G is Richard Fryling, Jr., of PSE&G.

Just to identify him, seated at the table is Mr. Edwin A. Liden, Project Licensing Manager, who will be our lead witness in this proceeding.

CHAIRMAN MILHOLLIN: Thank you, Mr. Wetterhahn.

MS. MACARTOR: June Macartor, Deputy Attorney General for the State of Delaware.

And I have with me to aid in cross-examination Harry Otto, Manager, Technical Service for Environmental Control for Delaware.

CHAIRMAN MILHOLLIN: Thank you, Ms. Macartor.

MR. HLUCHAN: Good morning, Mr. Chairman, and members of the Board. My name is Richard M. Hluchan. I am Deputy Attorney General representing the State of New Jersey.

CHAIRMAN MILHOLLIN: Thank you, Mr. Hluchan.

MR. ONSDORFF: Good morning, Mr. Chairman. I am Keith A. Onsdorff, Assistant Deputy Public Advocate for the State of New Jersey, representing the Intervenors Coleman.

I have with me this morning Gregory Minor of MHB Technical Associates.

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CHAIRMAN MILHOLLIN: Thank you, Mr. Onsdorff.

MR. VALORE: Good morning, gentlemen. My name is Carl Valore, Jr., of the firm of Valore, McAllister, DeBrier, Aron and Westmoreland. We represent the Township of Lower Alloways Creek, an Intervenor.

Sitting to our left is one of our expert consultants, Dr. George Luchak.

CHAIRMAN MILHOLLIN: Thank you, Mr. Valore.

MR. SMITH: Good morning, Mr. Chairman. My name is Barry Smith. I am representing the Nuclear Regulatory Commission.

To my left is Counsel Ms. Janice Moore.

To my right is Gary Zeck, Project Manager.

CHAIRMAN MILHOLLIN: Thank you, Mr. Smith.

The Board understands that at this time there will be a preliminary motion, and the Board will now entertain the motion.

MR. ONSDORFF: Thank you, Mr. Chairman.

I have a number of motions. Initially I would just like to comment that within the last ten minutes I was handed a document which is titled "An Order." I would more properly describe it as a voluminous written opinion or opinions apparently comprising approximately 36 pages which, while I haven't had the opportunity to read, in scanning it appears to establish the parameters for conducting this proceeding

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before the Safety and Licensing Board.

In light of the fact that this order does establish the rules for this proceeding, I feel that it renders going forward at this time substantially unfair to the Intervenor Colemans in light of the absence of a real and complete opportunity to appreciate the contents of this document, and particularly to seek appellant review thereof if same would be warranted.

I believe that the dismissal of the contention which deals with the consideration of alternatives is the basic and fundamental question confronting this Board and substantially we have been denied the opportunity to address that issue, based upon a document which was just handed to me.

I think that under the rules which guide the activities of this Licensing Board, all participants in the hearing process are entitled to the fundamental precepts of due process of law, those being notice and opportunity to be heard.

I don't believe being served with an order five minutes before the hearings proceed under that order is sufficient notice and opportunity to be heard in order to comply with these basic precepts of due process of law.

Therefore, I think the only appropriate action at this time is for this hearing to be adjourned until all the parties to this hearing have had the opportunity to consider the contents of this 35-page order and be given the opportunity

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to respond in an appropriate manner to the actions that are taken in this document.

Thank you.

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MR. HLUCHAN: Mr. Chairman, on behalf of the State of New Jersey, we would support Mr. Onsdorff's motion. I think, as he properly points out, being served with a document of this magnitude at this particular time is extremely prejudicial to the parties and I don't believe it is fair to continue with the hearing unless everyone has had the opportunity to fully digest the contents of this document, and therefore, I would support his motion

MR. WETTERHAHN: Mr. Chairman, we would oppose the motion. The parties were aware of the results, if not the content of this order in that the Board informed all parties during a conference call which of the contentions had been dismissed and which were still viable. Therefore, the parties had sufficient time to prepare.

MR. VALORE: Mr. Chairman, may I ask the Chairman to ask the Licensee a question as to whether the Licensee received this order prior to 10 minutes before the hearing started today? In other words, have they had more time to look at it? If so, I think their opposition would be unfair.

CHAIRMAN MILHOLLIN: Perhaps I could answer that question. We brought this with us this morning and we handed it out to everyone at the same time.

MR. VALORE: I would certainly join in Mr. Onsdorff's request for additional request, I don't see how attorneys can properly understand what they are to do without digesting the

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contents of a significant order in the case.

MR. SMITH: Mr. Chairman, can the Staff be heard?

The Staff would have no objection to some time being allowed for the parties to review the document. I would like to state for the record I don't believe that this hearing has to be contingent upon appeal, because no appeal is allowed from such an interlocutory order and I don't see any reason to oppose adjourning this hearing. Also, the order for proceeding was that the Colemans do have contentions in this proceeding.

MS. MACARTOR: One example: In spite of the Licensee's point that we did know by telephone conference which of the contentions would remain, but on Page Eight I notice quickly that the Board has said it is possible to be skeptical about the importance of the Colemans concern with the venting. And while that contention was left in, the rest of the paragraph goes on to talk more about skepticism. And I think that that would certainly have a bearing on the cross-examination questions which we would like to ask today.

MR. ONSDORFF: Mr. Chairman, if I might just respond to the statement by counsel for the Licensee, it is a fact that we had a conference call at which the nuggets of the decision, if you will, were articulated and we certainly attempted to prepare based upon that.

However, you all may recall at that time I emphasized the importance of serving a written order as soon as possible

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and specifically requested that that be done in order to aid in the preparation but, more importantly, to provide the opportunity to seek appropriate remedies to redress what I consider to be a prejudicial action on behalf of my client. That specific request was made. Unfortunately, for whatever reason, it was not able to be complied with.

Therefore, I don't feel that this notice was sufficient in that the conference call, at best, was merely superficial compared to a 35-page document. But in addition to the notice, the opportunity to be heard has been effectively denied by the service of this order this morning, I believe.

CHAIRMAN MILHOLLIN: Well the Board will grant your motion to adjourn the hearing for the purposes of allowing the parties to look more carefully at the order the Board has made.

The Board feels that, of course, you were informed as to the results of the order sufficient far in advance of the hearing to allow you to prepare for the hearing with the results in mind.

The reasoning, of course, was not available to you. We did our best to finish it sooner but were unable to.

Since the reasoning which the order contains could be of importance in preparation, we will adjourn until 10:45 by the clock in this room in order to give you time to look at the order.

MR. ONSDORFF: May I make the further statement, or

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possibly another motion for relief, since we will be proceeding apparently this morning, I would ask that an elaboration be given as to your understanding of the effective results of having the Colemans contention regarding alternatives dismissed whereas Lower Alloways Creek's contetionn on that very same matter is still a part of the case.

I would feel that in light of the prejudice that I have sustained, that the Board should seriously consider at least for the purposes of the hearing allowing the Colemans to submit evidence pertaining to the contention of Lower Alloways Creek.

The Licensee has taken the position that the Colemans should be denied that opportunity. However, I feel that the consideration of alternatives is a consideration of alternatives. The fact that we may have used somewhat different language than Lower Alloways Creek in articulating specific alternatives that should be explored, the basic thrust and legal position of both contentions is that there are viable alternatives to the increased density at the racking at Salem 1.

If we were allowed to submit evidence on the contention of Lower Alloways Creek, I think thatwould ameliorate to a great extent the prejudice that we would otherwise suffer in this proceeding.

CHAIRMAN MILHOLLIN: In response to your motion, Mr. Onsdorff, I'll have to say that the Board doesn't feel that you are sustaining any prejudice that the Board can identify.

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The motions, as you will learn from the opinion, were-- The motion was granted as to one contention and not the other for reasons which the opinion sets forth.

So if that's a further motion to the Board, and if the motion is that we permit you to introduce direct evidence on the contention of Lower Alloways Creek, then the motion is denied.

You are of course free to examine under the rules-- Under the rules, you are free to cross-examine on the contentions of other Intervenors, as you know, but the rules do not provide for direct evidence by one Intervenor on contentions of another.

MR. ONSDORFF: Could you cite me that rule, Mr. Chairman?

CHAIRMAN MILHOLLIN: No, I can't.

MR. SMITH: There is a case, Prairie Island, which does set forth the authority of the Licensing Board to allow an Intervenor to cross-examine another person's contentions if they show discernible interest.

CHAIRMAN MILHOLLIN: Yes, but that opinion does not authorize one Intervenor to introduce direct evidence on the contentions of another.

MR. ONSDORFF: Mr. Chairman, may I ask, does that opinion speak to the issue or does it speak to a different issue? I think that authorizing me to cross-examine is not

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necessarily prohibiting you from going forward and introducing evidence.

CHAIRMAN MILHOLLIN: In any event, the Board has ruled on your motion and it is denied.

MR. ONSDORFF: Thank you.

CHAIRMAN MILHOLLIN: So we will now begin our adjournment for one hour.

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(Recess.)

CHAIRMAN MILHOLLIN: The hearing will come to order, please.

I would like to announce at this time the Board's rule on photographers and cameras. The rule is that the photographers must remain in one location and use natural lighting. The same is true with respect to moving picture cameras.

The Board did agree, however, to a compromise, to the effect that for five minutes at the beginning of this session, camera crews could use artificial lighting and move around, so you will have five minutes to use artificial lighting and move around. And after that, the iron-clad rule will go into effect that you must remain in one place and use only natural lighting.

At a special prehearing conference on May 18th, 1978, the Board considered the various contentions filed by the parties to this case. The Board admitted Contentions 1

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and 3 of Lower Alloways Township and Contentions 2, 6, 9 and 13 of the Colemans.

The Licensee then filed on February 27th, 1979, a motion for summary disposition as to all the contentions of both Intervenors. The Board granted this motion as to Contention 3 of Lower Alloways Creek Township, and it granted the motion also as to Contention 9 and Contention 13 of the Colemans.

The Board denied the motion for summary disposition as to Contentions 2 and 6 of the Colemans, and Contention 1 of Lower Alloways Creek Township.

Therefore, we have now remaining in the case Contention 1 of the Township, and Contentions 2 and 6 of the Colemans.

MR. ONSDORFF: May I be heard briefly, Mr. Chairman-- I'm sorry, I didn't mean to interrupt you. I thought you had finished.

CHAIRMAN MILHOLLIN: Just a second.

At the prehearing conference among the parties which was held on March 15th, 1979, the Board required the parties to file written testimony, objections to that testimony, and an outline of cross-examination.

Several objections have been made to testimony and to the method of procedure. The Board will now rule on one of the objections. That objection was made by the Colemans to

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the practice which the Boards usually follow of allowing testimony by witnesses in panels. This form of proceeding is common in NRC matters, and the Board's view is that its advantages outweigh its disadvantages.

So the objection to having testimony by witnesses in panels is overruled.

The Board will take up other objections as they are made.

Are there any preliminary matters before we have opening statements?

MR. ONSDORFF: Yes, Mr. Chairman. I have a number of matters which I would like to address.

Initially now, having had a brief opportunity to read and review the order that we were handed, I can only state that I believe that there are certain matters of law which go beyond mere consideration of the specific factual contentions raised that I think the Board should consider, if I may briefly address myself initially to the Lower Alloways Creek Contention Number 1.

The first sentence of the contention, and I quote:

"Licensee has not considered in sufficient detail possible alternatives to the proposed expansion of the spent fuel pool --"

CHAIRMAN MILHOLLIN: Excuse me, Mr. Onsdorff. Did you have in mind making a motion? When I asked for statements

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on preliminary matters, the Board has no intention of hearing argument as to its order, so perhaps you should proceed with that in mind.

MR. ONSDORFF: Mr. Chairman, I would like to have a very brief opportunity to just respond now that I've had an opportunity to read the document. I believe that I can state for the record my position in order that the Board can consider the legal merits of that in order that, if it wished to reconsider that decision prior to taking appeal, that any errors which would affect the ultimate decision could be remedies before the hearing proceeds.

I think that is the rule for the conduct of hearings and trials, that on any ruling made a party should have an opportunity to assert for the record its position in order that if it is correct that the Hearing Panel would have the opportunity to revise its decision in order not to affect a proceeding which would then be reversible.

I'm attempting to assist the Board in that function very briefly. I'm not going to take an extensive amount of time.

CHAIRMAN MILHOLLIN: Well, let me understand what you are going to say then. You are simply going to set forth the reasons why you think the order is wrong?

MR. ONSDORFF: That's correct.

CHAIRMAN MILHOLLIN: Well, we are not disposed to

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hear arguments as to whether we were correct in the order.

We have ruled, as you know, and we ruled some time ago as to whether these contentions should stay in the case. I suppose it is our view that we could have published this opinion at some later date and that would have been perfectly proper since what you need to know to prepare for the hearing is the results of our decision.

So our view would be that it would not be profitable now to argue about the merits of our decisions in the order.

If you have a motion to reconsider them which is very brief, I suppose we might listen to it, but we are not disposed to hear arguments as to the merits of our order.

MR. ONSDORFF: Certainly that was what I was attempting to do, was to make remarks for a motion for reconsideration, which will be very brief.

CHAIRMAN MILHOLLIN: Okay.

MR. ONSDORFF: The first sentence of the Coleman Contention Number 9 reads, and I quote:

"Licensee has given inadequate consideration to alternatives to the proposed action."

I would submit that the characterization of these two contentions in the Board's order as being similar is in fact understated. They are identical. In fact the Board itself consolidated them for consideration at the hearing.

I believe that in reliance upon that I submitted

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certain factual contentions dealing with certain alternatives. Clearly, as stated by Alloways Creek, the alternatives which were suggested which--A the Board's order correctly points out, the burden is not upon Intervenors to present the alternatives, the burden is upon the Licensee to consider alternatives and to weigh them.

In light of that fact, the fact that we concluded certain specific possible alternatives was not to be a limitation upon the first sentence of each of these identical contentions and therefore, in our factual statements we were working in essence in tandem and not at cross-purposes, to suggest that factual contentions raised by the Colemans are in some fashion different than the factual contentions raised by Lower Alloways Creek is not actually the case, bearing in mind the identical language in essence used by the first two sentences of each contention.

Therefore, I would submit that in light of the Board's prior action in consolidating the two contentions which the Colemans relied upon in preparing an opposition to the motion that the Board reconsider its decision to dismiss the Colemans. I feel that the requirement that each and every fact, the burden which is placed upon the Intervenors, is in actuality a throwback to the notice pleading days prior to the 1930s.

I believe that the civil processes for litigation

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in the United States has evolved sufficiently since that time so that we have notice pleading and pleaded the notice provided by the two contentions of Lower Alloways Creek, and the Colemans placed the Licensee on notice as to the thrust, the fundamental consideration of alternatives which constitutes the basis of these two identical contentions.

And to suggest that we had to go and articulate every conceivable factual statement going to innumerable alternatives is just not reflective on modern-day legal practice.

CHAIRMAN MILHOLLIN: Are there any responses to this statement, to this motion?

Before we hear the responses, I should inform you that the five-minutes which the Board accorded for moving cameras has now expired, so it is time to take up your positions.

Are there responses to Mr. Onsdorff's motion for reconsideration?

MR. WETTERHAHN: We have none.

MR. SMITH: The Staff has none.

CHAIRMAN MILHOLLIN: The motion is denied.

MR. VALORE: Mr. Chairman, as a preliminary matter, I have a question I would like to put to the Board concerning the order. The question relates to page 4 of the order, approximately in the middle of the page. It would be actually

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the first full paragraph beginning where it says:

"The Board believes that this contention is behond the scope of the present proceeding. The Licensee, in order to store at Salem spent fuel generated elsewhere, would be required to obtain an additional license amendment in an additional proceeding. The existing license does not give the Licensee the right to receive at Salem spent fuel generated elsewhere. Thus, the present regulation already provides what the Township seeks."

Now my question is this. I have looked for that regulation and I am sure such a regulation does exist, but I would appreciate being enlightened, since I can't seem to find it.

Secondly, I'm not certain that such a regulation, once I was able to read it, is dispositive of the contention because the contention certainly covers transshipment between units on Artificial Island and there may be a regulation that deals with shipments offsite, but I don't think that would cover the situation where fuel from Salem 1 might be put in Salem 2, and vice versa.

So what I'm saying to the Board is, without reading that regulation, I have a difficult time evaluating whether I would want to make a motion for reconsideration. Could the Board give me the regulation number?

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CHAIRMAN MILHOLLIN: Mr. Smith, would you like to respond to that?

MR. SMITH: Ms. Moore will respond to that.

MS. MOORE: The regulation is Part 70 in relation to receipt of nuclear material licenses. And as far as shipment between certain Units 1 and 2, the regulation that would be appropriate would be 50.59.

MR. VALORE: Thank you, Mr. Chairman. I won't take the opportunity to review them at this moment. I will review them in a recess.

CHAIRMAN MILHOLLIN: Very well.

MR. ONSDORFF: One other preliminary matter.

In my motion not to utilize the procedure of the witness panel, I'm not necessarily arguing for reconsideration, possibly just a point of clarification.

I would request -- and it may very well be consistent with the Board's intent as to the use of the witness panel -- that all the parties be afforded the opportunity to question the members of the witness panel individually, direct their questions to a particular individual. Then I would not move to reconsider if that were the intent of the Board's ruling.

CHAIRMAN MILHOLLIN: You can assume that the Board would permit questions to be addressed to individual witnesses if it would appear that that were necessary for a party to have an adequate chance to cross-examine.

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MR. ONSDORFF: I certainly think it is. That's why I asked.

CHAIRMAN MILHOLLIN: So the answer to your question is

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as I've stated.

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MR.ONSDORFF: One further question. I would also assume that if a question is directed to a specific witness, if he did not feel that he was the proper person to provide the answer, that he so state. And he could possibly indicate if he felt there was another individual on the panel who is more qualified to provide the answer. And then the questioner would be left to his own choice as to whether to pursue the question with another member as opposed to some sort of in camera collaboration between members of the witness panel.

CHAIRMAN MILHOLLIN: When the occasion for the concern arises, you can state to the Board any feelings you may have on that point.

MR. ONSDORFF: Very well.

MR. SMITH: Mr. Chairman, are we still on preliminary matters?

CHAIRMAN MILHOLLIN: Yes. So this is the time when they should be brought before us.

MR. SMITH: I have another item. I don't know if the Board prefers cousel to stand or sit, is there any preference?

CHAIRMAN MILHOLLIN: It would be acceptable to the Board if counsel would sit and speak into the microphone.

MR. SMITH: Two points of clarification on the Board's order. By my reading of it, I see it as the Board saying that the only issue on the Township's contention is whether or not independent spent fuel storage installations are reasonable

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alternatives. Is that a correct reading of the Board's order?

CHAIRMAN MILHOLLIN: Well I'm reluctant to give an answer to that question until I know what context it might refer to, Mr. Smith.

MR. SMITH: The scope of cross-examination and potentially the witnesses that would be made available for cross-examination. The Township contention mentions several alternatives. From my reading of the Board's order, it is that the Board finds there is only a factual dispute relating to independent spent fuel storage installations.

CHAIRMAN MILHOLLIN: Well Mr. Smith, I'm afraid that you'll have to assume that. The analysis the Board did as to the motion to dismiss the contention referred to the motion and once the motion was denied, then we have simply the contention left. And it would be legitimate to pursue anything which is appropriate to the contention.

MR. SMITH: Thank you.

CHAIRMAN MILHOLLIN: Does that answer the question?

MR. SMITH: Yes, it does.

Well as long as you're talking about preliminary matters, on Lower Alloways Creek Contention 1, does the Board take the view that this contention was all inclusive of any alternatives or only those specifically set forth in the contention?

CHAIRMAN MILHOLLIN: My answer would have to be again

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the same as the one I just gave. We have received a motion to dismiss it. We performed an analysis of the motion and the responses to the motion. We denied the motion, but the contention remains and the view of the Board would be that our decision on matters which will come up at the hearing in relation to the contention will be, our decisions will be made according to whether we think the matters are relevant when they come up.

MR. SMITH: With reference to the objections of testimony that may be ruled on when made, all the parties did file objections, now would the procedure be that the objections would have to be restated or the Board will make a ruling based on what is in front of them as far as pleadings?

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CHAIRMAN MILHOLLIN: The best procedure might be for the parties simply to remind the Board that they did make the objection, to point out the objection. Then I think it is only fair, since no one has had a chance to respond to the objections, to hear remarks by counsel on those objections if remarks are in order, and I assume they would be.

So, without having the remarks now, we'll have to wait for the objections to be made.

MR. SMITH: One final point.

CHAIRMAN MILHOLLIN: I guess if the question is do we want to be reminded that you have an objection, I guess the answer is yes.

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MR. SMITH: The final point is that the Staff filed, on April 26, 1979, an NRC Staff motion for continuance to hear the Board questions. I understand from talking to you that some of the counsel have received this motion and some have not. I get an indication that the Board may not.

CHAIRMAN MILHOLLIN: The Board, for the record, should say that it received a telephone call from you stating that the motion would be made. The Board has not received the motion.

MR. SMITH: I apologize for the U.S. mail.

CHAIRMAN MILHOLLIN: Excuse me.

MR. KORNBLITH: I received it.

CHAIRMAN MILHOLLIN: Mr. Kornblith has received it, but he's the only member of the Board who has received it. He has the advantage of living in Washington. I live in Wisconsin. And as you know, Dr. Lamb lives in North Carolina, so we often don't receive things as rapidly as people in Washington do.

MR. SMITH: How would the Board want to proceed on that particular motion?

MR. ONSDORFF: Mr. Chairman, I think the parties would like the opportunity to respond before the Board reviews a motion which some of the parties have not even seen.

CHAIRMAN MILHOLLIN: Do you have extra copies of the motion with you?

MR. SMITH: Unfortunately, I do not.

MR. WETTERHAHN: By fortunate events, we do have extra

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copies of the Staff pleading, so we have copies sufficient for all the other parties.

MR. SMITH: I'd appreciate it if Mr. Wetterhahn will pass it out.

MR. WETTERHAHN: Mr. Fryling will pass them out.

(Document distributed.)

CHAIRMAN MILHOLLIN: The best procedure on this subject might be for us to take this motion up after lunch.

MR. SMITH: Fine.

MR. ONSDORFF: Mr. Chairman, I strenuously object to taking up this motion at any time. I feel that we discussed before the utility that the parties were directed to use in preparing for the hearing, based upon a conference telephone call. In reliance upon that conference phone call, at which time counsel for the Staff indicated a willingness to go forward at these hearings on the questions that the Board had raised pertaining to Three Mile Island, significant and substantial time was devoted to those questions because we consider them to be the most important.

Now for all of a sudden that couse of action to be changed 180 degrees strikes me as tremendously unfair. In addition to the fact that a phone call was made to the Board, I received no phone call that this motion was pending and I was denied the opportunity to use the time between the conference call and the beginning of these proceedings to act in a

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manner appropriate based upon representations that were made at the conference call.

In light of that, I would submit that it would be entirely inappropriate to consider this motion at the 59th minute of the 11th hour.

CHAIRMAN MILHOLLIN: Well Mr. Onsdorff, I interpret that as an argument which I thought I just suggested we would hold until after lunch.

I would recommend that -- well, the Board hereby orders that we postpone discussion of this motion until after lunch, and at that time we can take it up and we'll hear the views of counsel as to whether we should decide it now or later and what our decision should be.

MR. ONSDORFF: I'm sorry, Mr. Chairman, I thought you said we would argue on the merits. I was just suggesting that our discussion be limited to whether we should consider it at all.

CHAIRMAN MILHOLLIN: We'll take it up after lunch.

Any other preliminary matters at this time?

MR. WETTERHAHN: Does preliminary include the matter of going forward with regard to receipt of evidence?

CHAIRMAN MILHOLLIN: In my mind, that was the next item after the preliminary matters.

MR. WETTERHAHN: Okay.

Maybe Staff counsel could report on the agreements

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made, or I'll be glad to do it, with regard to the order of going forward.

CHAIRMAN MINHOLLIN: If there are no other preliminary matters at this time, we can take up the question of procedures, i there have been discussions or agreements on that point.

MR.ONSDORFF: Mr. Chairman, I might have one other comment. I'm not sure exactly where it would fit in, but we had some discussion as to an in camera session to consider the purportedly proprietary material of Exxon Nuclear.

We now have a sanitized version submitted which, upon review, we find completely unsatisfactory. It includes the basic conclusions of the study, but obviously the data relied upon the reach those conclusions are the heart of any cross-examination. Therefore, it would not be satisfactory from our point of view to use a document which has really no content that is susceptible to cross-examination.

MR. WETTERHAHN: Mr. Chairman, may I be heard for a second?

It was not the intent of the Licensee to substitute the non-proprietary version for the proprietary version in toto. We hopefully would minimize the need for an in camera session, so that members of the public could attend all hearings.

We are going to introduce both in evidence and, if the public advocate desires an in camera session, we have no objection to one.

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CHAIRMAN MILHOLLIN: I would suggest that at the time we discuss the procedure for presenting witnesses, we address the subject of the possible need for an in camera session on that document, so that it can be worked out with the greatest dispatch and the least burden to the public in being excluded from the hearing.

Any other preliminary matters?

(No response.)

CHAIRMAN MILHOLLIN: Well, then we come to the discus ion of the proposed order of proof, order of proceedings. Have the parties worked out agreements among themselves on this subject?

I notice from the filings the Licensee has suggested a certain order of procedure and no one has objected to that. Perhaps it would be most expeditious for the Licensee to repeat the Licensee's proposed order of proof, and then we can have comments on it if there are any.

MR. WETTERHAHN: Certainly.

We have had subsequent conversations -- I believe after the Board had a conference call, the parties remained on the line and reached an agreement. Let me recite my understanding of that agreement, and the other parties can comment if they so desire.

Basically the Licensee would proceed to present its direct case, which consists of the application as amended, one

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affidavit, which was attached to the Motion for Summary Disposition --

CHAIRMAN MILHOLLIN: Excuse me, which affidavit is that?

MR. WETTERHAHN: The affidavit of Mr. Edwin Liden.

The remainder of the evidence would consist of the proprietary version of the Exxon Nuclear Company report, the non-proprietary version and the accompanying affidavit supporting the proprietary nature of that document.

After which --- after the Licensee has presented its direct case, the Staff would then present its direct case, consisting of its safety evaluation and Environmental Impact Assessment --

CHAIRMAN MILHOLLIN: Excuse me, by direct case you're referring to --

MR. WETTERHAHN: A general case, the general documents in which it has reviewed the entire --

CHAIRMAN MILHOLLIN: You're not referring to its witnesses?

MR. WETTERHAHN: NOt at this time.

After that has been introduced, we would make our panel available for cross-examination on Contentions 2 and 6.

After cross-examination by all the parties would have been completed, the Intervenors would present any direct evidence, there would be cross-examination again by the other

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parties and, after all Intervenors have presented direct testimony, the Staff would present their evidence on particular issues, if there was additional evidence to be presented.

After all evidence and cross-examination on Contentions 2 and 6 have been completed, we would go to Contention 1.

CHAIRMAN MILHOLLIN: Excuse me, may I interrupt you for a second?

What would your view be as to rebuttal testimony?

MR. WETTERHAHN: We didn't discuss it. I don't think I could make a comment now.

CHAIRMAN MILHOLLIN: Perhaps I shouldn't have mentioned it.

MR. WETTERHAHN: Depending on how extensive rebuttal testimony has to be we would either, probably include it at the end of the consideration of contentions, or perhaps after all contentions have been considered. But that was not directly discussed during the course of our phone conversation.

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CHAIRMAN MILHOLLIN: Go ahead.

MR. WETTERHAHN: That was the essence of our discussion.

MR. KORNBLITH: Mr. Wetterhahn, the documentary evidence that you outlined originally, the application, SER, and so on, is that going to be introduced by stipulation or will we have witnesses sponsoring it?

MR. WETTERHAHN: We'll be glad to accept a stipulation by the parties but we have witnesses. Our panel will qualify--

MR. KORNBLITH: No stipulation has been agreed to as of now?

MR. WETTERHAHN: Not as of now. Maybe the parties are amenable to such a stipulation and would so stipulate.

CHAIRMAN MILHOLLIN: One advantage of stipulating to the Staff's documents of course is that no one would have to sponsor them if they're going to be introduced before the Staff witnesses come on.

MR. WETTERHAHN: Let me at this time move that the Applicant's evidence be accepted by stipulation.

MR. ONSDORFF: I believe that would be the requirement of a mutual agreement. I believe we would have to have some opportunity to discuss that briefly.

CHAIRMAN MILHOLLIN: Yes, that's correct. You would have to agree to that. I assumed you had already discussed

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it.

MR. ONSDORFF: Unfortunately we have not.

CHAIRMAN MILHOLLIN: Mr. Smith?

MR. SMITH: During the discussion we would also like a stipulation to the admission of the Staff's SER and the Environmental Impact Appraisal for the purposes of the general review that the Staff conducted, but the cross-examination would only be conducted on those portions relating to the contentions in the case.

CHAIRMAN MILHOLLIN: Would you repeat the last again?

MR. SMITH: The document contains an overview, as does the Applicant's application. It contains matters which are not in contention here. So we would like to have it stipulated into evidence. I'm just saying as we proceed we would have witnesses sponsor the sections of that document which relate to the contentions.

CHAIRMAN MILHOLLIN: And if there's additional evidence by your witnesses, presumably they would sponsor that evidence at that time?

MR. SMITH: Yes.

CHAIRMAN MILHOLLIN: Perhaps we can adjourn for five minutes to allow the parties to discuss this question.

MR. ONSDORFF: Five or seven minutes I think would be appropriate.

CHAIRMAN MILHOLLIN: Well, we will reconvene at 25

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minutes after 11:00 then.

(Recess.)

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CHAIRMAN MILHOLLIN: Ladies and gentlemen, please come to order. The hearing will come to order, please.

Has there been a stipulation as to the admissibility of the application and the Staff's milestone documents?

MR. ONSDORFF: Mr. Chairman, I believe we have reached agreement on all the documents except for the Exxon materials on which we have not reached agreement as to their admissibility without foundation testimony, and we have other objections to that material also.

I believe that's the situation among the parties.

MR. VALORE: I concur, Mr. Chairman.

CHAIRMAN MILHOLLIN: Very well.

Are there other matters which should be discussed now, which anyone wishes to discuss concerning the order of procedure, the order of witnesses or documents?

MR. WETTERHAHN: Just for the record, I would like to read into the record the particular exhibit numbers for the various sections of the application, such that it is in the record.

CHAIRMAN MILHOLLIN: Very well.

MR. WETTERHAHN: We would ask that the Reporter mark as Exhibit 1-A the November 13, 1977, letter to Mr. George Lear of the NRC, from F. E. Librizzi. We are asking only that

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the two-page cover letter be received in evidence inasmuch as the attachment has been superceded.

MR. VALORE: Mr. Chairman, I am not quite sure how that would affect the stipulation, and in fact it might not even bear on my contention or cross-examination; it may bear on the Public Advocate's. I don't want to get into his jurisdiction, but it just occurs to me if the document has been superceded, we might still, for a complete record, want the document in and whatever other document it superceded, rather than just omitting something that has been attached to a letter.

We didn't have any discussion on that point as I recall.

CHAIRMAN MILKOLLIN: Are you referring to the November 18th letter?

MR. VALORE: Exhibit 1-A.

MR. WETTERHAHN: As far as the application is concerned, it has been superceded by an amendment and therefore, it does not constitute part of the application. If you wish to introduce it into evidence, that's fine.

MR. ONSDORFF: I'm not quite sure I understand. We had an initial application and there have been material alterations to it. It might be very relevant as to the reasons there were amendments. I think I'm at a loss to understand exactly why something that has been revised does

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not reflect upon the initial submittal.

CHAIRMAN MILHOLLIN: Well, the cover letter obviously is admissible.

MR. ONSDORFF: I don't dispute that, sir.

CHAIRMAN MILHOLLIN: It would appear that the November 18th application is also admissible if somebody wants to introduce it into evidence.

MR. ONSDORFF: This was the agreement we made, that the application would be admitted. That's why I'm concerned that--

MR. WETTERHAHN: We considered the application as the application as amended, which is the document as exists today. And again I said it was superseded in fact by the February 14th, '79, submittal to the NRC.

You might note in that submittal there are bars along the side which indicate the changes that were made in the original application in submitting it on February 14th.

MR. ONSDORFF: Is it your statement, Mr. Wetterhahn, that the subsequent submittals contain the same material and indicate the changes?

MR. WETTERHAHN: They indicate the changes or they indicate where an addition has been made.

CHAIRMAN MILHOLLIN: Excuse me. Could you address your questions to the Board, and I will direct Mr. Wetterhahn to answer.

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MR. ONSDORFF: I apologize, Mr. Chairman.

I understood the agreement was to enable the proceeding to proceed in somewhat of an informal manner because in light of the action on the dismissal of various contentions, there is actually very little contained in the application which is relevant, at least as Counsel explained it to me, to the contentions still part of the case.

But in order to provide a complete record to the Board, and obviously this is necessary -- you can't look at something piecemeal -- we would put in the entire supporting documentation, but the hearing would really only address those points of contention. I agreed to that.

It seems to me that if we're going to have everything, everything means everything.

MR. WETTERHAHN: Maybe I can suggest a compromise, Mr. Chairman. We will make a copy of the attachment to the original application available to you. If you want to read and examine it and introduce it on your own, we are amenable to that.

CHAIRMAN MILHOLLIN: So there is no objection, Mr. Wetterhahn, to the introduction of the original November 18th application if any party wishes to introduce it?

MR. WETTERHAHN: That's correct.

CHAIRMAN MILHOLLIN: The Board does not hear any objection to the introduction of this document. So the Board's

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view is indeed we should go ahead with the exhibits.

MR. WETTERHAHN: I would designate as Licensee's Exhibit 1-B a December 13th, 1977, letter, again from Mr. Librizzi to Mr. Lear. That's one page, and a one-page attachment.

MR. ONSDORFF: Will you repeat the date on that, Mr. Wetterhahn?

CHAIRMAN MILHOLLIN: December 13th, 1977.

MR. WETTERHAHN: Licensee's Exhibit 1-C would be the February 14th, 1978, letter to Mr. George Lear from Mr. F. P. Librizzi. And attached to it is a 78-page attachment which is the revised application as I previously mentioned.

Licensee's Exhibit 1-D is the May 17th, 1978, letter to Lear from Librizzi, and two attachments totally 19 pages.

Licensee's Exhibit 1-E --

CHAIRMAN MILHOLLIN: Excuse me, Mr. Wetterhahn.

These letters which we're talking about from 1-D forward, they would be letters which supplement the application?

MR. WETTERHAHN: That's correct.

CHAIRMAN MILHOLLIN: Thank you.

MR. WETTERHAHN: Licensee's Exhibit 1-E is the July 31st, 1978, letter to Mr. A. Schwencer of the NRC from Mr. Librizzi, and an attachment of 32 pages.

Licensee's Exhibit 1-F is the August 22nd, 1978,

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letter, one page, and a one-page attachment.

Licensee's Exhibit 1-G --

MR. ONSDORFF: I'm sorry. Would you indicate, Mr. Chairman, the people corresponding on 1-F?

MR. WETTERHAHN: It's to Mr. Schwencer from Mr. Librizzi.

CHAIRMAN MILHOLLIN: Excuse me, Mr. Wetterhahn. Are all the letters from Mr. Librizzi?

MR. WETTERHAHN: Yes, they are-- Let me check.

(Pause.)

Yes, they are.

CHAIRMAN MILHOLLIN: The addressees are different in the letters?

MR. WETTERHAHN: The addressees are different. I believe the branch may have changed, or there may have been some internal reorganization.

CHAIRMAN MILHOLLIN: Very well.

MR. WETTERHAHN: Licensee's Exhibit 1-G is an October 13th, 1978, single-page letter, again to Mr. Schwencer, with a ten-page attachment.

Licensee's Exhibit 1-H, an October 31st, '78, letter to Mr. Schwencer again. And the attachment is some 23 pages, with a single-page letter.

Licensee's Exhibit 1-I is a November 20th, '78, letter, the same addressee, with a two-page attachment.

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Licensee's Exhibit 1-J, the same correspondents, December 22nd, 1978, letter, one page and a 13-page attachment.

Licensee's Exhibit 1-K is a January 4th, 1979, letter between the same correspondents, and it has a three-page attachment.

I would now designate as Licensee's Exhibit 2 the affidavit of Edwin A. Liden, of 15 pages.

I would note that page 14 and two lines on page 15 address Lower Alloways Creek Contention 3 which is no longer at issue. Therefore, we are not asking--

CHAIRMAN MILHOLLIN: Excuse me, Mr. Wetterhahn. Could you give us the date of this affidavit?

MR. WETTERHAHN: February 21st, 1979.

CHAIRMAN MILHOLLIN: Mr. Wetterhahn, is that the affidavit which is part of your motion for summary disposition?

MR. WETTERHAHN: That's correct.

MR. KORNBLITH: While you're interrupted, Mr. Wetterhahn, going back to 1-J, what was the date of that letter? Is that 12/22?

MR. WETTERHAHN: 12/22/1978.

MR. KORNBLITH: Thank you.

(Whereupon, the documents referred to were marked as Licensee's 1-A through 1-K and 2 for identification.)

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MR. WETTERHAHN: We have not reached a stipulation on my next three designated exhibits. Let me just ask at this time that they be marked just for continuity.

I would ask that Licensee's Exhibit 3 be Exxon Nuclear Company Document XN-NS-TP-009, "Fuel Storage Racks Corrosion Program, Boral - Stainless Steel."

This is proprietary to the Exxon Nuclear Company, and it has been given to the Reporter under seal.

(Whereupon, the document referred to was marked as Licensee's Exhibit 3 for identification.)

That document is dated November 9, 1978.

MR. ONSDORFF: I just reiterate for the record, Mr. Chairman, while we have no objection to marking that document for identification, our objection to its admission stands.

CHAIRMAN MILHOLLIN: Very well. The record will reflect the objection.

MR. WETTERHAHN: I ask that a document dated January 4th, 1979, which transmits an application for withholding proprietary information from public disclosure regarding Exhibit 3 and the affidavit of the Exxon Nuclear Corporation in support of that request of four pages be marked as Licensee's Exhibit 4.

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(Whereupon, the document referred to was marked as Licensee's Exhibit 4 for identification.)

MR. ONSDORFF: Mr. Chairman, I may have reviewed that and it may be among my documents but I would like the opportunity to examine the proposed exhibit, the January '79 letter. I may not have any objection to it. I don't recall reading it recently.

MR. WETTERHAHN: It had been sent to you, though? Is that correct?

MR. ONSDORFF: I'm not sure.

CHAIRMAN MILHOLLIN: I take it then what you're saying is you do not at this time stipulate to its admissibility?

MR. ONSDORFF: That's correct.

CHAIRMAN MILHOLLIN: Very well.

MR. WETTERHAHN: The last Licensee's Exhibit will be Licensee's Exhibit 5. That's a document with the number XN-NS-TP-009/NP, entitled "Fuel Storage Racks Corrosion Program, Boral - Stainless Steel (Non-proprietary Version)," and that is dated March 1979.

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(Whereupon the document referred to was marked as Exhibit 5 for identification.)

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CHAIRMAN MILHOLLIN: Excuse me, Mr. Wetterhahn, do the parties stipulate to the admissibility of Exhibit Number 5?

MR. ONSDORFF: No we do not, Mr. Chairman.

CHAIRMAN MILHOLLIN: Very well.

MR. WETTERHAHN: That completes the Licensee's exhibits at this time.

CHAIRMAN MILHOLLIN: Thank you, Mr. Wetterhahn.

Does the Staff wish to propose exhibits at this time?

MR. SMITH: Yes, we would. If I may take a moment, I would like to give them to the Reporter now.

MR. ONSDORFF: Mr. Chairman, possibly while we have this opportunity, I could take a look at this letter and we could obviate my concern possibly as to the proposed Exhibit Number 4.

CHAIRMAN MILHOLLIN: You're referring to the letter which applies for proprietary status?

MR. ONSDORFF: That's correct.

CHAIRMAN MILHOLLIN: Mr. Wetterhahn, can you supply a copy of that letter?

(Document handed to Mr. Onsdorff.)

CHAIRMAN MILHOLLIN: Mr. Onsdorff, you now have a copy?

MR. ONSDORFF: I have been loaned one, Mr. Chairman.

MR. KORNBLITH: Mr. Wetterhahn, I don't seem to have a copy of that letter. Would you furnish it to me at your

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convenience, just to complete my files?

MR. WETTERHAHN: Certainly.

We suddenly have a copy for the Board.

CHAIRMAN MILHOLLIN: Mr. Smith, would you care to proceed at this time?

MR. SMITH: Yes, I would, sir.

MR. WETTERHAHN: The Licensee appears to have extra copies of everything. I'm now giving Mr. Onsdorff an additional copy.

MR. SMITH: Mr. Chairman, the Staff would like to have marked for identification a January 15, 1979 letter from Mr. Al Schwencer to Mr. Librizzi consisting of two pages and transmitting the Safety Evaluation by the Office of Nuclear Reactor Regulation and the Environmental Impact Appraisal by the Office of Nuclear Reactor Regulation. We would request it be marked as Staff Exhibit 1A.

CHAIRMAN MILHOLLIN: Excuse me, Mr. Smith, 1A refers to the Safety Evaluation Report only?

MR. SMITH: No, I would just like to -- I thought we would have the cover letter and then identify the Safety Evaluation Report and the EIA as another.

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CHAIRMAN MILHOLLIN: Go ahead.

SMITH: The next exhibit, which is an attachment to the letter, would be Staff Exhibit 1B, Safety Evaluation by the Office of Nuclear Reactor Regulation Relating to the

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Modification of the Spent Fuel Storage Pool, Facility Operation License Number DPR-70, Public Service Electric and Gas Company, Salem Nuclear Generating Station Unit Number 1, Docket Number 50-272, which consists of 20 pages.

MR. ONSDORFF: Mr. Chairman, excuse me, a point of clarification. I think it might be easier if we would number all the exhibits consecutively, so that cross-examining, when you say Exhibit 1, there's a conflict in using the numbering, I believe, between the Licensee and the Staff which could be confusing at times. I would suggest we number all exhibits consecutively.

MR. WETTERHAHN: Either way, it doesn't matter.

CHAIRMAN MILHOLLIN: Very well.

Would you like to have this be Exhibit Number 6 and Exhibit Number 7?

MR. SMITH: That will be fine.

CHAIRMAN MILHOLLIN: We will mark the letter transmitting the Safety Evaluation and the Environmental Impact Analysis as Exhibit Number 6A.

MR. SMITH: Yes.

CHAIRMAN MILHOLLIN: And then the succeeding exhibit is 6B, which would be the Safety Evaluation?

MR. SMITH: That's correct.

CHAIRMAN MILHOLLIN: Very well. Proceed.

MR. SMITH: And 6C would be the Environmental Impact

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Appraisal by the Office of Nuclear Reactor Regulation Relating to the Modification of the Spent Fuel Pool, Facility Operating License Number DPR-70, Construction Permit Number CPPR-53, Public Service Electric and Gas Company, Salem Nuclear Generating Station Unit Number 1, Docket Number 50-272.

(Whereupon, the documents previosly referred to as Staff Exhibits 6A through 6C were marked for identification.)

MR. SMITH: That's all the exhibits the Staff intends to introduce at this time.

Mainly for clarification, Mr. Chairman, there are a number of minor corrections to this document. None of them go to the parts pertaining to the contentions. When we have the Project Engineer on the stand, I would like to make those corrections at that time.

CHAIRMAN MILHOLLIN: Very well.

MR. ONSDORFF: Mr. Chairman, I believe there are other exhibits, if I'm not mistaken, that the Staff wishes to submit at a later time. Just for administrative purposes, you don't want to have those marked now?

MR. SMITH: We can. Yes, that's fine.

CHAIRMAN MILHOLLIN: Should we do that?

MR. SMITH: Okay.

CHAIRMAN MILHOLLIN: I take it, however, that there is

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no agreement as to the admissibility of these succeeding documents, or shall we wait until they're read?

MR. ONSDORFF: We'd like to opportunity to examine those. These we're certainly familiar with, but the others --

CHAIRMAN MILHOLLIN: Very well, proceed, Mr. Smith.

MR. SMITH: This would be Exhibit 7, which would be -- which was attached to the affidavit of Mr. John Weeks. The affidavit we'll be introducing as testimony, it will not be marked as an exhibit.

But the attachments, the first one which we have marked as Exhibit 7, it's entitled, Corrosion of Materials in Spent Fuel Pools, John R. Weeks, July 1977, Department of Applied Science, Brookhaven National Laboratory, Upton, New York 11973.

MR. KORNBLITH: Hold on just a minute.

MR. HLUCHAN: I wonder if we could have that repeated, Mr. Chairman.

CHAIRMAN MILHOLLIN: Yes, that was a little fast, Mr. Smith, would you repeat that for us?

MR. SMITH: This was attached to the affidavit of John Weeks in our response to the motion for summary disposition. Exhibit 7 marked for identification, Corrosion of Materials in Spent Fuel Storage Pools, John R. Weeks, July 1977, also known as on the cover page BNL-NUREG 23021.

CHAIRMAN MILHOLLIN: Would you read the numbers again,

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please?

MR. SMITH: BNL-NUREG 23021.

CHAIRMAN MILHOLLIN: Thank you, Mr. Smith.

(Whereupon, the document previously referred to as Staff Exhibit 7 was marked for identification.)

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MR. SMITH: Marked for identification, Exhibit 8 would be BNL-NUREG 25582, Corrosion Considerations in the Use of Boral in Spent Fuel Storage Pool Racks, J.R. Weeks, January 1979.

CHAIRMAN MILHOLLIN: And the date, Mr. Smith?

MR. SMITH: January 1979.

MR. KORNBLITH: Excuse me, I have a copy dated December '78.

MR. SMITH: That is missing the cover page. The cover page should read January 1979, those are the ones we're introducing, it's the same document that you have. It was prepared there and went to publication in January 1979.

MR. KORNBLITH: Thank you.

MR. SMITH: Mr. Chairman, again for purposes of clarification, the Staff wanted to have the Staff Exhibit 6 and the Staff Exhibit which has been marked for identification 7 and 8 bound into the record, will that still be able to be be done under this procedure?

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The reason being the usual practice that the SER-EIA is bound into the record, although it's an exhibit. Exhibit 7 and 8 is an attachment to testimony and, although it is not required to be bound in, we would prefer it would be bound in with the testimony. It really makes it easier when a person is reading.

CHAIRMAN MILHOLLIN: It seems to be a reasonable procedure. We'll assume objections to the testimony will be heard, if there are any. Yes.

(Whereupon, the document previously referred to as Staff Exhibit 8 was marked for identification.)

MR. SMITH: I would like to have the SER bound in now, if that's accepted by stipulation, and the EIA.

That completes the Staff exhibits.

CHAIRMAN MILHOLLIN: There being no objection, it may be bound into the transcript.

(The document follows)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

January 15, 1979

Docket Nos. 50-272
and 50-311

Mr. F. P. Librizzi
General Manager - Electric Production
Production Department
Public Service Electric and Gas Company
80 Park Place
Newark, New Jersey 07101

Dear Mr. Librizzi:

Enclosed for your information are the following items relating to your request of November 18, 1977, for authorization to increase the storage capacity of the spent fuel storage pool at the Salem Nuclear Generating Station, Unit No. 1:

1. Safety Evaluation by the Office of Nuclear Reactor Regulation dated

2. Environmental Impact Appraisal by the Office of Nuclear Reactor Regulation dated

As indicated in Section 2.3 of the Safety Evaluation Report, if the proposed modifications are not performed until after the first refueling outage, you will be required to provide your intended procedures and safety precautions that will be observed during the modifications.

Sincerely,

A. Schwencer, Chief
Operating Reactors Branch #1
Division of Operating Reactors

Enclosures:
1. Safety Evaluation
2. Environmental Impact Appraisal

cc: w/enclosures
See next page

Mr. Alfred C. Coleman, Jr.
Mrs. Eleanor G. Coleman
35 "K" Drive
Pennsville, New Jersey 08070

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Board Panel
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# SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

# RELATING TO THE MODIFICATION OF THE SPENT FUEL STORAGE POOL

FACILITY OPERATING LICENSE NO. DPR-70

PUBLIC SERVICE ELECTRIC & GAS COMPANY

SALEM NUCLEAR GENERATING STATION UNIT NO. 1

DOCKET NO. 50-272

## 1.0 INTRODUCTION

By letter dated November 18, 1977, as revised on February 14, 1978, and as supplemented on December 13, 1977, May 17, July 31, August 22, October 13 and 31, November 20 and December 22, 1978, and January 4, 1979, Public Service Electric & Gas Company, et al. (PSE&G) requested an amendment to facility Operating License No. DPR-70 for the Salem Nuclear Generating Station, Unit No. 1. The request was made to obtain authorization to provide additional storage capacity in the Salem Unit No. 1 Spent Fuel Pool (SFP). By letter dated April 12, 1978, the licensee submitted Amendment No. 42 to the Application for Licenses for the construction and operation of the Salem Nuclear Generating Station, Units No. 1 and 2, consisting of changes to the Final Safety Analysis Report including a revised description of the spent fuel storage facilities for both units to reflect the proposed design changes of the Unit No. 1 license amendment application. The proposed modifications would increase the capacity of each SFP from the present design capacity of 264 fuel assemblies to a capacity of 1170 fuel assemblies.

The increased SFP capacity would be achieved by installing new racks with a decreased spacing between fuel storage cavities. The present rack design has a nominal center-to-center spacing between fuel storage cavities of 21 inches. The proposed new spent fuel racks would be modular stainless steel structures with individual storage cavities to provide a nominal center-to-center spacing of 10.5 inches. Each stainless steel wall of the individual cavities would contain sheets of Boral (Boron Carbide in an aluminum matrix) to provide for neutron absorption. The SFPs are located in separate fuel handling buildings adjacent to the respective reactor containment buildings. The general arrangement and details of the proposed new spent fuel storage racks are shown in Figures 1.2-1 through 1.2-4 of the licensee's revised submittal of February 14, 1978.

The expanded storage capacity of the Unit No. 1 SFP would allow Unit No. 1 to operate until about 1996, or until about 1993 while still maintaining the capability for a full core discharge.

The major safety considerations associated with the proposed expansion of the SFP storage capacity for Salem Unit 1 are addressed below. A separate environmental impact appraisal has been prepared for this proposed action.

## 2.0 DISCUSSION AND EVALUATION

### 2.1 Criticality Considerations

The proposed spent fuel storage racks will be an assemblage of open-ended double-walled stainless steel boxes with storage space for one fuel assembly in the cavity of each box. These boxes will be about 14 feet long and will have a square cross section with an inner dimension of 8.97 inches. The nominal distance between the centers of the stored fuel assemblies, i.e., the lattice pitch, will be 10.5 inches. The effective side dimension of the square fuel assembly, which was used in the criticality calculations, is 8.432 inches. This results in an overall fuel region volume fraction of 0.645 in the nominal storage lattice cell. Boral (boron carbide and aluminum) plates are to be press-fitted and seal-welded in the cavities between the double stainless steel walls. In its May 17, 1978 submittal, PSE&G states that stringent in-process inspection and process controls are imposed during manufacturing of the Boral plates to assure that they have a density of at least 0.020 gram of the boron-ten (B-10) isotope per square centimeter of plate. In this full array of storage boxes, there will be two Boral plates between adjacent fuel assemblies. This makes the minimum areal density of boron between fuel assemblies $2.41 \times 10^{21}$ B-10 atoms per square centimeter.

As stated in PSE&G's February 14, 1978 submittal, the fuel criticality calculations using the proposed new spent fuel racks are based on unirradiated fuel assemblies with no burnable poison and a fuel loading of 44.7 grams of uranium-235 (U-235) isotope per axial centimeter of fuel assembly.

The Exxon Nuclear Company (Exxon) performed the criticality analyses for PSE&G. Exxon's initial calculational method was the KENO-III Monte Carlo program with 18 energy group cross sections, which were obtained from the CCELL, BTR-I and GAMTEC-II programs. These programs were used to determine the effects on the effective multiplication factor (Keff)* in the SFP of mechanical tolerances, fuel and boron loading tolerances, temperature, and fuel density. Exxon then used the KENO-IV Monte Carlo program, with 123 energy group cross sections,

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* Keff, effective multiplication factor, is the ratio of neutrons from fissions in each generation to the total number lost by absorption and leakage in the preceding generations. To achieve criticality in finite system, Keff must equal 1.0.

which were obtained from the NITAWL and XSDRN programs, to calculate the Keffs for the nominal spent fuel storage lattice and for a postulated worst case, wherein the worst case geometry was assumed along with a 100°C temperature for the water between the fuel assemblies, while the water in the fuel assemblies was assumed to be 20°C. Exxon's calculated value for this worst case Keff is 0.923.

Exxon checked the accuracy of this KENO-IV method by calculating two types of experiments, which were done at the Oak Ridge National Laboratory by E. B. Johnson and G. E. Whitesides. One type was an arrangement of stainless steel clad, uranium dioxide fuel pins in unborated water. The other type was an arrangement of uranium metal fuel pins in unborated water on both sides of a central Boral plate which had a density of $3.8 \times 10^{21}$ atoms of B-10 per square centimeter. The maximum difference between the calculated and experimental values of Keff was found to be 0.013$\Delta$k (or about 1.3 percent).

These storage racks are designed to prohibit the insertion of a fuel assembly anywhere except in prescribed locations. In its May 17, 1978 response to our request for additional information, PSE&G stated that it is not possible to place a fuel assembly either between storage rack modules or between the outer periphery of the storage racks and the spent fuel pool walls.

In response to our request for additional information, PSE&G stated in its May 17, 1978 submittal that neutron transmission tests will be performed on the completed rack modules to verify the presence of all the Boral plates in the racks prior to placing any fuel in the racks.

The above results compare favorably with the results of calculations made with other methods for similar fuel pool storage lattices which also assumed new, unirradiated fuel with no burnable poison or control rods in unborated water. These calculations yield the maximum neutron multiplication factor that could be obtained throughout the life of the fuel assemblies. This includes the effect of the plutonium which is generated during the fuel cycle.

The NRC acceptance criterion for the criticality aspects of fuel storage in high density fuel storage racks is that Keff shall not exceed 0.95, including all uncertainties, under all conditions throughout the life of the racks. This acceptance criterion is based on the overall uncertainties associated with the calculational methods, and it is our judgment that this provides sufficient margin to preclude criticality in

fuel pools. A technical specification which limits Keff in spent fuel pools to 0.95 will be provided to assure this criterion is adhered to.

Since the maximum Keff that could be experienced in spent fuel pools can not practicably be measured (considering at any one time only a limited number of fuel assemblies, mostly irradiated ones, will be in the pool), it is prudent to use a calculated Keff. To preclude any unreviewed increase, or increased uncertainty, in the calculated value which could raise the actual Keff without it being detected, a limit on the maximum fuel loading is also required. Accordingly, we find that the proposed high density storage racks will meet the NRC criterion when the fuel loading in the assemblies described in these submittals is limited to 44.7 grams or less of U-235 per axial centimeter of stored fuel assembly. This restriction will be imposed by a Technical Specification change.

2.1.1 Conclusion

We find that when any number of the Salem plant fuel assemblies, which PSE&G states will have no more than 44.7 grams of U-235 per axial centimeter of fuel assembly, are loaded into the proposed racks, the Keff in the fuel pool will be less than the 0.95 limit. We also find that in order to preclude the possibility of the Keff in the fuel pool exceeding 0.95 without being detected, it is prudent to prohibit the use of these high density storage racks for fuel assemblies that contain more than 44.7 grams of U-235 per axial centimeter of fuel assembly. On the basis of the information submitted, and the Keff and fuel loading limits stated above, we conclude that there is reasonable assurance that the use of the proposed racks will not result in a criticality.

2.2 Spent Fuel Cooling

The licensee considered the additional heat load that would result from the additional fuel assemblies that will be stored in the SFP and calculated the effect of this heat load on the SFP cooling system. A description of the various assumptions considered in this review and the maximum heat loads expected are discussed below.

The licensed core power for Salem Unit No. 1 is 3338 thermal megawatts (MWt). PSE&G plans to refuel annually. This will require the replacement of about 65 of the 193 fuel assemblies every year. In its February 14, 1978 submittal, PSE&G assumed a 150-hour decay time after 1095 effective full power days (EFPD) of reactor operation to calculate the maximum in-pool heat generation rates per fuel assembly. Using the

method given on pages 9.2.5-8 through 14 of the NRC Standard Review Plan with the above assumptions, PSE&G calculated a decay heat load of 55.4 kw for an average power fuel assembly. Using this same method, PSE&G calculated that the maximum SFP heat load during the 18th annual refueling, i.e., the one that fills the pool, will be 18.6 x $10^6$ Btu/hr (5.45 MWt).

The SFP cooling system consists of two pumps and one heat exchanger. Each pump is designed to pump 2300 gpm (1.15 x 106 pounds per hour). The heat exchanger is designed to transfer 11.9 x $10^6$ Btu/hr (3.35 MWt) from 120°F fuel pool water to 95°F component cooling water, which is flowing through the heat exchanger at a rate of 1.49 x $10^6$ pounds per hour.

Should a full core offload be required, PSE&G states that the core would be cooled in the reactor vessel with the residual heat removal system until the SFP cooling system could keep the outlet water temperature from exceeding 150°F. At 150°F, the SFP cooling system will transfer 26.38 x $10^6$ Btu/hr (7.36 MWt). For a full core offload after 15 annual refuelings, PSE&G calculated that 570 hours (about 22 days) of decay time would be required before the SFP cooling system, with only one pump operating, would keep the outlet water temperature below 150°F.

2.2.1 Evaluation

PSE&G's calculated fuel pool outlet water temperatures are consistent with the stated cooling water flow rates and the design of the heat exchanger. We calculate that with one pump running at its design capacity and the 150 hour decay heat load in the pool at the 18th refueling (i.e., 18.6 x $10^6$ Btu/hr) the maximum spent fuel pool outlet water temperature will be about 134°F, which is consistent with the licensee's calculations.

As stated in Section 9 of the FSAR, up to 100 gpm of makeup water for the SFP is available from the refueling water storage tank, which is designed to seismic Class I criteria. We find that PSE&G's calculated peak heat loads for the SFP with modified racks are conservative and acceptable. We also find that the maximum incremental heat loads that will be added by increasing the number of spent fuel assemblies in the SFP from 264 to 1170 will be 4.5 x $10^6$ Btu/hr. This is the difference in peak heat load for a full core offload that essentially fill the present and the modified pool. The total peak heat load resulting from a full core offload will be 42.1 x $10^6$ Btu/hr for the modified design as compared to 37.6 x $10^6$ Btu/hrs for the existing rack design. For the full core offload that fills the pool (i.e., 15 prior annual refuelings), we calculate that the maximum required cooling time in the reactor vessel

that will be needed to keep the spent fuel pool water temperature below 150°F with only one spent fuel pool cooling pump running will be about the same as the 570 hours calculated by PSE&G. Therefore, the maximum delay in removing a full core from the reactor vessel would be about 22 days.

Assuming an SFP water temperature of 150°F, the minimum possible time to achieve bulk pool boiling after any credible additional failure in the SFP cooling system would be about six hours. After bulk boiling commenced, the maximum evaporation rate would be about 56 gpm. We find that six hours would be sufficient time for PSE&G to establish a 56 gpm makeup rate. We also find that under bulk boiling conditions the surface temperature of the fuel will not exceed 350°F. This is an acceptable temperature from the standpoint of fuel element integrity and surface corrosion.

2.2.1 Conclusion

We find that the present cooling capacities in the spent fuel pool of the Salem Unit No. 1 will be sufficient without modification to handle the incremental heat load that will be added by the proposed modifications. We also find that this incremental heat load will not alter the safety considerations of spent fuel pool cooling from that which we previously reviewed and found to be acceptable.

2.3 Installation of Racks and Fuel Handling

PSE&G's present plans are to modify the spent fuel storage racks at both Salem Nuclear Generating Station Units 1 and 2 prior to offloading spent fuel into either pool. If these plans are realized, at the time of the modification, the pools will not be contaminated with radioactivity and the racks can be changed without having water in the pools.

Since there would be no fuel assemblies in the fuel pool during the modification, it would not be possible to have an accident involving radioactivity. In the event that the modifications are not performed until after the first refueling outage for either Unit 1 or 2, PSE&G will be required to provide the staff with its intended procedures and safety precautions that will be used to ensure that an accident involving irradiated fuel does not occur.

After the new racks are installed in the pool, the fuel handling procedures that will be implemented in and around the pool will be the same as those procedures that were in effect prior to the modifications. These were previously reviewed and found acceptable by the NRC.

The spent fuel handling equipment has a separate spent fuel cask loading pool adjacent to the spent fuel pool, connected by a canal. Mechanical stops on the crane prevent passage of a spent fuel cask over or near the spent fuel pool.

Even if the modification were to be performed with water in the spent fuel pool, and should the cask drop or tip while in the handling building, any resultant water loss from the cask loading pit would neither create a safety hazard nor affect other safety-related equipment. Since two gates separate the cask loading pit from the spent fuel pool, water leakage from the spent fuel pool in the event of a cask drop directly over the loading pit will be prevented.

The NRC staff has under way a generic review of load handling operations in the vicinity of spent fuel pools to determine the likelihood of a heavy load impacting fuel in the pool and, if necessary, the radiological consequences of such an event. At present Salem 1 is prohibited by its technical specifications from the movement of loads with weight in excess of 2500 pounds over spent fuel assemblies in the SFP.* This restriction is to limit the maximum weight, i.e., a fuel assembly, that can be carried over the stored fuel assemblies until our generic review is completed. There are two other lighter loads, however, identified by the licensee, that are handled over stored fuel assemblies. These loads are the Fuel Assembly Handling Fixture and Burnable Poison Rod Assembly Tool. Although lighter than a single fuel assembly, these two loads could develop greater kinetic energy should they be dropped because of greater potential drop heights. This larger kinetic energy could theoretically cause more damage to stored fuel assemblies than that calculated assuming a single dropped fuel assembly. The licensee has therefore examined the use of these loads and has provided the information presented in Table 2.3-1.

As indicated, the maximum potential kinetic energy of an unloaded Fuel Assembly Handling Fixture is approximately twice that of a fixture when carrying a fuel assembly. And the maximum potential energy contained in the Burnable Poison Rod Assembly Tool is approximately four (4) times that of a dropped fuel assembly and handling fixture.

Based on the breaking strength of the wire rope reeving system, the design factor when handling an unloaded fixture or tool is 160:1 and 86:1, respectively. Further, the licensee points out

*Salem Unit 1 Technical Specifications, Section 3.9.7.

that whereas the fuel handling crane is limited to handling loads not exceeding 2500 pounds it is rated and tested, per OSHA (ANSI B 30.2) requirement, for 10,000 pounds (5 tons). In addition, as indicated in Table 2.3-1, the design factors for the attachment points for the fixture and tool (in an unloaded condition) are 28:1 and 17:1, respectively.

Based on the above, we believe that the likelihood of a drop of the unloaded fixture or tool due to either a structural failure of the crane or reeving components is very remote because of the existing large design margins. In addition to the design factors indicated above, to preclude a load drop due to it becoming disengaged from the crane hook, or failure of the hook itself, the licensee has indicated that it will provide a back up means of supporting the fixture or tool, as illustrated in Figure 2.3-1 (as provided in the licensee's December 22, 1978 submittal), in addition to the hook-throat latch type safety hook. This backup cable sling will have a safety factor comparable to the crane, i.e., 5:1. Therefore, if the tool or fixture should be improperly engaged or otherwise become disengaged from the crane hook, there is reasonable assurance that, it would be supported by the wire rope backup cable and is, therefore, acceptable.

The fuel handling crane is rated for 5 tons and tested in accordance with OSHA (ANSI B 30.2) requirements. The ratio of the weight of the unloaded fixture and tool to the cranes rated load capacity is 1:31 and 1:15, respectively. These margins, in our view, are sufficient to preclude their dropping due to a structural crane failure.

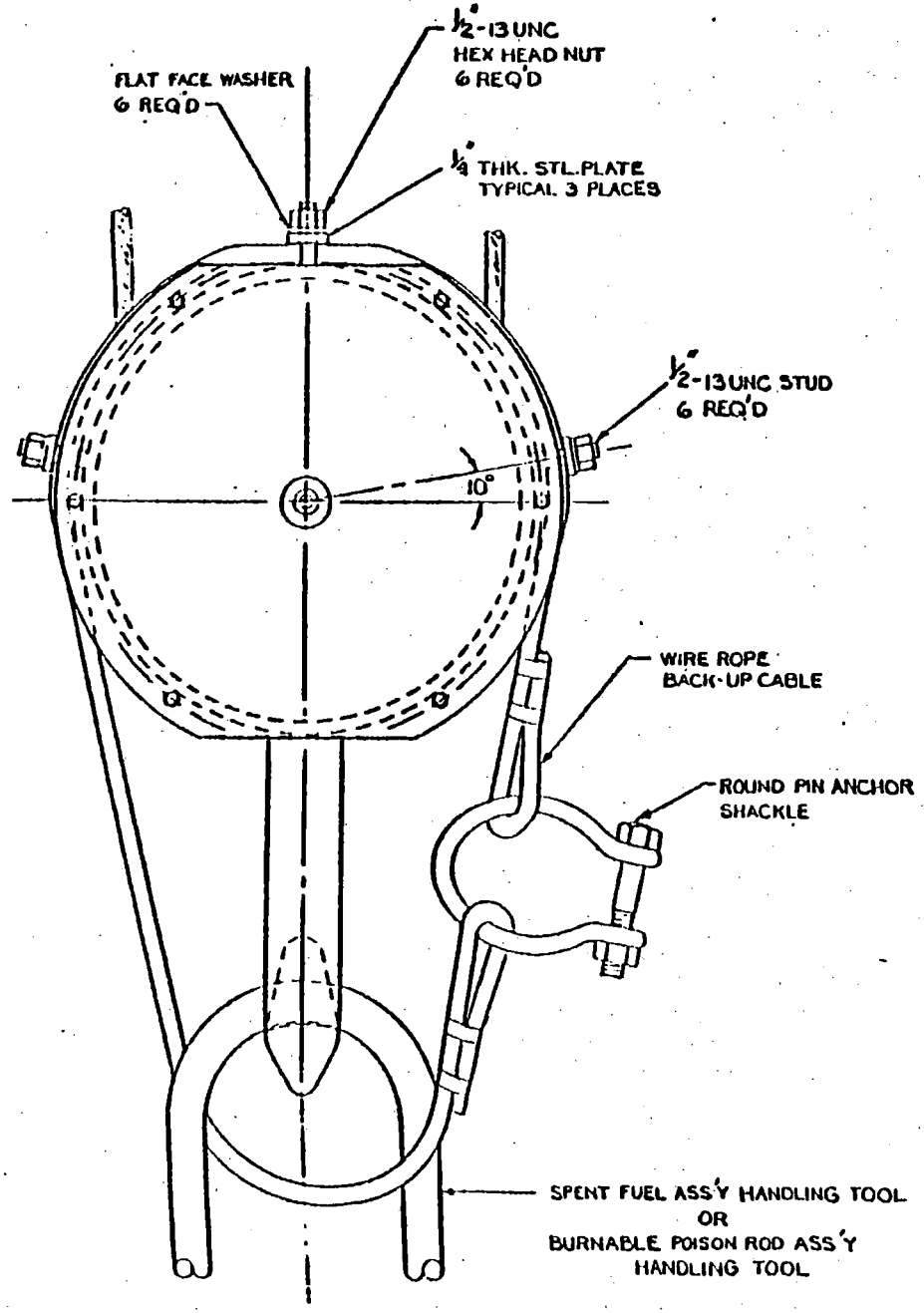
2.3.1 Conclusion

The consequences of fuel handling accidents in the spent fuel pool area are not changed from those presented in the Safety Evaluation Report dated October 1974. This design basis accident is independent of the number of fuel assemblies in the pool and is defined for fuel with the least decay after shutdown for refueling. The accident is assumed to occur at a time after shutdown identified in the Technical Specifications as the earliest time fuel handling operations may begin. The Technical Specifications which prohibit loads greater than 2500 pounds allow flexibility in the movements of fuel and other relatively light loads, while providing reasonable assurance that the consequences of the design basis accident will not be exceeded.

Table 2.3-1

| | Fuel Assembly Handling Fixture | Burnable Poison Rod Assembly Tool |
|---|---|---|
| Maximum Drop Height of Empty Tool over storage racks, ft. | 15 | 15 |
| Weight of Empty Tool, lbs. | 350 | 650 |
| Maximum Kinetic Energy at Impact, ft. lbs. | 5250 | 9750 |
| Maximum Drop Height of Loaded Tool over storage racks, ft. | 1 1/4 | 1 1/4 |
| Maximum Weight of Loaded Tool, lbs. | 1965 | 2265 |
| Maximum Kinetic Energy at Impact ft. lbs. | 2456 | 2831 |
| Unloaded Tool, Wire Rope Design Factor (based on breaking strength) - Reeving system | 350/56000 | 650/5600 |
| Loaded Tool, Wire Rope Design Factor (based on breaking strength) - Reeving system | 1965/56000 | 2265/5600 |
| Design Factor of remaining portions of fuel handling crane with respect to its loading of 5 tons | 5:1 | 5:1 |
| Design Factor of Tool Inducing the Connection Point (loaded condition) | 5:1 | 5:1 |
| Design Factor of Tool Including the Connection Point (unloaded condition) | 28:1 | 17:1 |

Note 1: Fuel Handling crane is load tested per Chapter 2-2 of ANSI B30.2


FLAT FACE WASHER
6 REQ'D
½-13 UNC
HEX HEAD NUT
6 REQ'D
¼ THK. STL. PLATE
TYPICAL 3 PLACES
½-13 UNC STUD
6 REQ'D
10°
WIRE ROPE
BACK-UP CABLE
ROUND PIN ANCHOR
SHACKLE
SPENT FUEL ASS'Y HANDLING TOOL
OR
BURNABLE POISON ROD ASS'Y
HANDLING TOOL

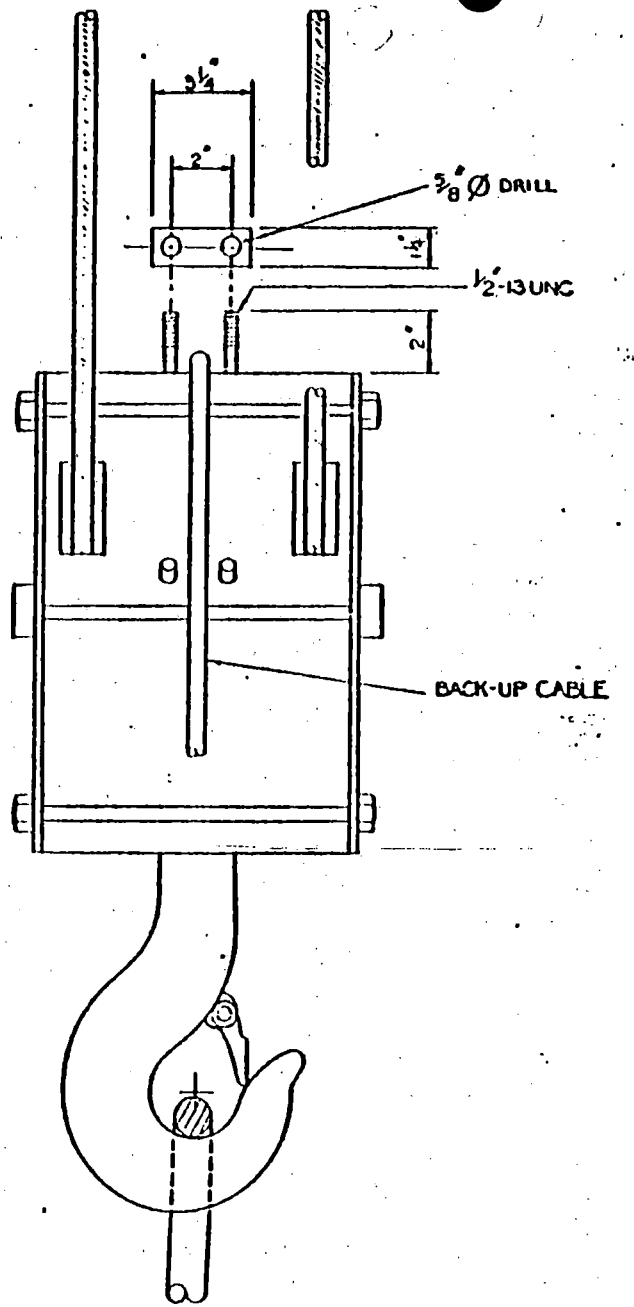

3¼
2
⅜ Ø DRILL
1¼
½-13 UNC
2
BACK-UP CABLE

FIGURE 2.3-1

## 2.4 Structural and Mechanical Design

The current fuel storage racks in the Salem Unit 1 spent fuel pool provides for a storage capacity of 264 fuel assemblies. The proposed modification consists of replacing the existing racks which will provide a storage capacity of 1170 fuel assemblies with a nominal center-to-center spacing between fuel assemblies of 10-1/2 inches. The storage cells are constructed of type 304 stainless steel, aluminum-clad Boral material, with the remaining portions of the rack structures constructed of type 304 stainless steel.

The design uses a stiffened module base which directly supports the fuel assemblies and an upper box structure which contains the spent fuel storage cells. These structures are assembled by welding. The rack bases are supported off the spent fuel pool floor by seven (7) support legs on each module. The upper box structure consists of a top grid assembly, mid-height peripheral members and plate diaphragms (stiffened, where necessary, to prevent shear/compression buckling), and are welded to the module base. Each cell is a square cross section formed from an inner shroud of stainless steel, a center sheet of aluminum clad Boral, and an outer shroud of stainless steel. A flared guide and transition section is provided at the top of each storage cell.

### 2.4.1 Evaluation
### Structural and Mechanical

The supporting arrangements for the modules, including their restraints, the design, the fabrication, the installation procedures, the structural design and analyses procedures for all loadings, including seismic and impact loadings, the load combinations, the structural acceptance criteria, the installation, and the applicable industry codes were all reviewed in accordance with the applicable portions of the NRC OT Position for Review and Acceptance of Spent Fuel Pool Storage and Handling Applications, April 1978.

The fuel pool is located in the Fuel Handling Building. A response spectrum dynamic seismic analysis of the fuel rack structures was performed using horizontal and vertical response spectra as seismic input which conform to those in the Salem FSAR and approved in the staff's SER for Salem Units 1 and 2. The seismic response spectra for the spent fuel storage pool floor were generated from the horizontal and the vertical time-history accelerations calculated at the level of the pool floor in the seismic analysis of the fuel handling building. The seismic modal responses of the racks and the three spatial earthquake components of rack response were combined in accordance with

Standard Review Plan Section 3.7.2 and Regulatory Guide 1.92, Rev. 1, entitled, "Combining Modal Responses and Spatial Components in Seismic Response Analyses."

The damping values utilized in the seismic analysis of the rack modules were consistent with those approved in the Salem FSAR and approved in the staff's SER for Salem Units 1 and 2. No credit was taken for additional damping due to the racks being submerged in water. The amount of mass added to a rack to account for submergence in the pool was taken to be the mass of the water enclosed in the spent fuel pool storage rack.

Time-history analyses were performed to account for the effects of the clearance gap between a storage cell and the fuel assembly contained therein. The analysis was performed using an artificially generated time-history whose response spectrum enveloped the floor level response spectrum for the floor of the Salem fuel storage pools. (The method was the same as that approved previously for Arkansas Nuclear One in the December 17, 1976 NRC Safety Evaluation Report for its spent fuel rack modification.) The results of the analysis were that the maximum combined support reactions calculated were 1.18 times the maximum combined reactions calculated by the simplified linear elastic time-history analysis with no gap between the storage cell walls and the fuel assembly. Therefore, the seismic loads developed by the linear elastic analysis of the complete rack structure were increased by a factor of 1.18. A maximum impact load on the fuel cell associated with the 1.18 impact factor was shown to be much less than the load capability of the fuel cell can walls. No adverse effects on the rack structures or fuel assemblies resulted from these considerations. Time-history analyses were also performed to account for the effect of rack modules potentially sliding on the pool floor and impacting the pool walls at the lower wall restraints. A row of four modules along the length of the pool was modeled.

Each module was modeled as a simplified two degree of freedom system with gap elements included at all thermal expansion gaps and friction elements provided to account for the racks sliding on the pool floor. The time-history used was the same as that developed for the storage cell/fuel assembly analysis. The friction factors between the module feet and the stainless steel floor were taken from General Electric Report No. 60 GL20, "Investigation of the Sliding Behavior of a Number of Alloys Under Dry- and Water-Lubricated Conditions," by R.E. Lee, Jr., January 30, 1960, which was published by General Electric. Subsequent evaluation indicated that the values used are consistent with the values contained in a report entitled,

"Friction Coefficients of Water-Lubricated Stainless Steels for a Spent Fuel Rack Facility," by Professor Ernest Robinowicz of the Massachusetts Institute of Technology. This analysis yielded a conservative reaction force at the pool wall which was used in the design of the wall restraints since it is improbable that the racks would slide at all. In addition, the rack module base was analyzed using this impact force directly superimposed on the other seismic and dead weight loads yielding no adverse effects.

The rack material properties for structural components used in the analysis of the fuel racks were taken from Appendix I of Section III of the ASME Boiler and Pressure Vessel Code. The material properties consistent with a temperature of 150°F were used for all load cases at normal operating temperatures and the material properties consistent with a temperature of 240°F were used for the load cases at maximum temperature.

Results of the seismic analysis show that the racks are capable of withstanding the loads associated with all the design loading conditions without exceeding allowable stresses.

The racks were also designed to withstand the local as well as gross effects of the impact of a fuel assembly dropped from a height of 15 inches such that no significant deformation of the rack module configuration will occur for the postulated dropped fuel assembly. The local effects were determined through a test on 2-foot long sections of a Boral poison spent fuel cell together with the flared lead in section to determine the load-deflection characteristics of the cells. Two cases were considered, one where the assembly falls vertically directly on one cell but rotated 45° such that the corners of the assembly hit the side of the cell, and the other where the assembly falls vertically at the center of a group of four cells. The first case results in maximum force and deflection on an individual cell while the second case results in a maximum force being applied to the rack structure. In both cases crushing of the cell was shown to be limited to the upper 7 inches of the lead-in section, above the rack module upper grid structure and above stored fuel assemblies. The effects of a dropped assembly accident inside a storage cell was also evaluated. The impact energy was absorbed by the 1/4-inch base plate and a small amount of bending distortion of the base assembly beam members. In addition, the effects of a dropped assembly accident, in which the assembly rotates as it drops, were evaluated. In this case, the assembly impacts a row of storage cells and comes to rest on top of the rack modules. The results indicate that this case results in lower loads than the simple vertical drop case.

The fuel pool structure consists of concrete walls and floor lined with type 304 stainless steel liner plate. The increase in floor loading due to the proposed spent fuel storage racks is well under 1% of the total mass lumped at the level in the fuel handling building analytical model. The walls have been investigated for the seismic effect of the heavier racks and stored fuel. The new high density racks have no appreciable effect on the structural stability and seismic response of the fuel handling building. The pool structure meets all allowable limits imposed on the design in the FSAR considering any new loadings.

Material Considerations

In August 1978, the staff was made aware of a problem at the Monticello facility that had been identified with regard to spent fuel storage racks similar in design to those proposed for use at Salem Unit No. 1. The problem involved the in-leakage of water into the stainless steel cans, such that hydrogen gas was generated due to oxidation of the exposed aluminum material. This gas caused a pressure buildup and resultant swelling of the stainless steel cans such that the removal of a fuel assembly, if located at an affected storage location, could not be removed. A discussion of how this potential problem has been considered at Salem is provided below.

The Salem high density spent fuel storage cell utilized Boral material sealed between an inner and outer stainless steel shroud. This cell will be supplied to Exxon Nuclear Company by Brooks and Perkins, Incorporated. The stainless steel shroud (or cladding) is type 304. The boral consists of an 1100 series aluminum and boron carbide matrix core sandwiched between two layers of 1100 series aluminum cladding. The stainless steel shrouds are seal-welded together at both ends such that the annulus between the shrouds is leaktight. In the event that there are leaks allowing water to enter the annulus, there will be corrosion of the aluminum with hydrogen gas as an off product. Once the pressure buildup within the composite exceeds 1.8 to 3 psi, the inner shroud will bulge inward and will contact the fuel bundle. In an effort to avoid the consequences of water leakage into the cell annulus, the licensee will impose strict welding procedures, welding operations and qualifications of welders in accordance with the requirements of the ASME Code, Section IX, and nondestructive examination requirements, in accordance with ASME Section X. In addition, leaktightness tests will be conducted using helium mass spectrometer tests to ensure 100% leaktightenss with a 95% confidence level.

The response of a poison spent fuel storage cell to internal pressurization caused by corrosion has been evaluated by Exxon Nuclear Co. in a series of tests which demonstrated that if a leak exists in a fuel storage cell after installation in the water filled pool and before fuel is inserted, the worst consequence would be the inability to insert the fuel into that cell. Secondly, if a leak develops in a fuel storage cell during the operating lifetime of the storage pool and fuel is already in place, the most severe results would be that the fuel could not be withdrawn with the normal fuel withdrawal force limit of the fuel handling machine. In this event, semi-remote tooling will be used to provide vent holes in the top of the storage cell annulus to relieve the pressure on the fuel assembly and permit routine removal.

Based upon our review to date of the corrosion potential in spent fuel pool environments and previous operating experience, we have concluded that at the pool temperature and the quality of the demineralized water (with dissolved boric acid) there is reasonable assurance that no significant corrosion of the stainless steel in the racks, the fuel cladding or the pool liner will occur over the lifetime of the plant, thereby significantly impacting the structural integrity of the racks. Since the possibility of long-term storage of spent fuel exists, the effects of the pool environment on the racks, fuel cladding and pool liner are under continued investigation.

2.4.2 Evaluation Summary

The analyses, the design, the fabrication and the installation of the proposed fuel rack storage system are in accordance with accepted criteria. The analysis of the structural loads imposed by dynamic, static, seismic and thermal loadings, and the acceptance criteria for the appropriate loading conditions, are in accordance with the appropriate portions of the NRC OT Position for Review and Acceptance of Spent Fuel Pool Storage and Handling Applications, April 1978.

The mechanical properties for the materials utilized in the rack design were those consistent with the pool maximum operating temperature of 150°F. The quality assurance procedures for the materials, the fabrication, the installation and the examination of the new rack structures are in acceptable general conformance with the accepted requirements of ASME Code, Section III, Subsection NF, Articles NF-2000, NF-4000 and NF-5000.

The effects of the additional loads on the existing pool structure due to high density storage racks have been examined. The pool structural integrity is assured by conformance with the original FSAR acceptance criteria. In turn, this provides adequate assurance that the pool will remain leaktight.

There is no evidence at this time to indicate that corrosion of the fuel assemblies, the stainless steel rack structures or the fuel pool liner will occur at the temperatures and quality of the demineralized water (with dissolved boric acid) to be maintained in this pool. The welding techniques and procedures and the nondestructive examination techniques provide a high level of confidence that the annuli containing the Boral in the installed cans will be leaktight. Although no leakage is likely to occur, tests were conducted which demonstrated that if isolated cases of leakage should occur in service, any swelling of the cans would not represent a safety hazard.

Upon exposure of the Boral plates ($B_4C$/Al matrix) to the spent fuel pool water, galvanic coupling between the aluminum-Boral liner, aluminum binder and the stainless steel shroud could occur. Deterioration of the Boral would be limited to edge attack by general corrosion and pitting corrosion of the aluminum liner and binder in the general area of the leak path. The $B_4C$ neutron adsorption particles are inert to the pool water and would become embedded in corrosion products preventing loss of the $B_4C$ particles. Thus, this small amount of deterioration would have no effect on neutron shielding, attenuation properties or criticality safety. The hydrogen produced by corrosion of the aluminum will be released by venting to minimize bulging.

To aid in verifying the above conclusions, the licensee has committed to conduct a long-term fuel storage surveillance program to verify that the spent fuel storage cell retains the material stability and mechanical integrity over the life of the spent fuel storage racks under actual spent fuel pool service conditions. Sample flat plate sandwich coupons and short fuel storage cell sections will be placed in an empty fuel storage cell and periodically examined visually and by weight analysis.

### 2.4.3 Conclusion

Based on the evaluation presented above, we find that the new proposed Salem spent fuel storage racks and the design and analyses performed for the racks, support frames and pool are in conformance with established criteria, codes and standards.

## 2.5 Occupational Radiation Exposure

If the modification is accomplished before the first refueling, there should be no occupational exposure associated with the removal, disassembly and disposal of the low density racks and the installation of the high density racks, because both spent fuel pools would be dry and without spent fuel or water containing radioactivity.

If the modification is not accomplished until after the first refueling, there would be some occupational exposure to radiation. Experience at similar facilities where re-racking has occurred has demonstrated that such exposures can be kept to acceptably low levels. Prior experience indicates this should be from about 2 to 5 man-rems. This would represent a small fraction of the total man-rem burden from occupational exposure at the Salem Station. Based on our review, we conclude the exposures from this operation should be as low as reasonably achievable (ALARA).

We have estimated the increment in onsite occupational dose resulting from the proposed increase in stored fuel assemblies at both units on the basis of information supplied by the licensee, and by using relevant assumptions for occupancy times and for dose rates in the spent fuel area from radionuclide concentrations in the SFP water. The spent fuel assemblies themselves contribute a negligible amount to dose rates in the pool area because of the depth of water shielding the fuel. The occupational radiation exposure resulting from the proposed action represents a negligible burden. Based on present and projected operations in the spent fuel pool area, we estimate that the proposed modification should add less than one percent to the total annual occupational radiation exposure burden at both units. The small increase in radiation exposure should not affect the licensee's ability to maintain individual occupational doses to as low as is reasonably achievable and within the limits of 10 CFR Part 20. Thus, we conclude that storing additional fuel in the two pools will not result in any significant increase in doses received by occupational workers.

## 2.6 Radioactive Waste Treatment

The station contains waste treatment systems designed to collect and process the gaseous, liquid and solid wastes that might contain radioactive material. The waste treatment systems were evaluated in the Salem 1 and 2 Safety Evaluation (SER) dated October 1974 for the station. There will be no change in the waste treatment systems or in the conclusions of the evaluation of these systems in Section 11.0 of the SER because of the proposed modification.

## 3.0 SUMMARY

Our evaluation supports the conclusion that the proposed modifications to the Salem Unit 1 SFP are acceptable because:

(1) The increase in occupational radiation exposure to individuals due to the storage of additional fuel in the SFP would be negligible.

(2) The installation and use of the new fuel racks does not alter the potential consequences of the design basis accident for the SFP, i.e., the rupture of a single fuel assembly and the subsequent release of the assembly's radioactive inventory within the gap.

(3) The likelihood of an accident involving heavy loads in the vicinity of the spent fuel pools is sufficiently small that no additional restrictions on load movement are necessary while our generic review of the issues is underway.

(4) The physical design of the new storage racks will preclude criticality for any credible moderating condition with the limits to be stated in the technical specifications.

(5) The SFP has adequate cooling with existing systems.

(6) The structural design and the materials of construction are adequate to assure safe storage of fuel in the pool environment for the duration of plant lifetime and to withstand the seismic loading of the design earthquakes.

## 4.0 CONCLUSION

We have concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations and that the proposed action to permit installation and use of high density spent fuel storage racks in the spent fuel pool at the Salem Nuclear Generating Station, Unit 1 will not be inimical to the common defense and security or to the health and safety of the public.

Date: January 15, 1979

# ENVIRONMENTAL IMPACT APPRAISAL

# BY THE OFFICE OF NUCLEAR REACTOR REGULATION

# RELATING TO THE MODIFICATION OF THE

# SPENT FUEL POOLS

FACILITY OPERATING LICENSE NO. DPR-70

CONSTRUCTION PERMIT NO. CPPR-53

PUBLIC SERVICE ELECTRIC & GAS COMPANY

SALEM NUCLEAR GENERATING STATIONS

UNIT 1

DOCKET NO. 50-272

## 1.0 Description of Proposed Action

By letter dated November 18, 1977, and as revised on February 14, 1978, as supplemented on December 13, 1977, May 17, July 31, August 22, October 13, and 31, November 20, December 22, 1978 and January 4, 1979, Public Service Electric and Gas Company (the licensee) requested an amendment to Facility Operating License No. DPR-70 for the Salem Nuclear Generating Station, Unit No. 1. The request was made to obtain authorization to provide additional storage capacity in the Salem Unit No. 1 Spent Fuel Pool (SFP). Also, by letter dated April 12, 1978, the licensee submitted Amendment No. 42 to the Application for Licenses for the construction and operation of the Salem Nuclear Generating Station, Units Nos. 1 and 2, consisting of changes to the Final Safety Analysis Report, including a revised description of the spent fuel storage facilities for both Salem units to reflect the fact that design changes proposed for Unit No. 1 are planned for Unit No. 2 as well.

The proposed modifications would increase the capacity of each SFP from the present design capacity of 264 fuel assemblies to a capacity of 1170 fuel assemblies.

This Environmental Impact Appraisal relates to the proposed licensing action of amending the Operating License No. DPR-70 for Salem Unit No. 1 to permit modifications of the storage capacity of the Unit No. 1 SFP. The licensee has also indicated, however, by submitting Amendment 42 to the Salem Station FSAR, that it plans identical modifications to Salem Unit No. 2. Since the Salem Station Final Environmental Statement (FES) in April 1973 considered the environmental impacts of the Salem Station rather than for any one particular unit and since the license plans to modify the Unit No. 2 SFP, also, we have addressed cumulative environmental impacts of the expansion of both SFP's that should be addressed in this Environmental Impact Appraisal. However, since the licensing action proposed at this time only involves the Salem Unit No. 1 operating license, certain areas, such as the need for storage capacity and alternatives, are considered primarily from the standpoint of the Unit No. 1 proposal, with reference to Unit No. 2, where appropriate. Similarities or differences between the two units are pointed out for clarification.

## 2.0 Need for Storage Capacity

The NRC issued the Salem Unit No. 1 operating license on August 13, 1976. Commercial operation began on June 30, 1977. The first refueling of the facility is scheduled for the

spring of 1979, at which time 1/3 of the core (about 65 fuel assemblies) is expected to be removed and transferred to the SFP. The current storage capacity of the SFP is 264 fuel assemblies. A full core for Salem Unit No. 1 consists of 193 fuel assemblies. Under the current fuel management plan, the reactor is scheduled to be refueled in this manner annually. After the second refueling, scheduled for the spring of 1980, the present Unit No. 1 SFP would not have room to off-load a full core. While the ability to off-load a full core is not required for safety, it is a desirable capability from an economic and operational standpoint. For example, it would allow inspection of core internals.

If Salem Unit No. 1 is refueled annually, the present SFP would be full after the refueling scheduled for the spring of 1982. If the storage capacity of the SFP is not increased or if alternate storage space for spent fuel from this facility is not located, Salem Unit No. 1 would have to be shutdown in 1983.

The proposed modification would extend the spent fuel storage capability of the pool and leave room for a complete core discharge, through 1993 or through 1996, without room for a full core discharge. In our evaluation, we considered the impacts which may result from storing an additional 906 spent fuel assemblies in the Unit No. 1 SFP and from a similar increase in the Unit No. 2 SFP.

The proposed modification would not alter the external physical geometry of the spent fuel pool or involve significant modifications to the SFP cooling or purification systems. The proposed modification would not affect in any manner the quantity of uranium fuel consumed by the reactor over its anticipated operating life and thus in no way would affect that amount of spent uranium fuel discharged from the reactor. The rate of spent fuel discharged and the total quantity discharged during the anticipated operating lifetime of Unit No. 1 or Unit No. 2 would be unchanged as a result of the proposed expansion. The modification would increase the number of these spent fuel assemblies that could be stored in the SFP of each unit at one time and the storage time of some.

## 3.0 Fuel Reprocessing History

Currently, spent fuel is not being reprocessed on a commercial basis in the United States. The Nuclear Fuel Services (NFS) plant at West Valley, New York, was shut down in 1972 for alterations and expansions; on September 22, 1976, NFS informed

the Commission that they were withdrawing from the nuclear fuel reprocessing business. The Allied General Nuclear Services (AGNS) proposed plant in Barnwell, South Carolina is not licensed to operate. The General Electric Company's (GE) Midwest Fuel Recovery Plant in Morris, Illinois, now referred to as Morris Operation (MO), is in a decommissioned condition. Although no plants are licensed for reprocessing fuel, the MO storage pool and the NFS plant storage pool (on land owned by the State of New York and leased to NFS thru 1980) are licensed to store spent fuel. The storage pool at West Valley is not full but NFS is presently not accepting any additional spent fuel for storage. Construction of the AGNS plant receiving and storage station has been completed. AGNS has applied for but has not been granted - a license to receive and store irradiated fuel assemblies there, prior to a decision on the licensing action relating to the separation facility.

## 4.0 The Facility

Salem Unit No. 1 and Unit No. 2 (the facilities) are described in the Final Environmental Statement (FES) related to operation of these facilities issued by the Commission in April 1973. Each facility has a pressurized water reactor (PWR) rated at 3338 megawatts thermal (MWt) core power and 1090 megawatts (MWe) gross electrical output. Pertinent descriptions of principal features of each facility as it currently exists are summarized below to aid the reader in following the evaluations in subsequent sections of this appraisal.

## 4.1 Station Cooling Water Systems

The Salem service water system is a once-through cooling system. Water is pumped from the Delaware River at a flow rate of approximately 41,900 gallons per minute (for each unit), circulated through each facility's turbine services and nuclear services cooling systems and returned to the Delaware River via the circulating water system discharge piping. During normal operations the total heat load for the service water system for each unit is approximately 176 x $10^6$ Btu/hr, of which the nuclear services portion is about 59 x $10^6$ Btu/hr.

The component cooling water system, which is cooled by the nuclear services portion of the service water system, is designed to remove heat from major components in the station, including the components associated with the removal of heat from the spent fuel pool.

4.2 Radioactive Wastes

The station has waste treatment systems that are designed to collect and process the gaseous, liquid and solid waste that might contain radioactive material from both units. The waste treatment systems for Units 1 and 2 are evaluated in the Final Environmental Statement (FES) dated April 1973. There will be no change in the waste treatment systems described in Section 3.4 of the FES because of the proposed SFP modification of Unit No. 1 or Unit No. 2.

4.3 Purpose of SFP

Each SFP is designed to receive irradiated fuel assemblies removed from the reactor prior either to accomplish a core refueling or to allow for inspection or modification of core internals. The latter purpose may require space in the pool for up to a full core. When first removed from the reactor, assemblies are initially intensely radioactive (due to their fresh fission product content) and have a high thermal output. The SFP provides shielding and cooling.

The major portion of the radioactivity and its associated heat decays in the first 150 days following removal from the reactor core. After this period, the spent fuel assemblies may be placed into a heavily shielded fuel cask and shipped offsite. Space permitting, spent fuel assemblies may be stored for an additional period allowing continued fission product decay and thermal cooling prior to shipment.

4.4 Spent Fuel Pool Purification System

The following description of the SFP purification system is for Salem Unit No. 1. Unit No. 2 has an identical system. The SFP purification loop consists of a 100-gpm purification pump, a cartridge filter, a mixed bed demineralizer and the required piping, valves and instrumentation. The pump draws water from the SFP cooling system loop and discharges through the cartridge filter and the demineralizer. The water is then returned to the pool. It is possible to operate the system with the demineralizer bypassed. There is also a separate pool skimmer system with two skimmers, a 100 gpm pump and one filter.

This purification system is similar to such systems at other nuclear plants which have demonstrated the ability to maintain concentrations of radioactivity in the pool water at acceptably low levels.

Because we expect only a small increase in radioactivity to be released to the pool water as a result of the proposed modification as discussed in Section 5.3.1, we conclude the present spent fuel pool purification system is adequate for the proposed modification and will be able to keep the concentrations of radioactivity in the pool water to acceptably low levels.

## 5.0 Environmental Impacts of Proposed Action

### 5.1 Land Use

The proposed modifications will alter only the spent fuel storage racks. It will not alter the external physical geometry of the SFP structures for either unit. The SFPs were designed to store spent fuel assemblies under water for a period of time to allow shorter lived radioactive isotopes to decay and to reduce the associated thermal heat output. The Commission has never set a limit on how long spent fuel assemblies could be stored onsite. The longer the fuel assemblies decay, the less radioactivity they contain. The proposed modifications will not change the basic land use of the SFPs. Each pool was designed to store the spent fuel assemblies for up to 4 normal refuelings. The proposed modifications would provide storage for up to 18 normal refuelings. The pools were intended to store spent fuel. This use will remain unchanged by the proposed modifications.

### 5.2 Water Use

There will be no significant change in plant water consumption or use as a result of the proposed modifications. As discussed subsequently, storing additional spent fuel in the SFP will slightly increase the heat load on the SFP cooling system. This heat is transferred in turn to the component cooling water system and to the service water system. The modifications will not change the flow rate within these cooling systems. The temperature of the SFP water during normal refueling operations and with only one SFP cooling pump running is expected to remain below 134°F, as compared to the 120°F used as the design basis in the FSAR. Therefore, the rate of evaporation and thus the need for makeup water will not be significantly changed by the proposed modifications.

### 5.3 Radiological

#### 5.3.1 Introduction

The potential offsite radiological environmental impacts associated with the expansion of the spent fuel storage capacity were evaluated and determined to be environmentally insignificant as addressed below.

Since the present racks will accommodate spent fuel from four normal (annual) refuelings, the additional storage would consist of spent fuel which has decayed at least 4 years.

During the storage of the spent fuel under water, both volatile and nonvolatile radioactive nuclides may be released to the water from the surface of the assemblies or from defects in the fuel cladding. Most of the surface materials thus released would consist of activated corrosion products such as Co-58, Co-60, Fe-59 and Mn-54 which are not volatile. The radionuclides that might be released to the water through defects in the cladding, such as Cs-134, Cs-137, Sr-89 and Sr-90 are also predominantly nonvolatile. The primary impact of such nonvolatile radioactive nuclides is their contribution of radiation levels to which workers in and near the SFP would be exposed. The volatile fission product nuclides of most concern that might be released through defects in the fuel cladding are the noble gases (xenon and krypton), tritium and the iodine isotopes.

As indicated above, we are concerned here only with such releases from the stored spent fuel as would occur after 4 years of storage. Experience at the Morris Operation and Nuclear Fuel Services indicates that there is little radionuclide leakage from spent fuel stored in pools after the fuel has cooled from four to six months. The predominant radionuclides in the spent fuel pool water appear to be those that were present in the reactor coolant system prior to refueling (reactor coolant mixes with SFP water during refueling operations) and those present in crud dislodged from the surface of the spent fuel during transfer from the reactor core to the SFP. During and after refueling, the SFP purification system, which is in continuous operation, reduces the radioactivity concentrations thus introduced to the SFP considerably. It is theorized that most failed fuel contains small, pinhole-like perforations in the fuel cladding at the reactor operating condition of approximately 800°F. After a few weeks in the spent fuel pool, the fuel clad temperature becomes relatively cool, approximately 180°F. This substantial temperature reduction reduces the rate of release of fission products from the fuel pellets and decreases the gas pressure in the gap between pellets and clad, thereby tending to retain the fission products within the gap. In addition, most of the gaseous fission products have short half-lives and decay to insignificant levels within a few months. Based on information submitted to the NRC staff, there has not been any significant leakage of fission products from spent light water reactor fuel stored in the Morris Operation (MO) (formerly Midwest Recovery Plant) at

Morris Illinois, or at Nuclear Fuel Services' (NFS) storage pool at West Valley, New York. Spent fuel assemblies have been stored in these two pools which, while in a reactor, were determined to have significant leakage. After storage in the onsite spent fuel pool, these fuel assemblies were later shipped to either MO or NFS for extended storage. Although the fuel assemblies exhibited significant leakage at reactor operating conditions, there was no significant leakage from this fuel by the time it was shipped to these offsite storage facilities. Nor has there been subsequent significant leakage from the assemblies.*

5.3.2 Radioactive Material Released to Atmosphere

With respect to gaseous releases, the only significant noble gas isotope attributable to storing additional assemblies for a longer period of time (beyond 4 years) would be krypton-85. As discussed previously, experience has demonstrated that after spent fuel has decayed a few months, there is no significant release of fission products from defective fuel. However, as a measure of conservatism, we assumed that an additional 114 Curies per year of krypton-85 would be released from both units when the modified pools are completely filled. This assumption is based on the expected annual reload cycle and the total number of fuel assemblies that could be stored in the modified pool. This would result in an additional total body dose to an individual at the site boundary of less than 0.005 mrem/year. Such a dose would be insignificant when compared to the approximately 100 mrem/year that an individual receives from natural background radiation. Furthermore, the additional total body dose to the estimated population within a 50-mile radius of the plant that would result from this assumption would be less than 0.005 manrem/year. Such a dose would be less than the natural fluctuations in the annual dose that this population would receive from natural background radiation. Under our conservative assumptions, these exposures represent an increase of less than 0.5% of the exposures from the station evaluated in the Salem 1/2 FES for an individual at the site boundary and the population. Based on the above scoping evaluation, we conclude that the proposed modifications will not have any significant impact on exposures offsite.

* NEDO 21326-I, January 1977, "Consolidated Safety Analysis Report for Morris Operations," Morris, Illinois, Vol. I.

ASME publication (Morris Operations) 77-JPGC-NE-15 by L. L. Denio, et al., "Control of Nuclear Fuel Storage Basin Water Quality by Use of Powered Ion Exchange Resins and Zeolites," June 19, 1977.

Assuming onsite storage for several years, iodine-131 releases from spent fuel assemblies to the SFP water will not be significantly increased because of the expansion of the fuel storage capacity since the iodine-131 inventory in the fuel will have decayed to negligible levels between refuelings for each unit. This will occur in the first 4 years of storage presently possible without these modifications. The storage of additional spent fuel assemblies is expected to increase the bulk water temperature above the 120°F during normal refuelings used in the design analysis. Based on our calculations and assuming one pump running at its design capacity, the peak bulk SFP water temperature may go as high as 134°F and may be above 120°F for as long as 32 days following the final incremental discharge of fuel that fills the pool to capacity. Most airborne releases from the plant result from leakage of reactor coolant which contains tritium and iodine in higher concentrations than would the SFP water. Therefore, even if there were a temporary higher evaporation rate from the spent fuel pool, the resulting increase in tritium and iodine released from the station would be small compared to the amount normally released from the station without these modifications as was previously evaluated in the FES. In addition, the station radiological effluent Technical Specifications, which will not be affected by this action, will limit the total releases of gaseous activity including those from stored spent fuel. If levels of airborne radioiodine become too high, the air over the SFP can be routed through charcoal filters for the removal of radioiodine before release to the environment.

5.3.3 Solid Radioactive Wastes

Without the proposed modifications, the concentration of radionuclides in each SFP is already controlled by the filter and the demineralizer and by decay of short-lived isotopes. Experience has shown that the activity will be highest during refueling operations while spent fuel is being removed from the core and while reactor coolant water is introduced into the pool. The activity decreases as the pool water is processed through the filters and demineralizer. The increase of radioactivity, if any, as a result of these modifications should be minor because the spent fuel affected is that which has already been in the SFP for 4 or more years. That fuel will already be relatively cool, thermally, and radionuclides in that fuel will have decayed significantly.

While we believe that there should not be an increase in solid radwaste due to the modification, as a conservative estimate we have assumed that the amount of solid radwaste may be

increased by 30 cubic feet of resin a year from the demineralizer (an additional resin bed/year) from each unit. Because neither Salem 1 or 2 has gone through a refueling, we do not consider the solid waste shipped from the station to date as being representative of what should be expected on the average from the two units each year in the future. The annual average amount of solid waste shipped from a representative number of pressurized water reactor sites during 1972 to 1976 is about 12,000 cubic feet per year. If the storage of additional spent fuel assemblies does increase the amount of solid waste from the SFP purification systems by the assumed 60 cubic feet per year, the increase in total solid waste volume shipped from the station would be about 0.5% and would not have any significant environmental impact.

Since the present spent fuel racks have not been contaminated, disposal at a licensed burial site need not be considered unless the proposed modifications are significantly delayed such that they could not be accomplished before the first refueling of the unit is required.

If the modification is not accomplished until after the first refueling for each unit, the spent fuel racks would be contaminated and would be disposed of at a licensed burial site. We have estimated that less than about 9000 cubic feet of low level solid radwaste would be removed from each SFP because of the proposed modification. Therefore, the total volume of solid radwaste shipped from the plant would be increased by less than 2% per year when averaged over the lifetime of the plant. This would not have any significant environmental impact.

5.3.4 Radioactivity Released to Receiving Waters

There should be no significant increase in the liquid release of radionuclides from the station as a result of the proposed modification. The amount of radioactivity in the pool water and on the SFP filter and demineralizer might slightly increase due to the additional spent fuel in the pool but because of the reasons discussed below, this increase of radioactivity should not result in a significant increase in radionuclides in liquid effluents processed from the station.

The cartridge filter and, to some extent, the mixed bed demineralizer remove mobile insoluble (solid) radioactive matter from the SFP water by way of the SFP cooling loop. The cartridge filter is periodically removed to the solid waste disposal area in a shielded cask and placed in a shipping container. Any insoluble matter that remains in the SFP water will be too

small to be trapped on the cartridge filters or not mobile enough to be taken up in the SFP cooling loop.

The mixed bed demineralizer resins (which remove some of the soluble radioactive matter through ion exchange) are periodically flushed with water to the solid radwaste system. The water used to transfer the spent radioactive resin is returned to the liquid radwaste system for processing. If any activity should be transferred from the spent resin to this flush water, it would be removed by the liquid radwaste system rather than being released as plant liquid effluent.

Finally, leakage of water from the SFP, if any, will be collected in the spent fuel pool building sump. This water is also transferred to the liquid radwaste system. The radioactivity in the SFP water would not be released to the receiving waters except by way of the liquid radwaste system. All such releases will be limited by Technical Specifications which will not be affected by the proposed modifications.

5.3.5 Occupational Exposures

There should be no occupational radiation exposure for the removal and disposal of the present racks and the installation of the new racks because both spent fuel pools are dry and have never been contaminated with radioactivity.

If the modification is not accomplished until after the first refueling, there would be some occupational exposure to radiation. Experience at similar facilities where re-racking has occurred has demonstrated that such exposures can be kept to acceptably low levels. Prior experience indicates this should be from about 2 to 5 man-rems. This would represent a small fraction of the total man-rem burden from occupational exposure at the Salem Station.

We have estimated the increment in onsite occupational dose at both units resulting from the proposed increase in stored spent fuel assemblies on the basis of information supplied by the licensee and by using realistic assumptions for occupancy times and for dose rates in the spent fuel pool area from radionuclide concentrations in the SFP water. The spent fuel assemblies themselves will contribute a negligible amount to dose rates in the pool area because of the depth of water shielding the fuel. The occupational radiation exposure resulting from the proposed modifications represents a negligible burden. Based on present and projected operations in the SFP area, we estimate that the proposed modifications should add less than one percent to the total annual occupational radiation

exposure burden at both units. Thus, we conclude that storing additional fuel in the two pools (beyond the first four reloads) will not result in any significant increase in doses received by occupational workers.

5.3.6 Evaluation of Radiological Impact

As discussed above, the proposed modifications do not significantly change the radiological impact evaluated in the FES for Units 1 and 2.

5.4 Nonradiological Effluents

There will be no change in the chemical or biocidal effluents from the plant as a result of the proposed modifications. However, the plant thermal discharge will be increased somewhat by the proposed modifications. At present, each pool has the ability and would be permitted to contain, as a maximum heat load, 1/3 of a recently discharged core plus a subsequent off-loading of one full core. This heat load is to be discharged to the Delaware River via heat exchangers in the SFP cooling system and the component cooling water system.

With the proposed modifications, an additional maximum heat load could be present in each pool due to accumulating the spent fuel from the first 14 refueling cycles (the youngest being at least 4 years old and the oldest being at least 14 years old) with the final three being discharged simultaneously as a full core offload. This additional heat load would be $4.5 \times 10^6$ Btu/hr which represents the difference in peak heat loads for full core offloads that essentially fill the present and the modified pools. The total peak heat load resulting from a full core offload will be $42.1 \times 10^6$ Btu/hr for the modified SFP as compared to $37.6 \times 10^6$ Btu/hr for the existing rack design.

The total station thermal discharge to the Delaware River without the proposed modifications would be approximately $15.3 \times 10^9$ Btu/hr. With the proposed modifications, it would be increased by no more than $9.0 \times 10^6$ Btu/hr ($4.5 \times 10^6$ Btu/hr for each unit), which is less than .06% of the estimated total thermal discharge to the Delaware River.

5.5 Impacts on the Community

The new storage racks will be fabricated offsite and shipped to the facility. No environmental impacts on the environs outside the spent fuel storage building are expected during

removal of the existing racks and installation of the new racks. The impacts within this building are expected to be limited to those typically associated with normal metal working activities.

No environmental impact on the community is expected to result from the fuel rack conversion or from the subsequent operation with the increased storage of spent fuel in the SFP.

6.0 Environmental Impact of Postulated Accidents

Although the new racks will accommodate a larger inventory of spent fuel, we have determined that the installation and use of the racks will not change the radiological consequences of a postulated fuel handling accident in the SFP area from those values reported in the Salem 1/2 FES dated April 1973.

Additionally, the NRC staff has underway a generic review of load handling operations in the vicinity of spent fuel pools to determine the likelihood of a heavy load impacting fuel in the pool and, if necessary, the radiological consequences of such an event. Because the licensee will be prohibited from moving loads with weight in excess of 2500 pounds over spent fuel assemblies in the SFP, we have concluded that the likelihood of a heavy load handling accident is sufficiently small that the proposed modifications are acceptable and no additional restrictions on load handling operations in the vicinity of the SFP will be necessary as a result of these modifications.

7.0 Alternatives

With respect to Salem Unit 1 SFP, we have considered the following spent fuel storage alternatives:

(1) Increase storage capacity as proposed

(2) Reprocessing of spent fuel

(3) Storage at independent spent fuel storage installations (ISFSI)

(4) Onsite storage in Salem Unit 2 SFP

(5) Offsite storage in SFPs of other reactors

(6) Shutdown of facility (storage in reactor pressure vessel)

(7) Conservation measures

7.1 Increase the Storage Capacity of the SFP, as Proposed

The total estimated installed capital cost of the proposed Salem Unit 1 new storage is $3,000,000. Of this amount $2,100,000 is for the new racks, $600,000 is for construction costs (including removal and disposal of the existing racks) and $300,000 is for engineering and other indirect costs. This equates to about $3,300 for each additional proposed fuel assembly storage space. The estimated costs of each of the alternatives considered are discussed in the following sections, where applicable, and summarized in Table 7.0.

7.2 Reprocessing of Spent Fuel

As discussed earlier, none of the three commercial reprocessing facilities in the U.S. is currently operating. The Morris Operation (MO) is in a decommissioned condition. On September 22, 1976, Nuclear Fuel Services, Inc. (NFS) informed the Nuclear Regulatory Commission that it was "withdrawing from the nuclear fuel processing business." The Allied-General Nuclear Services (AGNS) reprocessing plant received a construction permit on December 18, 1970. In October 1973, AGNS applied for an operating license for the separation facility (construction of which is essentially complete). On July 3, 1974, AGNS applied for a materials license to receive and store up to 400 metric tonnes of uranium (MTU) in spent fuel in the completed onsite storage pool. Hearings have not been completed on the materials license application. However, even if AGNS decides to proceed with operation of the Barnwell facility in light of the President's policy statement of April 7, 1977, discussed below, the separations plant will not be licensed until the issues presently being considered in the GESMO proceedings are resolved and the GESMO proceedings are complete.

In 1976, Exxon Nuclear Company, Inc. submitted an application for a proposed Nuclear Fuel Recovery and Recycling Center (NFRRC) to be located at Oak Ridge, Tennessee. The NFRRC would include a storage pool that could store up to 7000 MTU in spent fuel. The Exxon application for the NFRRC construction permit is under review.

On April 7, 1977, the President issued a statement outlining his policy on continued development of nuclear energy in the U.S. The President stated that: "We will defer indefinitely the commercial reprocessing and recyling of the plutonium produced in the U.S. nuclear power programs. From our own experience, we have concluded that a viable and economic

nuclear power program can be sustained without such reprocessing and recycling."

On December 30, 1977 NRC ordered (42 FR 65334) the termination of the pending fuel cycle licensing actions involving GESMO (Docket No. RM-50-5), Barnwell Nuclear Fuel Plant Separations Facility, Uranium Hexafluoride Facility, and Plutonium Product Facility (Docket No. 50-332, 70-1327 and 70-1821), Exxon's NFRRC (Docket No. 50-564), the Westinghouse Electric Corporation Recycle Fuel Plants (Docket No. 70-1432), and the Nuclear Fuel Services, Inc. West Valley Reprocessing Plant (Docket No. 50-201). The Commission also announced that it would not at this time consider any other applications for commercial facilities for reprocessing spent fuel, fabricating mixed-oxide fuel, and related functions. At this time, any consideration of these or comparable facilities has been deferred for the indefinite future. Reprocessing is not a reasonable alternative to the proposed expansion of the Salem Unit No. 1 SFP. Accordingly, no estimate of cost is considered appropriate.

7.3 Storage at Independent Spent Fuel Storage Installation

An alternative to expansion of onsite SFP storage would be the construction of new "independent spent fuel storage installations" (ISFSI). Such installations could provide storage space in excess of 1000 MTU of spent fuel assemblies. This is far greater than the capacities of onsite storage pools such as at Salem.

Fuel storage pools at MO and NFS are functioning as ISFSIs although this was not the original design intent. Likewise, if the receiving and storage station at the AGNS reprocessing plant is licensed to accept spent fuel, it also would be functioning as an ISFSI. The license for MO was amended on December 3, 1975 to increase the storage capacity to about 750 MTU; approximately 306 MTU are now stored in the pool.

We have discussed the status of MO with GE personnel and have been informed* that GE is primarily using the storage space there for GE-owned fuel (which had been leased to utilities) or for fuel which GE had previously contracted to reprocess. We were informed that the present GE policy is not to store spent fuel unless GE has previously committed to do so.**

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* GE letter to NRC dated May 27, 1977.

** An application for an 1100 MTU capacity addition is pending. Present schedule calls for completion in 1980 if approved. However by motion dated November 8, 1977 General Electric Company requested the the Atomic Safety and Licensing Board to suspend idefinitely further proceedings on this application. This motion was granted.

There is no such commitment for Salem. The NFS facility has capacity for about 260 MTU, with approximately 170 MTU presently stored in the pool. The storage pool at West Valley, New York is on land owned by the State of New York and leased to NFS thru 1980. Although the storage pool at West Valley is not full, NFS has indicated that it is not accepting additional spent fuel for storage even from those reactor facilities with which it had reprocessing contracts.

Based on the above, we conclude that these MO, NFS and AGNS facilities are not available to Salem as ISFSIs.

We also considered under this alternative the construction of new ISFSIs. Regulatory Guide 3.24, "Guidance on the License Application, siting, Design, and Plant Protection for an Independent Spent Fuel Storage Installation," issued in December 1974, recognized this alternative and provided regulatory guidance for water-cooled ISFSIs. Pertinent sections of 10 CFR Parts 19, 20, 30, 40, 51, 70, 71 and 73 would also apply.

We estimated that at least 5 years would be required to construct an ISFSI. We assumed one year for preliminary design, 1 year in which to prepare the license application and environmental report, to obtain approval for construction licensing and to finalize the design, 2-1/2 years for construction and to obtain an NRC operating license, and 1/2 year for plant and equipment testing and startup.

Industry proposals for ISFSIs are scarce to date. In late 1974, E. R. Johnson Associates, Inc. and Merrill Lynch, Pierce, Fenner and Smith, Inc. issued a series of joint proposals to a number of electric utility companies with nuclear plants in or near operation, offering to provide independent storage services for spent nuclear fuel. A paper on this proposed project was presented at the American Nuclear Society meeting in November 1975 (ANS Transactions, 1975 Winter Meeting, Vol. 22, TANSAO 22-1-836, 1975). In 1974, E. R. Johnson Associates estimated construction costs would approximate $9000 per spent fuel assembly.

Several licensees have evaluated construction of a separate ISFSI. The Connecticut Yankee Atomic Power Company, for example, estimated that an ISFSI with a capacity of 1,000 MTU would cost approximately $54 million and take about 5 years to construct and have ready for operation. The Commonwealth Edison Company estimated the construction costs of an ISFSI at about $10,000 per spent fuel assembly; to this would be added

costs for maintenance, operation, safeguards, security, interest on investment, overhead, transportation and other costs.

On December 2, 1976, Stone and Webster Engineering Corporation submitted a Topical Report requesting NRC approval for a standard design ISFSI intended for siting near nuclear power facilities. Based on discussions with Stone & Webster, we estimated that the present day cost for such a fuel storage installation would be about $24 million, exclusive of site preparation costs. On July 12, 1978 we concluded that the proposed approach and conceptual design are acceptable.

Based on the above facts, on a short-term basis (i.e., prior to 1985), an ISFSI is not available as an alternative. One would not be available in time to meet the licensee's needs. It is also unlikely that the environmental impacts of this alternative, on a delayed availability basis, would be less than the minor impacts associated with the proposed Salem modifications. This is based on the fact that offsite transportation would be involved and a structure, pool, and supporting systems would have to be erected and installed for an ISFSI, whereas for the Salem modifications, only new storage racks are involved.

On October 18, 1977, USDOE announced a new "spent nuclear fuel policy." USDOE will determine industry interest in providing interim fuel storage services on a contract basis. If adequate private storage services cannot be provided, the Government will provide interim fuel storage facilities. This interim storage could not be expected to be available until at least 1983 or 1984. A National Waste Repository could be available in the 1988-1993 time frame. The Salem Unit 1 SFP as presently designed would lose the ability to discharge a full core in the spring of 1980 and would have to shutdown instead of refueling in 1983 since the SFP would then be essentially full. The lack of a precise date that such Government-sponsored interim storage would be available makes this an unreliable alternative to consider for Salem Unit 1. Should such storage not be available when needed, Salem Unit 1 as presently designed would be forced to shutdown.

7.4 Onsite Storage in Salem Unit No. 2 SFP

Salem Unit No. 2 startup is scheduled for early 1979. The licensee has considered the possibility of using the Salem Unit No. 2 SFP for spent fuel storage from Unit No. 1. However, without the proposed modifications, the total storage capacity of both pools would provide for a maximum of eight reloads.

This would fill both pools in early 1983 and Unit No. 1 could discharge a fifth batch, or Unit No. 2 could discharge its fourth batch, but not both. In view of the uncertainty of the availability of an ISFSI capability by that time, this alternative, which would impact adversely on Unit 2 operation, is considered to be only a short-time, temporary alternative. If this alternative were to be pursued it could foreclose the ability to expand the capacity of either of the Salem SFP's in an unirradiated condition. Extra handling of irradiated spent fuel and working in the presence of the contaminated racks would not be consistent with the objective of maintaining occupational exposures to as low as reasonably achievable.

Since only one year separates the anticipated first refuelings of Units 1 and 2 and would result in either Unit 1 or Unit 2 having to shutdown in the spring of 1983, this alternative in effect is a version of the alternative of reactor shutdown which is discussed below.

In conjunction with the above, we have also considered the possibility of expanding the Unit No. 2 SFP storage capacity rather than the Unit No. 1 pool, and using the resultant additional storage locations for both units. This would provide a total of 1434 storage locations (264 in the Unit No. 1 pool and 1170 in the Unit No. 2 pool). Again assuming a refueling approximately once every 12 months for each unit, a maximum of 22 reloads would be possible. If these are divided equally between the two units, the Unit 1 pool would be full in the spring of 1982 and the Unit 2 pool in early 1989. Considering the extra handling of irradiated spent fuel that would be necessary to transport the Unit No. 1 spent fuel to the Unit No. 2 pool (which are located in separate fuel buildings) this alternative would not be consistent with the objective of maintaining occupational exposures as low as reasonably achievable. Since we have determined that the impacts associated with the proposed modifications for Salem Unit No. 1 are not significant, this alternative although may by itself have acceptable impacts would in effect result in greater environmental impacts than those associated with the present proposal.

7.5 Offsite Storage in SFPs of Other Reactors

The only other nuclear facilities owned by the licensee are the Hope Creek Units 1 and 2 currently under construction near the Salem facility on Artificial Island. The construction permits for Hope Creek 1 and 2 were issued on November 4, 1974. It is probable that these plants will not be in a

position to accept spent fuel from Salem Unit 1 before both Salem SFP's (unmodified) would be full. Furthermore, the Hope Creek units are boiling water reactors (BWRs) whereas the Salem units are pressurized water reactors (PWRs). Due to the dissimilar dimensions of the BWR and PWR fuels, a portion of the Hope Creek spent fuel pool racks would have to be replaced with racks capable of accepting the Salem PWR fuel. Such an alternative, if followed, would then impact on the limited storage capacity presently provided in these other plants.

According to a survey conducted and documented by the Energy Research and Development Agency, up to 46% of the operating nuclear power plants will lose the ability to refuel during the period 1975-1984 without additional spent fuel storage pool expansions or access to offsite storage facilities. Thus, the licensee cannot assuredly rely on Salem Unit 2, the Hope Creek units or on any other power facility to provide additional storage capability except on a short-term emergency basis. If space were available in another reactor facility, the cost would probably be comparable to the cost of storage at a commercial storage facility.

Based on the above facts, we have concluded that storage at another reactor site is not a realistic alternative at this time, or in the foreseeable future.

7.6 Shutdown of Facility

Upon filling the SFP as presently designed, there would be no ability to reload the core for the next operating cycle. When the 5th cycle of operation would be completed, Salem Unit No. 1 would be forced to shutdown for lack of space to store spent fuel. There would be a resultant energy availability loss and an associated loss of economic benefit from the facility, a cost associated with the purchase of replacement energy and the cost of maintaining the facility in a standby condition.

The licensee has estimated that a shutdown of Salem Unit No. 1 (rated at 1090 megawatts net electrical output) would result in replacement power costs alone of $500,000 per day. This is based on the differential costs of producing energy from Salem as compared to production from other available units in the PSE&G and Pennsylvania New Jersey Maryland (PJM) Interconnection systems. The licensee's estimates were based on the assumption that on a daily basis, with Salem Unit No. 1 operating at 100% power, the replacement costs would be about $500,000. In other words, Salem was assumed to have a 100% capacity factor.

We also have reviewed the differential costs of not operating Salem Unit No. 1, as well as other facilities in that area of the country. We believe that a more appropriate capacity factor to consider, on an annual basis, would be on the order of 60-70%. In view of this, the replacement costs associated with the Salem Unit No. 1, using the production costs provided by the licensee for alternate units, would be on the order of $300,000 to $350,000 per day. These costs still would be far in excess of the costs associated with the proposed modification, i.e., $3300 per assembly.

7.7 Conservation Measures and Extended Operating Cycles

Although there is no certainty that there are realistic alternatives at this time to the action proposed, the licensee investigated energy conservation measures and extended operating cycles for Salem Unit No. 1 as alternatives to the proposed expansion.

Salem Unit No. 1 is the most economical to operate of the PSE&G units and therefore would be used as a "base load" unit (operated at constant maximum power) even with any energy conservation program envisioned. If, instead, this nuclear unit were preferentially operated at reduced power, as permitted by any net reductions in power demand, the cost of power from less economical units would result in a higher cost per kW-hr to the consumer of the power delivered. In essence, this alternative is equivalent to the shutdown alternative. Assuming that conservation and reduced loading of Salem Unit No. 1 could have the benefit of extending operation of Unit 1 by a factor of two, the increased differential costs to the consumer would still be significant ($4.5 to $5 million/month) in that the kw-hr replacement power would extend for twice the time period, but at half the rate.

We have considered the potential for Salem Unit 1 to be operated with extended operating cycles, i.e., 18 months between refuelings rather than the present cycle of approximately 12 months. To do so, however, would involve higher fuel utilization, or burnups, which would necessitate a reconsideration of the potential results of accidents. This has not yet been assessed by the NRC and therefore the extended operating cycle is not available as an alternative at this time. The amount of savings realized under such a program would be consistent with the extra power taken from each fuel assembly. The extension of a fuel cycle to 18 months, but at a lower average power level, results in no benefits because the amount of fuel discharged to the SFP over the long run is not decreased. Such an option is therefore not a true alternative.

7.8 Summary of Alternatives

In summary, alternatives (2) and (3) above are either presently not available to the licensee or could not be made available in time to meet the licensee's needs. Alternative (3) would be more expensive than the proposed modification. Alternatives (4) and (5) would preempt storage space needed by another facility. Alternative (4) may also have additional, although acceptable impacts. Alternative (6), the shutdown of Salem Unit 1, would be much more expensive than the proposed action because of the need to provide replacement power. Conservatism is not predictably available. If available, Alternative (7) would not be economically attractive because Salem Unit 1 is the licensee's most economical unit to operate and is equivalent to shutdown. Operation of Salem Unit 1 to higher burnup, and thus longer fuel cycles, has not yet been evaluated and therefore is not available as an alternative.

We have also determined that the expansion of the storage capacities of the SFP for the Salem Unit No. 1 plant would have a negligible environmental impact. Accordingly, considering the economic advantages of the proposed action, deferral or severe restriction of the action here proposed would result in substantial harm to the public interest.

8.0 Evaluation of Proposed Action

8.1 Unavoidable Adverse Environmental Impacts

8.1.1 Physical Impacts

As discussed above, expansion of the storage capacity of the Unit 1 or the Unit 2 SFP would not result in any significant unavoidable adverse environmental impacts on the land, water, air or biota of the area.

8.1.2 Radiological Impacts

Expansion of the storage capacity of each of these SFPs will not create any significant additional radiological effects. As discussed in Section 5.3, the additional total body dose that might be received by an individual at the site boundary or by the estimated population within a 50-mile radius is less than 0.005 mrem/yr and 0.005 man-rem/yr, respectively, and is less than the natural fluctuations in the dose this population would receive from background radiation. There should be no occupational exposure of workers during removal of the present storage racks and installation of the new racks because the pools are not contaminated with radioactivity. Operation of the stations with additional aged spent fuel in the two SFPs is expected to increase the occupational radiation exposure by less than one percent of the total annual occupational exposure at the two units.

8.2 Relationships Between Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Expansion of the storage capacity of the SFPs will not change the evaluation of long-term use of the land as described in the FES for Salem Units 1 and 2. In the short term, the proposed modifications would permit the expected benefits (i.e., production of electrical energy and minimizing reliance upon foreign oil) to continue.

8.3 Irreversible and Irretrievable Commitments of Resources

8.3.1 Water, Land and Air Resources

The proposed action will not result in any significant change in the commitments of water, land and air resources as identified in the FES for Salem Units 1 and 2. No additional allocation of land would be made. The land area now used for the Unit 1 SFP would be used more efficiently by adopting the proposed action; this conclusion also applies to the proposed modification of the Unit 2 SFP.

8.3.2 Material Resources

It is not likely that the licensing action here proposed would constitute a commitment of resources that would tend to significantly foreclose the alternatives available with respect to any other individual licensing action designed to ameliorate a possible shortage of spent fuel storage capacity. The time frame under consideration is 6-9 months; our estimate of the time necessary to complete the generic environmental statement. The action here proposed may have significant effects on whether similar actions should be taken at Salem Unit 2 and Hope Creek Units 1 and 2 since it will affect the availability of short-time storage facilities for those reactors. The added SFP capacity proposed for Salem Unit 1 will not significantly affect the need for the total additional storage space presently planned at reprocessing facilities for which licensing actions are pending. In order to carry out the proposed modifications, the licensee will require custom-made racks of stainless steel, aluminum boron and carbide. These materials are readily available in abundant supply. In the context of this criterion, we conclude that the amount of material (aluminum, stainless steel, boron, and carbon) required for the racks for Salem Units 1 and 2 is insignificant and does not represent an irreversible commitment of natural resources.

The longer term storage of spent fuel assemblies withdraws the unburned fissionable material from the fuel cycle for a longer

period of time. The usefulness of this material as a resource in the future, however, would not be changed. The provision of longer onsite storage would not result in any cumulative effects due to plant operation since the throughput of materials would not change. Thus the same quantity of radioactive material will have been produced when averaged over the life of the plant. This licensing action would not constitute a commitment of resources that would affect the alternatives available to other nuclear power plants or other actions that might be taken by the industry in the future to alleviate fuel storage problems. No other resources need be allocated because the other design characteristics of the SFP remain unchanged.

8.4 Commission Policy Statement Regarding Spent Fuel Storage

On September 16, 1975, the Commission announced (40 F.R. 42801) its intent to prepare a generic environmental impact statement on handling the storage of spent fuel from light water reactors. In this notice, it also announced its conclusion that it would not be in the public interest to defer all licensing actions intended to ameliorate a possible shortage of spent fuel storage capacity pending completion of the generic environmental impact statement.

The Commission directed that in the consideration of any such proposed licensing action, the following five specific factors should be applied, balanced, and weighed in the context of the required environmental statement or appraisal.

a. It is likely that the licensing action here proposed would have a utility that is independent of the utility of other licensing actions designed to ameliorate a possible shortage of spent fuel capacity?

The reactor core for Salem Unit No. 1 contains 193 fuel assemblies. In its revised submittal of February 14, 1978, the licensee presented its estimated schedule for refueling. The facility is scheduled to be refueled at approximately 12-month intervals with about 65 fuel assemblies generally scheduled to be replaced at each refueling. The spent fuel pool was designed on the basis that a fuel cycle would be in existence that would only require storage of spent fuel for about one year prior to shipment to a reprocessing facility. Therefore, a pool storage capacity for 264 assemblies in the pool (about one and one-third of the full core load) was considered adequate. This provided for complete unloading of the reactor core even if the spent fuel from the previous refueling were still in the pool. It is prudent engineering practice to reserve space in the SFP to

receive an entire reactor core, should this be necessary to inspect or repair core intervals or because of other operational considerations.

Salem Unit No. 1 began commercial operation on June 30, 1977, and will complete its first operating cycle in the spring of 1979. With the present spent fuel storage racks, Unit 1 will not have sufficient room to store an additional normal discharge of spent fuel by the spring of 1983. If expansion of the storage capacity of the SFP is not approved, or if an alternate storage facility for the spent fuel is not located, Salem Unit No. 1 will have to shutdown in 1983 or before cycle 5 operations.

The proposed licensing action (i.e., approve installing new racks of a design that permits storing more assemblies in the same space) would allow Salem Unit No. 1 to continue to operate beyond the spring of 1983 and until the proposed Federal repository is expected to be in operation. The proposed modification will also provide the licensee with additional flexibility which is desirable even if adequate offsite storage facilities hereafter become available to the licensee.

We have concluded that a need for additional spent fuel storage capacity exists at Salem Unit No. 1 which is independent of the utility of other licensing actions designed to ameliorate a possible shortage of spent fuel capacity.

b. Is it likely that the taking of the action here proposed prior to the preparation of the generic statement would constitute a commitment of resources that would tend to significantly foreclose the alternatives available with respect to any other licensing actions designed to ameliorate a possible storage of fuel storage capacity?

With respect to this proposed licensing action, we have considered commitment of both material and nonmaterial resources. The material resources considered are those to be used in the expansion of the Unit 1 SFP.

The increased storage capacity of the Salem Unit No. 1 SFP was considered as a nonmaterial resource and was evaluated relative to proposed similar licensing actions within a 6-9 month period (the time we estimate necessary to complete the generic environmental statement) at other nuclear power plants, fuel reprocessing facilities and fuel storage facilities. We have determined that the proposed expansion in the storage capacity of the Unit 1 SFP is only a measure to allow for continued operation and to provide operational flexibility at the facility,

and will not foreclose similar licensing actions at other nuclear power plants. Similarly, taking this action would not commit the NRC to repeat this action or a related action in 1996, at which time the modified pool is estimated to be full if no fuel is removed.

We conclude that the expansion of the SFP at Salem Unit No. 1, prior to the preparation of the generic statement, does not constitute a commitment of either material or nonmaterial resources that would tend to significantly foreclose the alternatives available with respect to any other individual licensing actions designed to ameliorate a possible shortage of spent fuel storage capacity.

c. Can the environmental impacts associated with the licensing action here proposed be adequately addressed within the context of the present application without overlooking any cumulative environmental impacts?

We have considered the potential nonradiological and radiological impacts resulting from the fuel racks conversion and subsequent operation of the expanded SFPs at this station.

We find that there will be no environmental impacts on the environs outside the spent fuel storage building during removal of the existing noncontaminated racks and installation of the new racks. We conclude that the impacts within this building will be limited to those normally associated with metal working activities and with the occupational radiation attributable to these activities.

The potential nonradiological environmental impact attributable to the additional heat load in the SFP was determined by us to be negligible compared to the existing thermal effluents from the facility.

We have considered the potential radiological environmental impacts associated with the expansion of the SFPs and have concluded that they would not result in radioactive effluent releases that significantly affect the quality of the human environment during either normal operation or the expanded SFPs or under postulated fuel handling accident conditions allowed by the facility license.

d. Have the technical issues which have arisen during the review of this application been resolved within that context?

Yes. We believe that this Environmental Impact Appraisal and the accompanying Safety Evaluation have responded to all technical issues concerning health, safety and the environment which have arisen during our review.

e. Would a deferral or severe restriction on this licensing action result in substantial harm to the public interest?

We have evaluated the impact of deferral of the proposed action as it relates to the public interest. As we have seen, there are significant economic advantages associated with this proposed action, and expansion of the storage capacity of the SFP will have a negligible environmental impact. Therefore, it is clear that the proposed action itself is in the public interest.

Deferral of this action until the publication of the Final Generic Environmental Impact Statement (GEIS) would not be in the public interest. First, there is nothing in the Draft GEIS which is in conflict with the conclusions presented here - that the proposed rack modification is both a cost-effective and environmentally benign approach to the spent fuel storage problem as an interim measure. Further, there is nothing to suggest at this point that the Final GEIS will reach any different conclusions in this regard.

Second, while it is true that Salem Unit 1 does not face certain shutdown until 1983, there are other factors which weigh in favor of issuing the proposed amendments now. Following the refueling of Salem Unit 1 in the Spring of 1980, the existing SFP will not have sufficient room to accommodate a full core (193 assemblies) should this be necessary to effect repairs, for example, to return the unit to service. Therefore, after this point in time Salem faces

the possibility of shutdown at any time due to lack of a full core reserve in the SFP. While no serious adverse consequences to the public health and safety or the environment would likely result from this action itself, the reactor shutdown would, of course, remove the unit from service, and this in turn could adversely affect the licensee's ability to meet electrical energy needs, or force the operation of other plants which are less economical to operate or which have greater environmental impact, and thereby result in substantial harm to the public interest.

Following the Spring 1979 refueling, spent fuel in the pool would increase the difficulty of re-racking the pool and could have an impact on the occupational exposure to workers involved in this operation. In addition, 9000 $ft^3$ of low level solid radwaste would need to be disposed of at a licensed burial site. For these reasons, delay until after refueling is undesirable from a public interest standpoint.

Based on the foregoing, we conclude that public interest consideration weighs in favor of taking the proposed action now.

We have applied, balanced, and weighed the five specific factors and have concluded that this action to expand the spent fuel pool is in the public interest.

## 9.0 Cost-Benefit Balance

This section summarizes and compares the cost and the benefits resulting from the proposed modification to those that would be derived from the selection and implementation of alternatives. Table 7.0 presents a tabular comparison of these costs and benefits. The benefit from two of these alternatives, if available, would be the continued operation of Salem Unit No. 1 or other production of demanded electrical energy. The remaining alternatives (i.e., reprocessing of the spent fuel or storage at other nuclear plants, conservation measures) are not possible at this time or in the foreseeable future except on a short term emergency basis and, therefore, have no associated cost or benefit.

From examination of the table, it can be seen that the most cost-effective alternative is the proposed SFP modifications. As evaluated in the preceding sections, the environmental impacts associated with the proposed modification would not be significantly changed from those analyzed in the Final Environmental Statement for Salem Units No. 1 and 2 issued in April 1973.

10.0 Basis and Conclusion for not Preparing an Environmental Impact Statement

We have reviewed this proposed facility modification relative to the requirements set forth in 10 CFR Part 51 and the Council of Environmental Quality's Guidelines, 40 CFR 1500.6 and have applied, weighted, and balanced the five factors specified by the Nuclear Regulatory Commission in 40 CFR 42801. We have determined that the proposed license amendment will not significantly affect the quality of the human environment and that there will be no significant environmental impact attributable to the proposed action other than that which has already been predicted and described in the Commission's Final Environmental Statement for the Facility dated April 1973. Therefore, the Commission has found that an environmental impact statement need not be prepared, and that pursuant to 10 CFR 51.5(c), the issuance of a negative declaration to this effect is appropriate.

Date: January 15, 1979

## TABLE 27.0

## SUMMARY OF COST vs. BENEFITS

| Alternatives | Cost | Benefits |
|---|---|---|
| (1) Increase Storage Capacity of Salem Unit 1 SFP | $3,300/assembly | Continued operation of Salem Unit No. 1 and production of electrical energy. |
| (2) Reprocessing of Spent Fuel | N/A | None. This alternative is not available either now or in the foreseeable future. |
| (3) Storage at ISFSI | $9,000 to $10,000 per assembly | This alternative may not be available when needed. If available it would allow continued operation and production of electrical energy at Salem Unit No. 1. |
| (4) Onsite Storage in the Salem 2 Spent Fuel Pool | Comparable, but greater than storage at Salem Unit 1. It would also involve additional radiation exposure at both facilities. | Effectively none. This alternative would provide storage locations for Salem Unit 1 only until 1983, thus extending shutdown of Unit 1 by one year, but at the expense of a Salem Unit 2 shutdown 1 year early. |
| (5) Offsite Storage in SFPs of other Reactors | --- | None (before 1985). This is not available on a short-term basis (i.e., before about 1985). |
| (6) Shutdown of Facility | $9 to $10 million/month | None. No production of electrical energy. |
| (7) Conservation Measures | $4.5 to $5 million/month (assuming extension of operating cycle by factor of two) | Would stretch out refueling. SFP capacity would last longer. Would require somewhat fewer assemblies for a given amount of power - but not yet approved. |

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CHAIRMAN MILHOLLIN: There being no objection, Licensee's Exhibits 1A through K are hereby received into evidence.

(Whereupon the documents, previously marked as Licensee's Exhibits 1A through K, were received in evidence.)

CHAIRMAN MILHOLLIN: My understanding is there is no objection to the Licensee's Exhibit Number 2, is that correct?

MR. ONSDORFF: That's correct, Mr. Chairman.

CHAIRMAN MILHOLLIN: Licensee's Exhibit Number 2 is hereby admitted into evidence.

(Whereupon the document previously marked as Licensee's Exhibit 2, was received in evidence.)

CHAIRMAN MILHOLLIN: The Board's understanding is that at this time, at least, there is no stipulation as to the admissibility of Licensee's Exhibits Number 3, 4 and 5. Is that correct?

MR. ONSDORFF: That's correct.

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CHAIRMAN MILHOLLIN: Staff's Exhibits 6A, B and C, there being no objection, are hereby admitted into evidence.

(Whereupon the document previously marked as Staff's Exhibits 6A, B and C, were received in evidence.)

CHAIRMAN MILHOLLIN: The Board's understanding is that there is no present agreement as to the admissibility of Exhibits 7 and 8 by the Staff.

MR. ONSDORFF: That's correct, Mr. Chairman.

1E cont'd
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CHAIRMAN MILHOLLIN: Are there any exhibits which the parties wish to offer for the purpose of identification?

(No response.)

CHAIRMAN MILHOLLIN: Or is it your pleasure to wait until these exhibits are sponsored?

MR. ONSDORFF: I believe we can wait on behalf of the Colemans, Mr. Chairman.

MR. VALORE: We'll wait, Mr. Chairman.

CHAIRMAN MILHOLLIN: Does the State of New Jersey or the State of Delaware have any exhibits or any direct testimony which you propose to offer?

MR. HLUCHAN: Mr. Chairman, the State of New Jersey and the State of Delaware may jointly sponsor testimony on Lower Alloways Creek Township's contention and we would -- I suppose it would be best if we would make the appropriate motion once we arrive at that contention, unless the Chairman wishes otherwise.

MR. WETTERHAHN: Perhaps I should make a preliminary objection. My understanding was that all testimony had to be identified some period of time ago in order to give the parties an opportunity to object in writing and permit orderly procedure. If no testimony had been identified at that time, it was my understanding it would not be permitted at this time.

CHAIRMAN MILHOLLIN: Would you care to respond to that?

MR. HLUCHAN: Only if the Chairman wishes us to get

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into this now. It was my intention to raise this particular matter at the time that we dealt with that contention. If the Chairman wishes it to be done now, I have no problem.

CHAIRMAN MILHOLLIN: It's not clear what it is you're proposing. You're saying, as I understand you, that you may have testimony but at this time you are not sure, or can you say at this time that you're certain that you will offer testimony?

MR. HLUCHAN: Yes, Mr. Chairman, we will.

What we propose to do, Mr. Chairman -- well, I will put this in the form of a motion, since we apparently have arrived at that point.

Pursuant to Section 2.715 of Title X CFR Section C, it states that the State of New Jersey is entitled to introduce evidence and interrogate witnesses and advise the Commission without requiring the representative to take a position with respect to those issues. That particular provision also has a statutory basis in the Atomic Energy Act, 42 USC Section 2021L.

Now it's my understanding that pursuant to that section and provided that the procedural requisites have been complied with, that we are entitled to produce evidence as to any contention which has been admitted in this proceeding.

What we propose to do is to sponsor the testimony which had been proffered by Mr. Onsdorff as to which each party has been given notice on the Lower Alloways Creek contention. And

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I believe that the State of Delaware would join in that request.

MS. MAC ARTOR: The State of Delaware is interested in having full information in the record, and for that reason, we do join in the introduction of this testimony which has been noticed to all parties previously.

CHAIRMAN MILHOLLIN: You're referring to the testimony which the Colemans proferred with respect to Contention 9?

MR. HLUCHAN: Correct.

MS. MAC ARTOR: Yes.

MR. HLUCHAN: Yes, sir.

MR. WETTERHAHN: Can you identify that further?

MR. HLUCHAN: I believe that's known as the Crockett letter.

MR. ONSDORFF: That's correct, with attachments.

CHAIRMAN MILHOLLIN: So you're proposing to introduce only that letter?

MS. MAC ARTOR: With its attachments.

CHAIRMAN MILHOLLIN: With its attachments. Is that correct, that the direct testimony you're proposing is the letter with its attachments?

MR. HLUCHAN: That's correct.

MR. SMITH: Mr. Chairman --

CHAIRMAN MILHOLLIN: Yes, Mr. Smith?

MR. SMITH: A point of clarification. Does that include the examination of the witness that the Colemans intend

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to provide? Is there going to be a person sponsoring that letter?

MR. HLUCHAN: That was our intent, Mr. Chairman. And it was my intention to allow Mr. Onsdorff to conduct that portion of the examination on behalf of the States of New Jersey and Delaware.

I would point out that Mr. Onsdorff is an official of the State of New Jersey as an Assistant Deputy Public Advocate, although technically he does not represent the State of New Jersey in these proceedings, I do.

MR. WETTERHAHN: May we be heard?

CHAIRMAN MILHOLLIN: Just a second.

Could you identify the witness you're proposing to sponsor this letter?

MR. HLUCHAN: I believe originally it was supposed to have been Mr. Crockett, but I believe that Mr. Wetterhahn and Mr. Onsdorff may have reached an agreement as to a substitute.

MR. ONSDORFF: There was -- I have his name in one of my files. I can take the time to pull it out. Possibly Mr. Wetterhahn could refresh my memory and possibly that could be stipulated to.

It's a letter which I don't believe has any doubts as to its origin and we may obviate the need for live testimony to sponsor it.

MR. WETTERHAHN: Merely to clarify the matter prior to

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stating my objections, I would note that I sent to Mr. Onsdorff the qualifications of Mr. Paul Krishna.

CHAIRMAN MILHOLLIN: Would you spell his name, please?

MR. WETTERHAHN: K-r-i-s-h-n-a.

Let me get his title.

(Pause.)

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His title is Assistant General Manager, Fuel Supply for Public Service Electric and Gas. And my letter stated that he would be able to authenticate that document. I don't think any agreement has been reached with regard to his appearing on behalf of anyone else for any other purpose.

But with regard to the legal issue at hand, while Section 2.715(c) undoubtedly gives the right to States to participate in the proceedings, the Commission case law is such that they are bound by the same procedural requirements as other parties. I would cite the Gulf States Utilities Riverbend case to that effect, where the State was held to, I believe, be required to submit testimony in advance, and I think that same requirement is here -- should be placed here.

CHAIRMAN MILHOLLIN: Excuse me, Mr. Wetterhahn. Might I ask you whether the precise question which apparently is going to be posed here was posed in that case?

MR. WETTERHAHN: It is almost on all fours.

CHAIRMAN MILHOLLIN: Would you care to elaborate on the case at this time?

MR. WETTERHAHN: It is some three or four years ago.

MR. SMITH: I can return the favor. I have a copy of the case here.

MR. WETTERHAHN: Would you like to read the holding?

MR. SMITH: I would like to have you do it. The case I believe is ALAB-444, Gulf States Utilities Company,

eb2

Riverbend Station, Units 1 and 2, issued November 23, 1977, found at 6 NRC 760.

(Document handed to Mr. Wetterhahn.)

I believe the portion you are referring to starts on 768.

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CHAIRMAN MILHOLLIN: Mr. Wetterhahn, if you're not ready--

MR. WETTERHAHN: I'm ready to proceed.

This case is not the one I was referring to, but again it is cited in ALAB-444. The case again was Riverbend, Gulf States Utilities, ALAB-317 3 NRC --

CHAIRMAN MILHOLLIN: Would you go a little slower, Mr. Wetterhahn?

MR. WETTERHAHN: Sure.

CHAIRMAN MILHOLLIN: ALAB --

MR. WETTERHAHN: 317, 3 NRC at 180, Note 7.

CHAIRMAN MILHOLLIN: So, Mr. Wetterhahn, you're saying that the previous citation to ALAB-444, 6 NRC 760, is not the citation which is appropriate?

MR. WETTERHAHN: It's not the direct citation, but it is in accord with that citation.

CHAIRMAN MILHOLLIN: So what you're saying is the second case is in accord with the first, but the first case is the fountainhead of authority on this subject?

MR. WETTERHAHN: Yes, sir.

eb3

CHAIRMAN MILHOLLIN: All right.

MR. WETTERHAHN: Let me just quote:

"Once let in, an interested State must observe the procedural requirements applicable to other participants."

MR. ONSDORFF: Mr. Chairman, could we have an identification of-- Is that the fountainhead or is that the--

MR. WETTERHAHN: That is from the fountainhead, yes.

MR. HLUCHAN: May I respond, Mr. Chairman?

MR. WETTERHAHN: If I may take a second just to complete?

MR. HLUCHAN: I'm sorry.

MR. WETTERHAHN: We see this as an attempt to circumvent the procedures set forth by this Board and to get around the fact that there is no contention left to support this submission of direct testimony, and we believe that it should not be permitted to be submitted.

CHAIRMAN MILHOLLIN: Very well. Thank you, Mr. Wetterhahn.

Mr. Hluchan?

MR. HLUCHAN: Mr. Chairman, in fact all the procedural prerequisites have been complied with. The testimony or, rather, the letter was provided to all parties in this proceeding by Mr. Onsdorff's letter to the Board of April 11th, 1979. Since that time, every party has been on record

eb4

as having had notice.

In fact, the Licensee and I believe the Staff have filed -- perhaps not the Staff, but I believe the Licensee has filed substantive objections to this testimony, so certainly they cannot claim in any respect that they will be prejudiced by the admission of this letter by the States of New Jersey and Delaware.

I would submit that all the prerequisites have been complied with.

CHAIRMAN MILHOLLIN: Thank you, Mr. Hluchan.

Would the Staff care to respond to the statement by the State of New Jersey which indicates that it is the intention of the State of New Jersey to offer direct evidence which will consist of the letter from Mr. Crackett with its attachments?

MR. SMITH: Mr. Chairman, I would agree that the parties have had this letter prior to -- at least within the 15 days required by the regulations. The problem that I see is the fact -- and this is what Mr. Wetterhahn said. We had a motion for summary disposition. An order came out. The contention was denied. There was no indication prior to today that the State of New Jersey would introduce this testimony, and I believe that all parties had notice of what the Board's rulings were prior to today.

I have difficulty also with the fact that the State

eb5

of New Jersey says they want to offer it but they want to allow Mr. Onsdorff to handle the direct or the cross-examination, and I'm not sure who Mr. Onsdorff represents now if it is the parties or the State of New Jersey.

But despite all this, I think the Staff would have to say that in the interests of a full record and the fact that the States do have an interest in participating in our proceedings and we cannot say that we are prejudiced by having this testimony, that I would not object.

CHAIRMAN MILHOLLIN: Thank you, Mr. Smith.

MR. VALORE: Mr. Chairman, I conceive I would have some standing in the matter since in effect it is Lower Alloways' contention that this testimony is going to be submitted ancillary to, and we have no objection to the procedures put forward by the State.

CHAIRMAN MILHOLLIN: Thank you very much.

MR. SMITH: I would like to object to Mr. Onsdorff handling the witness on direct or cross. I believe the State should present its own testimony.

CHAIRMAN MILHOLLIN: So your objection goes only to the testimony and not the possible impropriety of having Mr. Onsdorff represent simultaneously two different parties to the proceeding?

MR. SMITH: Yes, sir.

MR. ONSDORFF: If I may respond, I believe there has

eb6

been somewhat of a misunderstanding. I think it's a question as to the foundation evidence, and that was only as a convenience because I had done the preparation as to that aspect of it.

I certainly would not supercede or for a second suggest that I would supplant the State of New Jersey as far as its appropriate role. The foundation, if that can be stipulated to by the parties, I believe this is a letter by the Licensee, Public Service, as to which the authenticity is not in dispute.

Therefore, the Licensee's objection goes to substantive issues and not to the foundation testimony that I, or the State of New Jersey, would proffer. If that, as a preliminary matter, could be disposed of, we could certainly get to the substantive question as to whether or not there is a valid objection to the admission of this document in light of the voluminous applications that we went into before.

I think a rather innocuous letter which sets forth merely factual materials it's somewhat nitpicking to make a big to-do about nothing, really.

MR. HLUCHAN: Mr. Chairman, I would just like to add that I understand Mr. Smith's objection. I would just point out that I believe this goes to the very heart of the attorney-client relationship. I don't believe it is within the realm of any other attorney here to say who may or who

eb7

may not represent a party in a particular proceeding.

MR. KORNBLITH: Excuse me. Does the State consider itself to be a party at this point in the sense in which the term is used in 2.714 and 2.715?

MR. HLUCHAN: Well, Mr. Kornblith, with all due respect, I don't believe that the regulation so states. It says that the State is the equivalent of a party. I'm personally not sure what the State's status is in this matter. I would defer to the Board's judgment on that.

I'm not attempting to be evasive. I'm honestly not clear as to the technicalities here.

MR. KORNBLITH: The State is admitted under 2.715(c), as I understand it, --

MR. HLUCHAN: That's correct, sir.

MR. KORNBLITH: -- which relates to an interested State which is not a party.

MR. HLUCHAN: That's what it says, sir, and I believe that's what the statute also stated.

MR. KORNBLITH: Also, according to my understanding of the intent of the rule, it is intended to afford a certain status to a State which does not wish to take a position with respect to the issues.

MR. HLUCHAN: That's my reading as well.

MR. KORNGLITH: Is the State now taking a position with respect to the issues by introducing this testimony?

eb8

MR. HLUCHAN: No, sir, we're not. I believe all we are attempting to do is to have a full exposition and airing of the issues, and clarification of what's at stake here. And my belief is that this material could aid the Board in examining those issues.

MR. KORNBLITH: And would you consider it appropriate for an attorney who is Counsel for one of the parties who has taken a position to also represent the State in this particular aspect?

MR. HLUCHAN: Mr. Kornblith, again I'm not sure that it would be appropriate for me to -- with all due respect, to render my opinion as I don't know what weight that would have.

I think to the extent the two parties are interested in seeing that there is a full airing of the issues and that all relevant material is considered, that their interest may to that extent be deemed identical, and to that extent, I would have no difficulty with what he suggests.

MR. KORNBLITH: And I presume Delaware is in agreement with what you have said in the last few minutes?

MS. MAC ARTOR: Yes, sir, the State as an interested State is a very special one under the rules, and it was added to the rules fairly recently, I believe, because of the interest and concern that STates have that is somewhat separate from any other party to the proceeding. So that States were given the privilege, really, of participating in the case

eb9

without taking a position, because in representing all the citizens of a State, it was recognized that there are conflicting positions of citizens of the State, and that therefore a STate might wish to more fully represent everyone by not taking a position but should have the opportunity to do everything that a party might.

MR. KORNBLITH: You're absolutely correct in your understanding of the intent of that provision.

It's not a new provision; it has had some modifications in the last year or so, primarily to extend it to lower level governmental bodies, but the fundamental proposition has been there since the rules were first written, I believe.

CHAIRMAN MILHOLLIN: It might be useful to explore just for a second what's at stake in this matter. I'd like to address a question to Mr. Smith if I might.

Mr. Smith, I take it that you don't find any objection, you have said that you don't find any objection to having this document sponsored by someone, and having it received into direct evidence. The consequences of having it received into direct evidence would then be presumably that we have cross-examination of the person sponsoring the document, --

MR. SMITH: Yes.

CHAIRMAN MILHOLLIN: -- to which you would not object?

MR. SMITH: No.

eb10

CHAIRMAN MILHOLLIN: Except for the fact that you object to the identity of the cross-examiner, I take it.

MR. SMITH: Object to the identity?

CHAIRMAN MILHOLLIN: You object to having Mr. Onsdorff do the cross-examination.

MR. SMITH: Yes, representing another party.

CHAIRMAN MILHOLLIN: All right.

Let me ask you this: Would you agree with the statement that Mr. Onsdorff is entitled to cross-examine, use this document in cross-examining any way, is he not?

MR. SMITH: Oh, yes. I didn't think that was in dispute. My understanding was that Mr. Onsdorff would represent the STate of New Jersey in placing the witness on the stand and representing the witness and the STate as far as objections to cross as one attorney would do when he puts on a direct case.

To further clarify, I didn't believe there were any problems with the authenticity of this document, and the Applicant was not going to object to it, merely stipulating to its agreement and then allowing Mr. Hluchan to sponsor that witness. I have no objection to that.

MR. HLUCHAN: Mr. Chairman, the Chairman's remarks to Mr. Smith suggested something. I think, for our purposes, it would be sufficient if the document were simply sponsored, authenticated, and entered into evidence, and then of course --

ebll

and that would be the extent of our direct case.

And then of course each party would be entitled to cross-examine on it, which would not raise the specter of one attorney representing another party, as was earlier suggested.

MR. WETTERHAHN: Mr. Chairman, we would again object to that procedure. First, we have other objections with regard to this document pending with regard to relevancy and other matters.

CHAIRMAN MILHOLLIN: Yes, we recognize that, that you object to the document's relevancy.

I think it would also be fair to say the Staff objects to the document's relevancy.

MR. SMITH: Yes.

MR. WETTERHAHN: I think it's a different matter, in addition, using a document for empeachment purposes on cross-examination and introducing it for the truth of the assertions contained in it, into evidence.

CHAIRMAN MILHOLLIN: So you would not stipulate to the admissibility of the document?

MR. WETTERHAHN: Correct. We might stipulate as to the authenticity of the document, but certainly not to its admissibility.

CHAIRMAN MILHOLLIN: So you would stipulate that it is the document which it purports to be, which would make it

eb12

unnecessary to have it sponsored. That's what I'm getting at.

MR. WETTERHAHN: That's correct, under the condition that the other parties would stipulate to the identification of the document to which it is responding.

MR. ONSDORFF: That of course is only fair. Of course we would agree to that.

CHAIRMAN MILHOLLIN: So it turns out that we need not have anyone to sponsor this document. Is that correct?

MR. WETTERHAHN: We are not contesting its-- I haven't seen the copy that Mr. Onsdorff or whoever will tender, but it is very improbable that we would state it is not a true and correct copy of the document which was sent to the Department of Energy.

CHAIRMAN MILHOLLIN: We still have the problem remaining of the possibility of cross-examination, not with the document but on it. What is your position on the availability of the witness whom you previously agreed to make available for that purpose?

MR. WETTERHAHN: We agreed to make-- My understanding is that we would agree to make a witness available to authenticate it, which is one thing.

We did not agree to make an expert available for any other party.

CHAIRMAN MILHOLLIN: It is nearing the time when people normally take luncheon recesses. I think it has been

eb13

somewhat fruitful to get this issue before the parties and the Board early so that we have an opportunity for the parties to agree on a procedure for dealing with this matter when it comes up, so I would encourage the parties to get together, the parties and the other participants, get together and discuss an arrangement for making these objections more precise, and looking for a possible compromise which everyone could agree to with respect to the introduction of this document as direct testimony.

I take it that we won't be confronted with that problem for some time in the hearing, so hopefully between now and then, this can all be worked out among the parties.

Are there other matters which any party or participant would like to bring up at this time?

(No response.)

In that event, we will take a recess from now until 2:00 p.m.

(Whereupon, at 12:20 p.m., the hearing in the above-entitled matter was recessed to reconvene at 2:00 p.m. the same day.)

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AFTERNOON SESSION

(2:00 p.m.)

CHAIRMAN MILHOLLIN: Will the hearing please come to order?

I'd like to reannounce at this time the rule concerning photographers. The photographers are hereby granted five minutes to move around the hearing room to take photographs. After the five minutes expires, the photographers will take up a position and remain there for the rest of the hearing.

This morning we put off until this time a decision on the motion by the NRC Staff for a continuance concerning their response to some questions which the Board posed.

Mr. Smith, would you like to make any remarks concerning your motion which are not already contained in it?

MR. SMITH: No, sir. Except maybe after a ruling from the Board I would like to discuss further, either at this time or at some later point in the hearing, a possible further clarification of the Board's order but I don't want to say anything more on the motion.

CHAIRMAN MILHOLLIN: Very well.

Mr. Onsdorff, you had some comments this morning, would you care to say anything at this time in addition to the comments you made this morning?

MR. ONSDORFF: Very briefly, Mr. Chairman, I believe that in essence the motion probably is premature. If the

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experience over the course of this morning's proceedings is any indication, it will not become a matter of contention because we won't reach the question due to the other matters before the Board taking up the full allotment of time.

I would feel, however, that for that reason it be held in abeyance in that I'm sure the Staff people are continuing, we would certainly hope they are, to delve into the causes of Three Mile Island. And should they reach some conclusions which would be enlightening to the board and the time was available, then we would preserve the opportunity to hear that. And I think that opportunity should not be lost unnecessarily.

So my only comment would be that we really don't have to consider this motion at this time.

CHAIRMAN MILHOLLIN: Does anyone else have a comment on this motion?

MR. VALORE: Mr. Chairman--I'm not certain my microphone is working but I'm sure you can hear me.

Mr. Chairman, we apparently were the only parties who submitted something in response to the Board's question which was the testimony of Dr. Richard E. Webb.

Now in all fairness to the Staff in this matter, Dr. Webb has been working for us and in fact had prepared this technical report and other technical reports in advance of Three Mile Island, and he is still working on attempting to put

agb3

together material in reference to the other testimony he has filed using the Three Mile Island facts and what can be gleaned from them.

So I was in a position of being able to do this on rather short notice.

I might point out to the Board that if they review this testimony, they will see that it was prepared before Three Mile Island, and that some of the observations in them were almost prophetic.

But, that being the case, I can understand the Staff's difficulty in preparing for this hearing and at the same time presenting meaningful testimony with respect to the questions posed by the Board, so I would not oppose a continuance.

CHAIRMAN MILHOLLIN: Are there any other statements concerning the motion?

MR. KORNBLITH: Let me ask a question: Did you say you provided some testimony to the Board?

MR. VALORE: Yes, I did.

MR. KORNBLITH: When was this?

MR. VALORE: On April 25.

MR. KORNBLITH: It never reached me, sir.

MR. VALORE: I think what happened, in error it was sent to Chairman Milhollin and Dr. James Lamb and Glenn O. Bright. Apparently you were substituted for Mr. Bright, and

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the mailing list that we used wasn't up to date apparently, I'm assuming that's what occurred. So we will correct that error and get it off to you.

MR. KORNBLITH: I think that would be a good idea. Do you have an extra copy of it here in the room today?

MR. VALORE: I don't have an extra copy with me.

MR. KORNBLITH: Incidentally, that raises another question. It appears to me that one of the other Board members told me that he had received an outline of the cross-examination of the State of New Jersey.

Is that correct, was that offered to the Board?

MR. HLUCHAN: Yes, sir.

MR. KORNBLITH: I never received a copy of that either.

MR. HLUCHAN: I'm sure you're on my service list, sir. I also do not have an extra copy, but I'd be happy to provide it. I apologize for the mix-up.

MR. KORNBLITH: Thank you.

CHAIRMAN MILHOLLIN: Any other remarks concerning this motion?

(No response.)

CHAIRMAN MILHOLLIN: The Board hereby grants the motion for a continuance.

MR. SMITH: Thank you, sir.

MR. KORNBLITH: Excuse me, Mr. Chairman, I would like

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to ask the Staff a question in connection with this.

CHAIRMAN MILHOLLIN: Surely.

MR. KORNBLITH: What specifically is the type of information, other than -- let's forget about the question that the Staff objects to, with respect to the other questions, namely the effect of the Three Mile Island accident on that pool and the effect of a similar accident at Salem, what is it that requires this extensive preparation that the Staff hasn't been able to carry out?

MR. SMITH: Mr. Kornblith, the Staff Office of Inspection and Enforcement and the Nuclear Reactor Regulation Staff is still, as you are aware of -- I hope you have gotten the Board notifications on the various preliminary notices on the Three Mile Island incident -- they're still in the process of evaluating that information. It's presenting that information to Congress, et cetera --

MR. KORNBLITH: Excuse me, information on the effect of the accident on the fuel pool?

MR. SMITH: No, not the fuel pool, no.

MR. KORNBLITH: I think that's really at the heart of the Board's question. I don't know what else the Board would be interested in at this point.

MR. SMITH: Well my understanding of the question was if there was a similar accident at Salem, how would that affect the spent fuel pool at Salem.

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MR. KORNBLITH: If it would affect it and, if so, how, yes. And that's something that has to await a complete investigation of the Three Mile Island accident?

MR. SMITH: The Staff feels then, too, it has to complete the investigation so that they can fully respond to your questions and know whatever there is to know, that it takes that time.

I could represent to you now certain things as far as an attorney, but the Staff feels that time is required to look at what the -- all the information coming in, evaluate it for Salem, and see if any of this would affect the spent fuel pool.

MR. KORNBLITH: Well with regard to the first question that we asked, does the Staff know at the moment whether or not the Three Mile Island accident had any effect on that spent fuel pool?

MR. SMITH: I could represent to you, in talking with the Staff, that that spent fuel pool was empty, there was no fuel in it. It is now being used to store, I believe, waste tanks for some of the radioactive waste.

But to the best of my knowledge from talking with the Staff, there is no impact on the spent fuel pool, particularly since there was no fuel in there.

MR. KORNBLITH: That would seem to take care of the first question. The only question then is the second one, and

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that's the one where you think you have to know more about the details of the accident in order to answer, is that correct?

MR. SMITH: In order to make sure that we give you as full a response as we can.

MR. ONSDORFF: Mr. Kornblith, I would indicate for the record that the question and the substantive conclusion is not concurred in by the Intervenors.

MR. KORNBLITH: This is a Board's question, not the Intervenors' question. If the Intervenor wants to cross-examine as to the answers that we get from the Staff, I think he's authorized to do that under the rules. Now it's basically, in the first instance, a question of the Board.

CHAIRMAN MILHOLLIN: Mr. Smith, I understand that there also may be an additional benefit to deferring this which you may want to comment on.

There is the question whether our question covers a "Class IX" accident. Is it true that there may be some reconsideration by the Staff at this time as to its position on that point?

MR. SMITH: I can only relay to you what I'm sure you have heard on the news yesterday. Mr. Mattson, an official of the NRC, said there may have been two -- that it was too early, that it was only speculation, but that there may have been explosion and meltdown. That's all I can say, that's what I heard on the news, I don't have a full statement or if it was

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taken out of context or anything like that.

CHAIRMAN MILHOLLIN: Thank you, Mr. Smith.

Well the Board has granted the motion.

MR. KORNBLITH: I would inquire whether--as to the completion of all investigations, I don't think at this point in time we can really have any idea as to the length of time that may be required for the completion of the entire investigation of Three Mile Island.

CHAIRMAN MILHOLLIN: Perhaps we should ask Mr. Smith whether he proposes a date.

MR. SMITH: I can respond somewhat. What the NRC is doing is, on a 30-day interval, evaluating the information that we have received and have looked at and see how this information should be used in our licensing actions, particularly applications or licensing proceedings involving operating licenses. And then the next step would be how it would affect proceedings such as this. This is being done every 30 days.

I think I can attempt to inform the Board and parties after that 30 day interval, and I'm not sure when that 30 day begins, what status the investigation has and as it relates to this proceeding.

On the conference call, the Board indicated that they could probably not meet again until July. I think that we would try to have responses, if enough information is available to give an adequate response -- what we feel would be adequate and,

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again, it is subject to the Board reviewing it -- by the July-time hearing particularly since, as I understand it, that's the first time the Board can meet.

CHAIRMAN MILHOLLIN: So we can assume that if the Board were to set a time sometime in the first 15 days of July, that from what you know now, that it would seem to you that it would be profitable to address those questions at that time?

MR. SMITH: I can't commit to doing that but I certainly can say that it seems reasonable that we could meet that type of date.

CHAIRMAN MILHOLLIN: Very well. Thank you.

We're ready now, I believe, to ask Mr. Wetterhahn whether he is ready to present evidence.

Would you care to make a preliminary statement, Mr. Wetterhahn?

MR. WETTERHAHN: I think we have another preliminary matter from before lunch. I would ask Mr. Hluchan to take the lead on this.

MR. HLUCHAN: Mr. Chairman, Mr. Wetterhahn and I conferred during the lunch break and have reached something of an agreement respecting the Crockett letter.

Mr. Wetterhahn on behalf of the Licensee has agreed to stipulate to the authenticity of both the letter from the Department of Energy of December 20, 1977, which has been distributed to the members of the Board, as well as to the

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response and the attachment of January 19, 1978, by Mr. Crockett of PSE&G.

That's the extent of the agreement. Mr. Wetterhahn will preserve his right to challenge the sponsorship of these documents by the States of New Jersey and Delaware. He also preserves his rights as to the rel vance, materiality, et cetera, of these documents to Lower Alloways Creek's contention. In other words, his objection in that respect continues.

So perhaps it might be appropriate at this time to simply mark these for identification. And if the Board wishes, perhaps we can treat those issues at the time we hear that contention or, if the Board pleases, perhaps we could dispose of that now.

CHAIRMAN MILHOLLIN: Very well, we'll mark these for identification. First the Crockett letter -- Excuse me, we'll take these in chronological order for identification.

MR. HLUCHAN: Yes. First the December 20.

MR. WETTERHAHN: The next exhibit number is 9, I believe. We are now giving the Reporter three copies of a December 20, 1977 letter to Mr. R.I. Smith, Chairman, Public Service Electric and Gas Company from George W. Cunningham, Acting Program Director for Nuclear Energy. This letter is four pages in length.

I might note that I have handwritten the date, December 20, 1977 in the upper right hand corner. It was stamped

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on the original, but when it was reproduced it is not legible. That date was on the original and Mr. Hluchan has seen and agreed to that.

(Whereupon, the document previously referred to as Exhibit 9 was marked for identification.)

MR. HLUCHAN: Mr. Chairman, the Crockett letter will be identified as Exhibit Number 10. A person from the Licensee is currently retrieving the necessary copies to give to the Reporter, so why don't I just identify it in the meantime.

It's a letter dated January 19, 1978 from Robert M. Crockett to the United States Department of Energy to Eric S. Beckjord, Acting Director. The letter is one page and there are seven pages of attachments.

There appears in the lower right hand corner of the letter the date January 26, 1978, which is not a part of this document. Also, in the last paragraph -- excuse me, Mr. Chairman.

(Pause.)

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The copies the Licensee has provided--

MR. WETTERHAHN: We will make more copies from your original.

MR. HLUCHAN: I beg the Board's indulgence for a moment.

(Pause.)

I think I have completed identifying the letter, and copies will be provided to the Reporter as soon as we have the adequate copies. I apologize for the delay.

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(Whereupon, the document referred to was marked as Exhibit 10 for identification.)

CHAIRMAN MILHOLLIN: We are now ready to proceed with the Licensee's case in chief on Contentions 2 and 6 of the Colemans.

Mr. Wetterhahn.

MR. WETTERHAHN: I would like to call my witness--

MR. ONSDORFF: Are we going to have the opportunity for opening statements, Mr. Chairman?

CHAIRMAN MILHOLLIN: Do you think it's necessary to make an opening statement?

MR. ONSDORFF: I had certainly intended to do so.

CHAIRMAN MILHOLLIN: Well, I think it would be appropriate if you want to make an opening statement, to make

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the opening statement in connection with your case in chief.

MR. ONSDORFF: If that's the Board's desire.

CHAIRMAN MILHOLLIN: That's the Board's pleasure.

Mr. Wetterhahn, you may proceed.

MR. WETTERHAHN: I would like to call at this time as the Licensee's witness Mr. Edwin A. Liden, Project Manager, Public Service Electric and Gas Company; Mr. Robert P. Douglas, Licensing Manager, Public Service Electric and Gas Company--

CHAIRMAN MILHOLLIN: Excuse me, Mr. Wetterhahn. Could you go a little slower, please?

MR. WETTERHAHN: Very well, sir. That is Edwin A. Liden, L-i-d-e-n.

The second witness--As I mentioned previously, Mr. Liden will be our lead witness.

The second witness from Public Service Electric and Gas is Robert P. Douglas, and he is Licensing Manager.

The third witness is from Exxon Nuclear Company, Mr. Warren S. Nechodom, N-e-c-h-o-d-o-m. And his title is Manager, Licensing and Compliance.

Our fourth witness is Thomas G. Eckhart, also of Exxon, Senior Nuclear Engineer, Storage Engineering Services. Eckhart is E-c-k-h-a-r-t.

The qualifications of all of these witnesses have been previously supplied to the Board and the parties.

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I now ask that these four witnesses take seats at the witness table. I think it might just take a minute. I wonder if we could go off the record until then.

(Pause.)

Let me identify the witnesses as they are seated at the table for the Board and the parties.

Farthest away from me, to the Board's left is Mr. Douglas. Seated next to him is Mr. Liden, Mr. Eckhart, and finally, closest to me is Mr. Nechodom.

I would ask that the witnesses be sworn.

Whereupon,

EDWIN A. LIDEN,

ROBERT P. DOUGLAS,

WARREN S. NECHODOM,

and

THOMAS G. ECKHART

were called as witnesses on behalf of the Licensee and, having been first duly sworn, were examined and testified as follows:

CHAIRMAN MILHOLLIN: Mr. Wetterhahn, you may proceed.

DIRECT EXAMINATION

BY MR. WETTERHAHN:

Q Do each of you have before you a document entitled "Technical Qualifications"?

A (Chorus of "Yes.")

Q Was that document prepared by you?

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A (Chorus of "It was.")

Q Is it true and correct?

A (Chorus of "Yes.")

Q Do you adopt this document as part of your testimony in this proceeding?

A (Chaorus of "Yes.")

MR. WETTERHAHN: At this time the Licensee would move that the professional qualifications of the witnesses be admitted into evidence and bound into the transcript as if read.

Copies are now being provided to the Reporter.

CHAIRMAN MILHOLLIN: It will be so received and bound.

(The professional qualifications of the witness panel follow:)

# APPENDIX A
# TECHNICAL QUALIFICATIONS

## EDWIN A. LIDEN
## PROJECT LICENSING MANAGER

## PUBLIC SERVICE ELECTRIC AND GAS COMPANY

My name is Edwin A. Liden. My business address is 80 Park Place, Newark, New Jersey. I am Project Licensing Manager in the Engineering and Construction Department of Public Service Electric and Gas Company and have served in this capacity since 1977. In my present position, I am responsible for directing the licensing activities for the Salem Nuclear Generating Station.

I was graduated from the State University of New York Maritime College with a Bachelor of Marine Engineering degree in 1963. I also served in the U. S. Merchant Marine as a licensed engineering officer.

From 1963 to 1966, I was employed by Newport News Shipbuilding and Dry Dock Company. I was certified by the NRC as Shift Test Engineer on the A2W and C1W naval nuclear power plants. I was the senior shipyard representative on shift during refueling and overhaul operations on both the USS Enterprise and USS Long Branch.

From 1966 to 1967, I was staff engineer at Combustion Engineering, Inc., working on fuel channel development for the heavy water organic cooled reactor (HWOCR) project.

From 1967 to 1970, I was department head at the Saxton Nuclear Facility and, in that capacity, held a Senior Reactor Operator license. I was responsible for nuclear plant maintenance, performance, health physics, radiochemistry, radwaste and nuclear fuel.

From 1970, when I joined PSE&G, until 1977, I have participated in the licensing process for the Salem Nuclear Generating Station which included preparation of the FSAR, Environmental Report, and Safety and Environmental technical specifications.

I am a member of the American Nuclear Society.

EAL:kd
2/15/79

WARREN S. NECHODOM

Manager, Licensing and Compliance

Quality Assurance and Licensing Department

BS, Chemical Engineering, Gonzaga University, 1954

Mr. Nechodom joined Exxon Nuclear Company, Inc. in 1971 with responsibility for reload fuel licensing and for fabrication plant criticality analysis. In 1974, he became Manager, Licensing and Compliance, with responsibility for all Exxon Nuclear Company licensing activities.

Mr. Nechodom began his nuclear career, in 1954, with the General Electric Company in Richland, Washington. He held various technical and management positions in support of reactor operations including Supervisor, Process Physics, where he was responsible for providing process physics support for N-reactor and Manager, Reactor Physics where he was responsible for all physics research and development programs for N-reactor.

In 1967, he transferred to Douglas United Nuclear when it assumed contractual responsibility for operation of N-reactor. He continued as Manager, Reactor Physics, until 1968 when he became Manager, Nuclear Safety Technology, with

responsibility for developing basic criteria and technical limits in the area of nuclear safety technology for inclusion in program scope proposals, technical criteria, bases for process standards and nuclear safety specifications and bases for project and process design.

In 1970, he was named Director, N-Reactor Power-Only Study Group; responsible for planning scheduling and directing the development of a "power-only" fuel model for the N-reactor.

THOMAS G. ECKHART

Senior Nuclear Engineer, Storage Engineering Services

Reprocessing and Field Services Department

Mr. Eckhart joined Exxon Nuclear Company in 1976. He currently is responsible for coordinating the licensing, criticality analysis and marketing aspects for fuel storage rack projects.

While with Exxon Nuclear Company, he has also been responsible for coordinating the contractual, design, fabrication, licensing and installation phases of spent fuel racks.

Mr. Eckhart began his career in 1965 as an engineering and reactor supervisor aboard the nuclear ship Savannah. After serving three years aboard the Savannah, Mr. Eckhart joined the Westinghouse Electric Corporation in 1969 as a Nuclear Fuels Design Engineer. During his three and one-half years with Westinghouse, he performed reload core analysis for Westinghouse P.W.R.'s. In addition to developing models for incorporating uranium/gadolinium (ge) into P.W.R. reactors, he coordinated several R&D programs related to operating fuel performance and performed detailed fuel management studies to establish physics limitations for fuel cycle optimization.

In 1973, Mr. Eckhart joined the Portland General Electric Company as a Nuclear Fuels Engineer with responsibility for developing computer models to simulate the operation of the Trojan Nuclear Reactor. He was also responsible for many aspects of fuels planning and power supply planning.

TECHNICAL QUALIFICATIONS
ROBERT P. DOUGLAS
LICENSING MANAGER
PUBLIC SERVICE ELECTRIC AND GAS COMPANY
APPENDIX A

My name is Robert P. Douglas. My business address is 80 Park Place, Newark, New Jersey. I am Licensing Manager in the Licensing and Environment Department of Public Service Electric and Gas Company. I also am Acting Environment Manager. In this position, I manage all the technical and administrative matters of the Licensing and Analysis Division and the Environment Division of the Licensing and Environment Department. The Licensing and Analysis Division is involved with safety analysis of nuclear and non-nuclear PSE&G facilities, coordination and preparation of reports required for the licensing activities including permit applications, safety analysis reports, and topical technical reports, analysis of radiological impact of generating station operation, coordination of meteorological and radiological monitoring data collection programs and other licensing related responsibilities.

I was graduated from Cooper Union with a B.S. degree in Mechanical Engineering in 1964. In 1966, I received a Master of Science degree in Nuclear Engineering from Massachusetts Institute of Technology. In 1967, I received the Degree of Nuclear Engineer from Massachusetts Institute of Technology. I joined PSE&G in 1967 as an Assistant Engineer in the Mechanical Division of the Electric Department. From 1967 to 1974, my responsibilities included the radiological evaluation of PSE&G nuclear generating stations, safety analysis, site selection studies, environmental program considerations and other areas. In 1974, I assumed responsibility as head of the Nuclear Licensing Group in the Mechanical Division. In 1977, I was promoted to my present position. I have either participated in directly or supervised the preparation of the radiological impact evaluation of Salem Nuclear Generating Station, including analyses required for the PSAR, FSAR, Environmental Report; Appendix I to 10CFR50 evaluation and the radiological impact of the spent fuel pool expansion.

I am a member of the American Nuclear Society, the American Society of Mechanical Engineers, and am a registered professional engineer in New Jersey.

eb1

MR. KORNBLITH: Excuse me, Mr. Wetterhahn. Are these the same documents which have previously been furnished to the Board, some of which are not titled as "Professional Qualifications"?

MR. WETTERHAHN: Yes, sir. These are the professional qualifications of the witnesses. Thte two of them from Exxon are not so titled, but that is their substance.

BY MR. WETTERHAHN:

Q Mr. Eckhart, your qualifications do not indicate your education. Will you elaborate on that for the Board, please?

A (Witness Eckhart) I have a Bachelor of Science degree from the United States Merchant Marine Academy, a Master of Nuclear Science from the University of Washington, a Master's in Business Administration from the University of Pittsburgh.

I'm a Registered Professional Engineer in the State of California.

Q Mr. Eckhart, I show you a copy of a document entitled "Fuel Storage Racks Corrosion Program - Boral - Stainless Steel," which has previously been marked as Exhibit 3 and is proprietary. Are you familiar with this document?

A Yes, I am.

Q What part did you play in writing this document?

A I participated in the decision two years ago to

eb2

conduct an experimental program and worked on specifying the goals of the program. I consulted with others in R&D and Materials groups within Exxon with regard to the design and construction of the test equipment. I consulted with the poison material supplier with regard to the specimen samples to be used.

I followed the conduct of the test program and reviewed the results at each phase of the program. And I prepared the final report which was reviewed and approved by other responsible disciplines within the company.

Q Did you have a part in the actual drafting and writing of the report?

A Yes, I did.

Q Would you tell the Board about what you did in that respect?

A Mainly I participated or conducted a pulling together of the various parts of the two-, six-, and 12-month program phases, preparing a draft which was sent out for review and comment among the other responsible disciplines within the company, and just overseeing the over-all preparation of the work.

Q You drafted large portions of this?

A That's correct.

Q Mr. Nechodom, would you explain to the Board and the parties your participation in this document?

eb3

A (Witness Nechodom) I was a party to the original decision to prepare this experimental program. I reviewed the report in its various phases of preparation and approved the report prior to its issuance.

Q Thank you.

Mr. Eckhart, is this document true and correct to the best of your knowledge, information and belief?

A (Witness Eckhart) Yes, it is.

Q And I ask the same question of Mr. Nechodom.

A (Witness Nechodom) Yes, it is.

MR. WETTERHAHN: At this point I would move the admission of this document into evidence.

CHAIRMAN MILHOLLIN: Are there any objections?

MR. ONSDORFF: I would like the opportunity to voir dire, Mr. Chairman.

CHAIRMAN MILHOLLIN: With respect to what?

MR. ONSDORFF: I believe Mr. Eckhart indicated that he reviewed the results, and I wanted to find out in what fashion he reviewed the results. And he indicated he followed the conduct, and I wanted to question him as to in what manner he followed the conduct of the test program.

CHAIRMAN MILHOLLIN: Very well.

VOIR DIRE EXAMINATION

BY MR. ONSDORFF:

Q Mr. Eckhart, the actual work, the test work, was not

eb4

done by you; is that correct?

A (Witness Eckhart) That's correct.

Q Where was the work done?

A It was done in our Research and Technology Center where my office is.

Q Located where?

A In Richland, Washington.

Q And your offices were also located in Richland, Washington?

A That's correct.

Q Are your offices in the laboratory?

A No, they are not.

Q In what form were the results presented to you for your review?

A Basically two portions. Both the raw data was presented to me, and the summary conclusions by the experimenters.

Q This was in written form then?

A Correct, written and typed.

Q In other words, the results were not results off the machine or other scientific interpretative mechanisms that were used, but results as they were obtained by the technicians who actually did the work?

A That is correct.

MR. ONSDORFF: At this point, Mr. Chairman, I'm not

eb5

sure so I would rather be safe. Some of the question I have on voir dire are from the document, on the initial page. However, the document is marked "Proprietary" in its entirety.

I would think that my next series of questions would not be proprietary in nature. However, in light of the agreement that was entered, I would ask for the Board's advice as to what procedure would be appropriate at the present time.

CHAIRMAN MILHOLLIN: Your questions now are directed to the qualification of the witness to speak as to the document; is that right?

MR. ONSDORFF: Well, the document has been moved. I would certainly argue foundation, based upon the--

CHAIRMAN MILHOLLIN: When you say "argue foundation," what do you mean?

MR. ONSDORFF: The absence of a sufficient foundation.

In addition to that I have another objection to the admissibility of this document based upon contents and the representations included as a separate issue.

CHAIRMAN MILHOLLIN: You're saying you have additional questions as to the admissibility of the document rather than additional questions concerning cross-examination; is that right?

MR. ONSDORFF: Well, I have additional questions of this witness as to the admissibility of this document based

eb6

upon certain material on the initial page of the document.

MR. WETTERHAHN: Could you identify the initial page?

MR. ONSDORFF: Not the cover page but the page directly following the cover page.

MR. WETTERHAHN: The page that says:

"Important notice regarding the contents and the use of this document...."

MR. ONSDORFF: That's correct.

MR. WETTERHAHN: Perhaps I can help. Are you asking as to Items 1 and 2?

CHAIRMAN MILHOLLIN: Excuse me, gentlemen. You will have to refer your remarks to the Chairman.

Your question is--

MR. WETTERHAHN: I'm trying to identify specifically what he would like to examine Mr. Eckhart on.

CHAIRMAN MILHOLLIN: Could you state what your question -- the nature of your question so that Mr. Wetterhahn can know whether this will enter areas which he would prefer not to have divulged to the public forum?

MR. ONSDORFF: The representations in the document indicate its contents as to their appropriate use. I felt that it would be appropriate to ask this witness as to the appropriate use as represented in these first few paragraphs.

MR. KORNBLITH: Let me make another suggestion to

eb7

you, Mr. Onsdorff. Can you not ask these questions by reference to the non-proprietary document? It appears to me that the first two paragraphs are identical in both.

MR. ONSDORFF: In that case, that certainly doesn't present a problem on that score.

CHAIRMAN MILHOLLIN: Go ahead.

BY MR. ONSDORFF:

Q Mr. Eckhart, do you have the paragraphs and the page before you?

A (Witness Eckhart) Yes, I do.

Q Did you have any part in the decision to limit or to expressly remove any warranty, expressed or implied, as to the accuracy or usefulness of the--

MR. WETTERHAHN: Objection.

MR. ONSDORFF: I haven't finished my question.

CHAIRMAN MILHOLLIN: What's the ground?

MR. WETTERHAHN: It goes completely behond voir dire.

CHAIRMAN MILHOLLIN: Sustained.

MR. ONSDORFF: Could I have an explanation of that, Mr. Chairman?

CHAIRMAN MILHOLLIN: No. I ruled, and you can proceed.

MR. ONSDORFF: Well, I want to, but I need some guidance.

CHAIRMAN MILHOLLIN: I agree, I think it goes beyond

eb8

voir dire. You're concerned here with whether this witness is competent to testify as to this document. You should try to limit your questions to that purpose.

MR. ONSDORFF: Excuse me, Mr. Chairman. I indicated there were two separate objections. One was his ability to provide sufficient foundation for the document.

The second was the fundamental question of the use and admissibility of this document based upon the expressed representation that its sole use was for the customer. Its presentation in a hearing before the Nuclear Regulatory Commission is not for the sole use of the customer.

I would submit then that in light of that expressed representation that it not be used for any other purpose but for the sole use of the customer. And in light of the above representation that there is no warranty as to its accuracy, it lacks any admissibility for its own statements on the face of the document, that it is not represented to be accurate. And that's a fundamental issue for admission of evidence.

MR. WETTERHAHN: May I speak very briefly to that point, Mr. Chairman?

CHAIRMAN MILHOLLIN: Yes.

MR. WETTERHAHN: Obviously this is a-- "Warranty" is a business matter and it is not directed to any use in the proceeding. It is directed to its use, its potential use by a customer. It's a very common practice to put this

eb9

type of exclusion in.

I believe in a lot of NRC documents or documents prepared for the NRC, the same type of exclusion is in. The witness has already stated that this document is true and correct to the best of his knowledge, information and belief.

CHAIRMAN MILHOLLIN: I sustain the objection, Mr. Onsdorff.

BY MR. ONSDORFF:

Q Mr. Eckhart, are the results which were presented to you-- Did you at any time review the source documentation which were generated into those written or typed results?

A (Witness Eckhart) Could you be a little more specific?

Q Well, I would believe that tests were performed using certain instruments to make measurements. Did you ever examine the measurements that those instruments made, upon which technicians made the readings to produce the results that were presented to you?

A Yes, I did.

4.210

Q And in all cases, sir?

A In many cases.

Q Can you tell us in what cases you did?

A This program, as I mentioned before, was conducted over a 12- to 18-month period. We did not even have technicians involved with the program. We had scientists and

eb10

engineers conducting it.

The equipment utilized was very, very fundamental to basic chemical measurement techniques. Before we approved the program to even be initiated, all those responsible and involved with the program became familiar with the equipment. And on a periodic, approximately one-month basis, we went in the lab and reviewed the progress and the measurements as the program went forward.

But I certainly didn't go in every day and check the individual monitors.

Q Is your answer then that you could not tell us which of the results which are contained in this document you yourself have knowledge as to the manner and the results that were obtained?

A No, that's not the answer.

Q Well, then, could you--

A The program, as indicated in the non-proprietary version, reports were given at two-, six-, and 12-month intervals. Myself and several others reviewed all the data that came forth for the two-, six-, and 12-month interval that formed the basis of the report that you have in front of you.

Q Is that the non-proprietary report?

A The data is the same forthe non-proprietary and proprietary versions.

Q Yes, but my question is: The data which is contained

ebll

solely in the proprietary version, is that separate than what you referred to as having--

A No, it is not.

MR. ONSDORFF: I would move my objection, Mr. Chairman, I don't feel that the witness has sufficient first-hand knowledge of the contents of the technical data which was performed in order to provide the foundation testimony which is necessary for its admission.

MR. WETTERHAHN: I believe the witness' statements stand for themselves. I think it's obvious he does have the qualifications and did follow this program on a close basis, and he prepared the report. I think all the foundation elements have been given, and this should be admitted into evidence.

CHAIRMAN MILHOLLIN: The Board agrees. The document will be received in evidence.

(Whereupon, Exhibit 3, having been previously marked for identification, was received in evidence.)

MR. WETTERHAHN: Mr. Chairman, may I ask a question through you?

Based upon this ruling, would Counsel for the Colemans remove his objection to Exhibits 4 and 5?

MR. ONSDORFF: I would no longer pursue those

eb12

objections.

CHAIRMAN MILHOLLIN: The answer is he will no longer pursue those objections.

MR. WETTERHAHN: If then Exhibits 4 and 5 are accepted by stipulation, I would now tender the witnesses for cross-examination with the proviso that we decide what we are going to do about an in camera session.

CHAIRMAN MILHOLLIN: Hearing no objection, Exhibit Number 4 and Exhibit Number 5 are hereby admitted into evidence.

(Whereupon, Exhibits 4 and 5, having been previously marked for identification, were received in evidence.)

CHAIRMAN MILHOLLIN: I take it there will be substantial cross-examination on proprietary matters at this time. You do release the witnesses at this time for cross-examination?

MR. WETTERHAHN: I certainly do.

CHAIRMAN MILHOLLIN: So my question would be whether the other parties have the intention of cross-examining on material which is proprietary?

MR. ONSDORFF: Mr. Chairman, I do have that intention, not at this time. I don't think we will reach that stage in the proceeding probably until tomorrow morning.

eb13

I might suggest that if we scheduled it for first thing in the morning, that might very well obviate the need for clearing the courthouse. We just wouldn't open it up first thing. That's my present feeling. I won't get to it until tomorrow some time.

CHAIRMAN MILHOLLIN: Would that be agreeable to you, Mr. Wetterhahn?

MR. WETTERHAHN: I don't know what we're going to do for the rest of the afternoon then. My witnesses are here to testify on Contentions 2 and 6.

If you believe that the remainder of your cross-examination on these topics will take today, that's fine, but I would rather clear the courtroom now if you wish to start out your cross-examination with examination on this in camera document.

MR. ONSDORFF: That's not my schedule for cross-examination. It's not likely that I'll get to the Exxon witnesses today at all.

CHAIRMAN MILHOLLIN: Well, let's assume then that when the time comes that you enter territory which is proprietary that Mr. Wetterhahn will speak up.

MR. WETTERHAHN: Okay, or my witnesses. It is, after all, Exxon's document, and I would hope they will indicate when matters get proprietary.

CHAIRMAN MILHOLLIN: Very well.

eb14

Have the parties agreed upon a sequence for cross-examination among the various Intervenors and States? Was that part of your agreement?

MR. ONSDORFF: No, we haven't discussed that.

Before we start, can I suggest a five-minute adjournment? I would like the opportunity to discuss that very subject.

MR. WETTERHAHN: We will accept any stipulation that the Intervenors make.

4.300

MR. SMITH: The Staff thought that the procedure as outlined by Mr. Wetterhahn, I believe the Staff would be the -- Counsel for the Intervenor -- Counsel who had the contention would cross-examine first, then the States, then the Staff.

CHAIRMAN MILHOLLIN: That sounds like a reasonable schedule to the Board, so since this is the contention of the Colemans, you may proceed.

MR. ONSDORFF: Then I would renew my request for a short five-minute recess before I begin.

CHAIRMAN MILHOLLIN: Very well, we'll adjourn for five-minutes.

(Recess.)

CHAIRMAN MILHOLLIN: Back on the record.

MR. WETTERHAHN: One preliminary matter, Mr. Chairman. Is my understanding that the cross-examination that will take place is on both Contentions 2 and 6?

eb15

CHAIRMAN MILHOLLIN: Yes, that's the Board's understanding. We are treating these together for the purpose of cross-examination.

MR. ONSDORFF: Somewhat similarly to 1 and 9?

(Laughter.)

CHAIRMAN MILHOLLIN: You can assume there is no answer for that question.

MR. ONSDORFF: I did assume that, Mr. Chairman.

CHAIRMAN MILHOLLIN: You may proceed, Mr. Onsdorff.

MR. ONSDORFF: Thank you.

CROSS-EXAMINATION

BY MR. ONSDORFF:

Q Mr. Liden, is it your understanding that the present license permits the use of the spent fuel pool for the life of the plant?

A (Witness Liden) Yes, that's correct.

Q Is it also your understanding that should no alternative make itself available by the end of that lifetime that the spent fuel pool would be available for continued storage beyond the life of the plant itself?

MR. WETTERHAHN: Objection. Beyond the scope of the contention, beyond the scope of the possible issues in this proceeding.

MR. ONSDORFF: I would just ask in the future that prior to objections being made, that the person be allowed

eb16

to complete his question.

CHAIRMAN MILHOLLIN: I take it your question is then-- Could you restate it for us, please?

MR. ONSDORFF: Does the spent fuel pool have the physical capability-- I would assume the life of the plant is approximately 40 years.

BY MR. ONSDORFF:

Q Is that right, Mr. Liden?

A (Witness Liden) Yes. The normal design lifetime of the plant as a rule is 40 years.

Q And at the end of that period of time you don't anticipate that the lifespan of the pool will be exhausted as the plant itself physically wears out. Is that correct?

A I don't see any reason why the pool would wear out, no.

CHAIRMAN MILHOLLIN: Excuse me, Mr. Onsdorff. I asked you to restate your question.

MR. ONSDORFF: I did, and he answered it.

CHAIRMAN MILHOLLIN: The question is whether the pool is capable of containing fuel for a period of time-- Is that your question?

MR. ONSDORFF: That is a part of it certainly, for a definite period of time that I was referring to.

CHAIRMAN MILHOLLIN: The Board has to rule on Mr. Wetterhahn's objection.

eb17

Which is what, Mr. Wetterhahn?

MR. WETTERHAHN: I objected to his previous question which asked about the use of the pool after the expiration of the operating license which I believe would be beyond the scope of the issues. That was my objection.

CHAIRMAN MILHOLLIN: Yes, the operating license, as the Board understands it, grants the Licensee the power to operate the plant for 40 years, and that includes the right to operate the fuel pool for that period. So we'll sustain that objection.

I'm sure you can ask your question in a way which will avoid the difficulty.

MR. ONSDORFF: As a matter of fact, as you point out, I did.

CHAIRMAN MILHOLLIN: Very well. Go ahead.

BY MR. ONSDORFF:

Q Mr. Liden, could you tell us where the spent fuel pool building is located?

A (Witness Liden) The spent fuel pool building is a separate building located off the side of the containment building.

Q I'm sorry, where is it in regards to the containment building?

A It is adjacent to the containment building.

Q How close is it to the active core of Salem 1?

eb18

MR. WETTERHAHN: Objection. This question appears clearly beyond the scope of this contention.

CHAIRMAN MILHOLLIN: What relevance does the question have, Mr. Onsdorff?

MR. ONSDORFF: Mr. Chairman, I think--

CHAIRMAN MILHOLLIN: What relevance does the proximity of fuel pool to the core have with respect to the Contentions 2 and 6?

MR. ONSDORFF: In answer to that I would just suggest if we attempt to compartmentalize our proceedings to such an extent that we can't have some background questions, it is not going to make the entire proceeding really cohesive. We have a number of issues--

CHAIRMAN MILHOLLIN: My question is what's the relevance of the proximity of the pool to the core?

MR. ONSDORFF: I think the relevance is in the interaction between the core having material brought out of the core, the distance it has to travel in order to get to the spent fuel pool in regard to the amount of criticality potential that would be involved.

CHAIRMAN MILHOLLIN: We'll let you proceed for the moment.

MR. ONSDORFF: Thank you.

WITNESS LINDEN: Would you restate your question, please?

eb19

MR. ONSDORFF: Would the Reporter read the question please?

(Whereupon, the Reporter read from the record as requested.)

WITNESS LIDEN: The spent fuel pool building, being adjacent to the reactor, is on the order of 70 feet from the reactor.

BY MR. ONSDORFF:

Q Would you please explain the operation of the spent fuel pool?

A (Witness Liden) Could you be a little more specific as to the type of operation you're looking for?

Q I would ask that its operative purpose be explained so that know how that role which it has is anticipated to be achieved.

A Its role?

MR. WETTERHAHN: Mr. Chairman, I would object to that. The operative purpose and the use of the fuel pool was approved along with the operating license for Unit 1. The procedures for transferring fuel were also so approved.

The only thing at issue here is the increased storage racks, and I have no idea what this has to do with the deterioration of the boron material.

CHAIRMAN MILHOLLIN: Neither do I, Mr. Wetterhahn, but I'll allow it as a background question, with the express

eb20

hope that the background won't take too long.

MR. ONSDORFF: I certainly thank you, Mr. Chairman. This is absolutely essential to being able to get to the specifics as to the change in the achievement of that goal.

BY MR. ONSDORFF:

Q You have stored fuel placed in the pool; is that correct, Mr. Liden?

A (Witness Liden) Yes, that's correct.

Q Are there certain mechanisms which are intended to maintain the integrity of that material and to contain it from release into the ambient environment?

A Yes, there are. I assume you mean by "material" the spent fuel.

Q Material that is being contained is the spent fuel; that's correct.

And in what manner is that pool operated to maintain that in a condition which is within compliance with the Nuclear Regulatory Commission rules for persons holding and maintaining radioactive materials?

A The pool located in the spent fuel building is of course under rigid security as is the rest of the plant. The pool is filled with water. The fuel is stored in the fuel storage racks sitting in the bottom of the pool, which is approximately 40 feet deep.

The water is maintained cold by a spent fuel pool

eb21

cooling system. There is a control ventilation system in the building.

Those are basically the features which are used to store the fuel.

Q How deep is the pool?

A Approximately 40 feet.

Q And is it presently contaminated?

A Yes, it is.

Q What material is in the pool?

A There are approximately 32 spent fuel assemblies in the pool.

2c

2D agbl

Q When were those 32 bundles placed in the pool?

A I beg your pardon?

MR. WETTERHAHN: Objection.

BY MR. ONSDORFF:

Q I asked when were the bundles placed in the pool.

MR. WETTERHAHN: I'll renew my objection. I don't see what relevance this has. After listening to this line of examination, most if not all of this information is contained in the basic application. I don't see any use in reciting it here orally.

CHAIRMAN MILHOLLIN: It is of some possible relevance.

Proceed, we'll overrule the objection.

WITNESS LIDEN: The fuel assemblies were placed in the pool, they are continually being placed in the pool at this time. We shut the unit down for refueling outage earlier this month -- last month, excuse me.

C5

BY MR. ONSDORFF:

Q And my question is, when was the first spent fuel placed into the pool?

A (Witness Liden) I don't know the exact date, it was some time in the month of April this year.

Q Mr. Liden, do you know when Salem 1 began commercial operation?

A Yes, it was around June, 1977. June 30th, 1977.

Q Thank you.

agb2

Could you very briefly describe the manner in which the spent fuel is placed in the pool and sits in the present racks? I assume there are 267 racks in the pool presently.

A 264.

Q 264.

In what manner was the fuel placed in there and how does it sit?

A The fuel assemblies are lowered vertically into the racks. They are standing on end. Each fuel assembly in an individual fuel storage cell.

Q Are they clustered, the spent fuel bundles?

A I cannot answer that. I have not been out to the plant since the refueling has started, I don't know the exact locations that the assemblies have been placed in.

Q If the reracking was approved, would it be feasible and prudent for a strategy to be employedby Public Service that would leave essentially the same spacing density that is available now with the present racks by placing the spent fuel in alternate rack spaces?

MR. WETTERHAHN: Objection, I fail to see the relevance of what the rack spacing is. This Board is here to either approve or disapprove the use of the new spent fuel racks.

CHAIRMAN MILHOLLIN: Your objection is overruled.

MR. ONSDORFF: Thank you, Mr. Chairman.

CHAIRMAN MILHOLLIN: YOu don't need to thank me,

agb3

Mr. Onsdorff.

WITNESS LIDEN: With the proposed rack modification installed, the spent fuel assemblies would be loaded into the rack in some semblance of order to facilitate good recordkeeping. I see no reason why there should be any reason to use alternate rack spacing.

BY MR. ONSDORFF:

Q Would you envision that alternate rack spacing would inhibit the achievement of the recordkeeping that you seem to be interested in?

A (Witness Liden) No, I speak of recordkeeping as solely for the convenience of the operational staff. I am not familiar with their bookwork, how they log in each fuel assembly, whether it means running the crane twice as much.

Q Well are you aware of the K-effective calculations that were done which indicate that a greater space between stored spent fuel permits a lower K-effective and therefore less chance of criticality, would that be a sufficient reason to have alternate rack use, in your mind?

MR. WETTERHAHN: Objection. It assumes a fact not in evidence, that any criticality -- any K-effective below one would increase criticality, the chance of accidental criticality.

CHAIRMAN MILHOLLIN: Overruled.

WITNESS LIDEN: Would you repeat the question?

MR. ONSDORFF: Would the reporter repeat the question?

agb4

(Whereupon, the Reporter read from the record, as requested.)

WITNESS LIDEN: That is the general situation with K-effective, the spacing of the fuel and the moderator, yes.

BY MR. ONSDORFF:

Q I'm sorry, I don't understand your answer. Are you saying that --

A (Witness Liden) I'm aware that if you take two fuel assemblies and put them six inches or 10 inches from one another and then move them to 20 inches, generally speaking, K-effective would decrease, yes.

Q So that thenwould be a safety factor, a greater margin of safety, is that correct?

A Well yes, you could say that, yes.

Q And then you would be interested, if it did not interfere with other legitimate objectives of Public Service, to maintain an extra margin of safety, would you not?

A We have a sufficient margin of safety in the design.

Q I believe that was not my question. Are you interested in an increased margin of safety, if it doesn't interfere with other goals which outweigh safety?

MR. WETTERHAHN: I would object. I think the ultimate determination to be made is the reasonable assurance to the health and safety of the public. The witness has answered yes, in his opinion, there's reasonable assurance. Anything can

agb5

be --

CHAIRMAN MILHOLLIN: I would sustain an objection to the question are you interested in increased safety.

MR. ONSDORFF: That wasn't my question, Mr. Chairman.

BY MR. ONSDORFF:

Q My question is, if alternate spacing provides increased safety without interfering with other legitimate interests and bookkeeping, would you have any objection to it?

A (Witness Liden) No, I would not.

Q Thank you.

What is the volume of the spent fuel pool, Mr. Liden?

A I don't know exactly. I believe it's on the order of between 200-and 330,000 gallons.

Q Approximately in the area of 330,000 gallons, would that be correct?

A Yes.

Q That's with the racks empty?

A That is the volume of the pool, the actual open space in the pool, yes.

Q Now with the racks filled with the present spacing, how much of that volume would be occupied by water?

A About 10 percent.

MR. KORNBLITH: Could I hear the question and the answer back, please?

(Whereupon, the Reporter read from the record as requested.)

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MR. ONSDORFF: Mr. Chairman, I would ask at this time if the witness is seeking or does not have the information available to answer the question, that he advise the hearing of that, and I will direct the question to another individual. They were conferring, if I could just cite that for the record.

MR. WETTERHAHN: Mr. Chairman, we see nothing wrong with conferring as part of a panel. I think Mr. Onsdorff and the Board should be interested in the answer, and not as to who gave it.

MR. ONSDORFF: Well I assure you that I am interested in who provides the answer.

CHAIRMAN MILHOLLIN: Do we have a question now pending? We do not, do we.

You may proceed, Mr. Onsdorff.

BY MR. ONSDORFF:

Q After conferring, are you still standing by your answer, Mr. Liden?

A (Witness Liden) I'd like Mr. Eckhart to address that question.

Q Mr. Eckhart is from Exxon, which is not responsible for running the Salem 1 Nuclear Power Plant. Do I understand his position?

Mr. Eckhart, you're with Exxon, you have no responsibility for running Salem?

A (Witness Eckhart) That's correct.

agb7

Q Are you familiar with the spent fuel pool at Salem?

A Yes, I am.

Q In what manner have you familiarized yourself with it?

A Exxon Nuclear Company has done the detailed design of similar type storage racks to what they have in Salem. In the process of doing the design of both non-poison and poison storage racks for a variety of utilities and companies and applications, we have familiarized ourselves with both different rack concepts and pool layouts.

Q You indicated Exxon and we, my question was directed to you personally, sir.

A That's correct.

Q What is correct?

A I am familiar with what Exxon has done in this area.

Q Yes, and my question was are you familiar with the pool at Salem 1.

A In terms of the context of the question you just asked, yes I am.

Q And my next question was how have you familiarized yourself with the spent fuel pool at Salem 1?

A We are working with the Salem project in both the old racks and the new racks, we can't separate the two.

Q I'm not separating racks there, I'm trying to separate I from we. I would like to know have you seen it, have you

agb8

measured it, have you visited it?

A No, I have not.

MR. ONSDORFF: I would object to Exxon providing an answer without a foundation for providing that answer.

CHAIRMAN MILHOLLIN: Your question is, what percentage of the volume in the pool is occupied by water? Is that your question to which you want an answer? That's the question which is pending, as I understand it.

MR. ONSDORFF: But in addition to it, when the pool is filled to its capacity with spent fuel.

CHAIRMAN MILHOLLIN: When the pool is filled to it's capacity with spent fuel, your question is at that point what percentage of the volume is occupied by water?

MR. ONSDORFF: Exactly.

CHAIRMAN MILHOLLIN: And the answer --

MR. VALORE: Mr. Chairman --

CHAIRMAN MILHOLLIN: The answer the Board heard was 10 percent.

MR. ONSDORFF: I pursued that and Mr. Liden turned it over to Mr. Eckhart.

CHAIRMAN MILHOLLIN: Yes, the Board was here during that period, Mr. Onsdorff.

The Board asks the witness whether it's necessary to refer this question?

WITNESS LIDEN: Let me reanswer the question. In

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repeating the question from the Court Reporter, I did not fully understand or hear the entire question.

You're asking for the present spacing -- you're asking with the present spacing?

BY MR. ONSDORFF:

Q That's correct.

A (Witness Liden) I interpreted you to mean the new proposed modification spacing. With the present spacing, it occupies about 5 percent of the volume.

CHAIRMAN MILHOLLIN: We're talking about the water.

MR. ONSDORFF: That's correct.

BY MR. ONSDORFF:

Q Now am I correct that that is a 50 percent reduction in your prior answer, which was 10 percent?

A (Witness Liden) Mr. Eckhart.

MR. ONSDORFF: I'm objecting to Mr. Eckhart offering any answer unless he can show a foundation for providing the answer.

MR. KORNBLITH: Let's not play games here. The question was, how much of the pool is filled with water, not how much of the pool is filled with fuel.

WITNESS ECKHART: I can answer that. As the manufacturer of those kind of fuel assemblies, I know the water-to-metal ratio.

For the old type rack design, you displace about 5 percent of the water in the pool, approximately, when the

agb10

pool is full.

MR. KORNBLITH: Does that give you the information you were searching for?

MR. ONSDORFF: I had a motion or I had an objection to Mr. Eckhart providing an answer.

CHAIRMAN MILHOLLIN: Well the Board will overrule your objection to his providing the answer, Mr. Onsdorff.

What relevance does this question have to your Contentions 2 and 6, Mr. Onsdorff?

MR. ONSDORFF: Well I think the issue of the criticality is inextricablybound to the question of cooling. Temperature is a very important concept or safety mechanism. Water is a cooling mechanism. I wante to explore that.

BY MR. ONSDORFF:

Q Mr. Eckhart, apparently you answered my question, and just let me ask, did you say it was 10 percent water with the present rack and that it's reduced to 5 with the new racks, the proposed rack structure?

A (Witness Eckhart) That's not precisely what I said. There is approximately a 5 to 15 percent change between going from the existing storage racks to the new type high density.

Q Did I understand your answer, that it was 5 to 15 percent possibility?

A I said approximately 5 percent the reduction in the water volume when the pool is filled with the existing storage

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racks, to approximately on the order of 15 percent reduction in pool water volume when the new storage racks are filled with spent fuel.

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Q Mr. Liden, can you tell us what the source of the makeup water is for the spent fuel pool?

MR. WETTERHAHN: Objection; beyond the scope.

CHAIRMAN MILHOLLIN: Sustained.

Mr. Onsdorff, your contention has to do with deterioration of the rack structure and deterioration of the neutron absorption material. Are you planning to get to that this afternoon?

MR. ONSDORFF: I have been pursuing it all along, Mr. Chairman.

CHAIRMAN MILHOLLIN: It's not obvious to the Board, Mr. Onsdorff.

Please proceed.

BY MR. ONSDORFF:

Q Mr. Liden, what are the possible contributors to degradation in the boral material?

A (Witness Liden) Mr. Eckhart will respond.

A (Witness Eckhart) Could you be more specific?

Q Well, I would assume there are more than one. I was interested in having someone with familiarity with what causes degradation of boral to indicate what are the ones that they would be concerned about in operating a denser spent fuel pool.

A The reason why I asked you to be more specific is I am not aware of any mechanisms that will degradate the boral

eb2

material for the purpose for which it was designed in the Salem plant.

Q Does the boral material have aluminum as one of its constituent parts?

A Yes, it does.

Q And are there possible contributors to the degradation of the aluminum component of the boral material?

A Not for the purpose for which it was intended.

Q Well, that may very well be, but I didn't ask for the purpose for which it was intended. I asked are there contributors to its degradation?

A I'm sorry, I still do not follow your question. I cannot hypothesize or guess what you're going after. If you could be specific, it would help me a great deal.

Q Are there any materials that act upon aluminum, elements or forces, which would be in a spent fuel pool that, under certain conditions, could lead to the degradation of the aluminum components?

A There are vehicles where aluminum can changes its form; yes, there are. If you want me to identify some of them I will, --

Q Thank you.

A -- as long as you are clear that they do not degrade the purpose for which it was intended.

Q We'll get to that, I assure you.

eb3

A All right.

Aluminum is subject, in a variety of pool water conditions and coupling with various materials, to either edge attack, surface corrosion, or pitting.

(Pause.)

CHAIRMAN MILHOLLIN: You may proceed, Mr. Onsdorff.

BY MR. ONSDORFF:

Q Now you mentioned two criteria, I believe, pool water and contact with other materials.

What kind of materials can precipitate the edge attack?

A (Witness Eckhart) If the aluminum in the boral were exposed in the pool water environment, which in the Salem storage rack it is not, the boric acid environment would have a slight tendency to remove particles near the edge of the boral plates.

But again in the Salem storage rack, the storage cells are all sealed from the pool water environment.

Q Has Exxon devised a procedure in which intentionally the pool water may be brought into contact with the boral material?

A Yes, it has.

Q And what is that procedure?

A Pardon?

Q What is that procedure?

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A If I may repeat your question, I believe you asked if Exxon has devised a method for developing a leaking environment or an environment whereby the water is exposed to the boral plates.

Q That's correct.

A That meant-- That method is described in our proprietary version of the report. Do you want me to summarize it for you?

MR. ONSDORFF: Possibly I can help, Mr. Chairman.

BY MR. ONSDORFF:

Q I was referring specifically to the venting procedure.

A (Witness Eckhart) Will you repeat your question in light of the vented storage cell?

Q Well, we were discussing the purpose for which it was designed. Have you contemplated that intentionally pool water would be brought into contact with boral through a procedure known as venting?

A If venting were required it was because water was already in contact with the boral. That's why I misunderstood your question. The venting would be done for a different purpose altogether.

Q So while it is not the purpose for which it is designed, you have information that pool water of its own volition may come in contact with the boral material?

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A There is a possibility that the fuel in the cells will have cases where the water will come in contact with the plates. That's correct.

Q Has this occurred in spent fuel pools in the United States previously where water has come into contact with the boral material?

A Water has been in contact with the boral materials in other storage pools; correct.

Q Are you familiar with any such incidents?

A I am familiar with some design conditions for two plants. Do you have something else in mind?

Q No, I was wondering if you were familiar.

A I'm familiar with the use of boral in a design vented condition for Browns Ferry and Monticello.

Q Will you describe what occurred at Browns Ferry that necessitated the venting procedure?

A Very generally, since it is not particularly our design.

The Licensee installed storage racks in their pool that had not been particularly designed to be leak-tight. They found after installing the storage racks in the pool that a few of the storage cells swelled due to a leak existing near the bottom of the storage cell.

And with a 14-foot head of water difference between the top and the bottom of the storage cell in the pool water

eb6

environment, the resultant gases were formed from the surface corrosion of the aluminum plates and caused the cell walls to swell.

The proposed fix, and the one that was accepted and utilized was to drill a small hole at the top of every storage cell to insure this internal gas pressurization will not occur in the future.

Q The internal gas pressurization that you refer to is alleviated by drilling holes which allowed the gas to escape from the swelled storage cell?

A That's correct.

Q And what type of gas was that?

A It was hydrogen gas.

Q Where did the hydrogen gas go?

A It bubbled through the pool water to the pool water surface.

Q And mixed with air when it got to the surface?

A Yes.

Q Is an air-hydrogen mixture potentially explosive?

A Not of the volumes we're talking, the ratios we're talking about here, no.

Q Sir, can you answer my question?

A I did.

MR. WETTERHAHN: I would ask that Counsel not argue with the witness, please.

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MR. ONSDORFF: Mr. Chairman, I would ask that the--

CHAIRMAN MILHOLLIN: Proceed, Mr. Onsdorff. I don't think we need exchanges between Counsel.

MR. ONSDORFF: I wasn't attempting to do that, sir. I want to ask my question and hopefully get an answer to it.

BY MR. ONSDORFF:

Q Is a hydrogen-air mixture potentially explosive at a concentration?

A (Witness Eckhart) By "a" do you mean pure pure oxygen or regular air?

Q Well, let's take them both.

A As you're probably aware, there's a big difference between mixing hydrogen and oxygen together. Hydrogen and air, under the proper mixture and the proper temperature conditions, I believe could result in an explosive combination.

Q And air is what we're talking about, not pure oxygen in a spent fuel pool environment?

A In a proper mixture, that's correct.

Q I believe you also indicated you had some familiarity with the Monticello Nuclear Generating Station and experience there. Is that correct?

A That's correct.

Q What was the experience with the boral material at that plant?

A That is just what I summarized for you.

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Q I'm sorry, I believe you were discussing Browns Ferry.

A Browns Ferry and Monticello were-- The proposed fix and design concept for both plants was the same. What I've described to you is accurate for both.

Q Did each facility sustain a like number of effective cells?

A I don't know the answer to that.

Q Have you explored any alternatives to venting which would not entail the release of hydrogen gas that could either prevent the water from getting in there in the first place or alleviate the problem without the release of hydrogen gas?

A That's a rather long question.

Q I will break it down.

I think we would agree that it is not favorable to have swelling of the cells; is that correct?

A We didn't agree; it is undesirable, but our design precludes it.

Q Will you agree that you would not want your cells to become swollen?

A We did not design our cells to swell; that's correct.

Q Swell.

(Laughter.)

My question was: Confronted with the possibility of

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that occurring, you have apparently proposed a procedure to drill holes in your system; is that correct?

A In the unlikely event that we have a leaking condition, we have a plan for preventing them; that's correct.

Q Okay.

My question is: Have you analyzed an performed any tests on a preventive maintenance program which would catch the problem at an early enough stage so that the water would not get in there and would not react with aluminum and not cause the hydrogen gas to be released?

MR. WETTERHAHN: Objection. It's a hypothetical question with no foundation.

CHAIRMAN MILHOLLIN: The Board will overrule the objection.

You may answer the question.

WITNESS ECKHART: The steps that we have taken to preclude the problem that you are alluding to is by the design and fabrication of process controls employed in the Salem project, not employed in the Monticello and Browns Ferry project, to insure that all the cells remain leak-tight. Those were the steps we took.

BY MR. ONSDORFF:

Q I think that my question goes one step beyond that, however. Will you accept for the sake of argument that it's an unlikely event but you have indicated that you have

eb10

planned for the contingency. Your plan is the drilling of holes for venting of the hydrogen gas.

I assume when a problem arose at the other plants there wasn't an immediate recognition that venting was the solution. I'm sure consideration was given to potential viable alternatives.

My question is: Did you or Exxon Nuclear endeavor to explore alternatives which did not entail the release of hydrogen gas?

A (Witness Eckhart) No, we didn't.

Q Mr. Liden, returning to you for a minute, the pool water, what is the chemical composition or makeup of that environment?

A (Witness Liden) Of the pool water?

Q That's correct.

A Hydrogen, oxygen, and boric acid, demineralized water with a boric acid solution in it.

Q Now what is the function of the boric acid?

A In the spent fuel pool?

Q That's correct.

A It has no function.

Q How much does it cost?

MR. WETTERHAHN: Objection.

BY MR. ONSDORFF:

Q You are putting it in and it has no function?

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A (Witness Liden) It has no function in the spent fuel pool for spent fuel storage.

If I might elaborate, during refueling operations the reactor is borated to about 2,000 parts per million for chemical shutdown and reactivity control. During the refueling process, the spent fuel pool water comes in contact with the reactor water. In order to prevent the reactor water from becoming diluted, the boron concentrations between the two are matched.

Q How is that achieved?

A Through chemical analysis, boration of the reactor.

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Q My question is, in what manner is the pool borated to achieve this matching concentration?

A Basically the pool is only necessarily borated totally once, when it is initially filled prior to the first refueling. The boric acid is blended with water into a very highly concentrated solution in a portable tank and put into the pool and circulated through the spent fuel pool cooling system until it is adequately mixed and analyzed through chemical procedures.

Q Is it manually added?

A Yes, to the best of my knowledge.

Q Is there any tolerance on the level which is deemed to be acceptable as far as the matching concentrations?

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CHAIRMAN MILHOLLIN: What's the purpose of this line of questioning?

MR. ONSDORFF: I think that there is a potential for the boric acid, if the proper concentration is not maintained, to act as an additional corrosive agent and the reliability of the facility to maintain the proper concentration of boric acid may be very important to the corrosive properties of the pool water if it comes in contact with the boral material.

CHAIRMAN MILHOLLIN: So you're trying to get at the question what the concentration is?

MR. ONSDORFF: That's correct.

CHAIRMAN MILHOLLIN: Very well.

WITNESS LIDEN: The normal concentration in the spent

agb2 fuel pool is approximately 2000 parts per million.

BY MR. ONSDORFF:

Q My question was, is there a range over which that approximately 2000 parts can vary?

A 2000 is the minimum. There is no upper limit.

Q So in your testing you test for a minimum but no maximum, is that correct?

A You test for the actual concentration.

Q Mr. Eckhart, if I can address a question to you, what would be the effect of the pool water coming in contact with the boral material with boric acid concentrations in excess of 2000 parts per million and without a potential maximum?

A (Witness Eckhart) Let me answer the question in two parts.

First of all, there's a solubility limit as to how much boric acid you can get into the pool water between the limits which I specified in the operating spec, and that limit is very close to 3000 ppm.

In answer to your question as to the effect upon the aluminum or the boral, our studies indicate that there is very little difference in performance between DI water and boric acid environment.

Q Could you be more precise as to "very little?" What precisely would be the difference? You have not quantified?

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A I don't believe that would be conducive to quantification.

More specifically, the differences observed between what we look at and borated water environments as have been reported to DI water environments, all have a certain degree of measurements. And what we have found is, in general, that pitting, surface pitting in low pH environments is generally a little more severe than what has been reported elsewhere. And we find that the surface corrosion effects are a little bit less.

Q Could you be a little more precise than a little bit less?

A No.

MR. WETTERHAHN: May I inquire of the witnesses whether this is getting into proprietary data?

WITNESS ECKHART: In part, it is. We geared our experiments specifically for the kind of storage cells that are being utilized for the Salem project as well as others. The other types of information were not geared specifically for this kind of an application and there are trends that could be inferred. But to quantify in terms of 3 percent difference or 5 percent difference would not be helpful to the purposes for which our measurements were conducted.

CHAIRMAN MILHOLLIN: You may proceed, Mr. Onsdorff.

BY MR. ONSDORFF:

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Q Mr. Liden, are you all familiar with the K-effective calculations which were performed on the proposed rerack structure for the Salem spent fuel pool?

A (Witness Liden) I'm not familiar in detail with them, no.

Q Do you know if Mr. Douglas is?

A Mr. Eckhart is.

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Q Does that mean Mr. Douglas is not?

MR. WETTERHAHN: I fail to see the purpose of this.

CHAIRMAN MILHOLLIN: So do I, Mr. Onsdorff, what's the difference?

MR. ONSDORFF: Well it may be that there is none, but it's a simple question and I would presume that --

CHAIRMAN MILHOLLIN: The answer was Mr. Eckhart is familiar with those.

MR. ONSDORFF: That was not an answer to my question, sir, respectfully.

BY MR. ONSDORFF:

Q Mr. Douglas?

MR. WETTERHAHN: I have a pending objection. I think he's answered the question. I see no purpose in --

MR. ONSDORFF: I haven't asked Mr. Douglas the question.

CHAIRMAN MILHOLLIN: What question are you referring to?

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MR. WETTERHAHN: The pending question was answered yes, Mr. Eckhart does. He's the expert proposed by the Licensee and as lead witness, Mr. Liden has indicated where the questioning may be fruitful.

CHAIRMAN MILHOLLIN: Well let's wait to see what the question is.

BY MR. ONSDORFF:

Q Mr. Douglas, do you agree in Mr. Liden's statement?

A (Witness Douglas) I agree with him that I'm not familiar with the details of the K-effective operation.

MR. ONSDORFF: That's not what he said, but that provides me an answer. Thank you.

BY MR. ONSDORFF:

Q Mr. Eckhart, are you familiar with the document NUREG 0404, the Generic Environmental Impact Statement on the Handling and Storage of Spent Light Water Power Reactor Fuel?

A (Witness Eckhart) I'm not sure if I know the specific document by the numbers that you just gave.

Q It is March, 1978, a publication by the U.S. Nuclear Regulatory Commission, Office of Nuclear Materials Safety and Safeguards.

A I don't believe I am.

Q Are you familiar, without reference to this document, with the previous standard for evaluating K-effective values which were set at 0.90?

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MR. WETTERHAHN: Objection.

MR. SMITH: I would also voice an objection to this point.

CHAIRMAN MILHOLLIN: The grounds?

MR. WETTERHAHN: I see no relevance. The K-effective calculation standard is as of today, and I see no reason to inquire as to any other standard.

MR. SMITH: My objection is somewhat different, in that it seems to be getting outside the scope of this contention, at least as the Staff views it, and that is deterioration of the boral material in the racks, and this is what the Chairman also previously stated a few minutes ago, the criticality calculations are not part of this contention.

MR. ONSDORFF: Mr. Chairman, if I might respond, we're clearly dealing with Contentions 2 and 6 as consolidated. And if Mr. Smith is correct, 2 deals primarily with degradation. Six, I would submit, addresses criticality, which I think the basic point in evaluating criticality is the K-effective value, which is what I'm attempting to elicit testimony about.

CHAIRMAN MILHOLLIN: Your question goes to what objective, then?

MR. ONSDORFF: My objective is to determine whether the design that was utilized here is consistent with the state of the art knowledge of the K-effective value for light water reactors that have been employed at Salem 1.

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CHAIRMAN MILHOLLIN: Very well, I'll overrule the objection.

You can answer the question.

The question as I understand it is whether the witness is familiar with K-effective calculations for Salem 1, is that your question?

MR. ONSDORFF: That's correct.

BY MR. ONSDORFF:

Q Let's start with that question initially. There's a K-effective standard, is there not, for evaluating the proposed reracking?

A (Witness Eckhart) There are many stnnards. That's the first time you've referenced the one that is governing the license submittal here.

What we utilized and what the licenseehas referenced is the NRC guidelines for review and acceptance of spent fuel storage applications. Salem 1 did not have that particular document in the original storage racks reference. If you're talking about K-effective of 0.90, that's not applicable.

Q What is the applicable one?

A The current standard limit is less than or equal to 0.95.

Q And previously was there a standard which was 0.90?

A That is my understanding.

Q And are you familiar with the purported improvements

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in sophisticated computational techniques which allowed for the reduction in this margin of safety from 0.90 to 0.95?

A That's a very long question. Could you rephrase that?

Q The value given for spontaneous criticality is 1.0, is that correct, and a sustained criticality can be obtained with a K-effective value of 1.0?

A That's correct.

Q Now if you're going to have a compliance standard of 0.90, you have a 0.1 margin of safety between that and your point of criticality, is that not correct?

A If you're trying to quantify actual numbers in terms of their effect upon criticality, that's misleading, but in terms of absolute numbers, the difference between 0.90, 0.95, 1.0, is indeed 0.05 in K-effective between each of those steps.

Q Well possibly you can enlighten all of us as to how it is misleading in that one is closer than the other, to me, anyway. I don't know what I'm missing. Would you be able to help us in that regard?

A The difference between 0.95 K-effective and its impact upon neutron population as opposed to what the neutron population could be at a K-effective of 1.0 can be off many, many orders of magnitude, that's all I'm saying.

CHAIRMAN MILHOLLIN: Are you planning to tie these questions to the Salem pool sometime, Mr. Onsdorff?

agb9

MR. ONSDORFF: Mr. Chairman, respectfully I would submit that they're already tied to it in that the safety evaluation performed by the Staff uses the K-effective standard of 0.95.

CHAIRMAN MILHOLLIN: Well you can ask questions about that, Mr. Onsdorff.

BY MR. ONSDORFF:

Q My question specifically is you may not see the direct correlation of a 50 percent reduction in safety margin from 0.90 to 0.95, but would you not agree, Mr. Eckhart, that that change has some meaning in regard to criticality calculations?

A (Witness Eckhart) In all fairness, I think you're asking the wrong witness. The criteria for 0.90, which was later increased to 0.95, was done by the NRC and their basis and guidelines for so doing, those questions should properly be addressed to the Staff.

I have a general awareness of what they did, but they did not originate with Exxon Nuclear Company.

MR. ONSDORFF: Excuse me, Mr. Chairman, will you just indulge me for a second? I think I'll be moving on to a new line of cross-examination.

(Pause.)

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CHAIRMAN MILHOLLIN: The Board will take a ten -minute recess at this time.

(Recess)

CHAIRMAN MILHOLLIN: Back on the record.

Mr. Onsdorff, you may proceed with your new line of cross-examination.

MR. ONSDORFF: Thank you.

BY MR. ONSDORFF:

Q Mr. Liden, do you have your affidavit handy?

A (Witness Liden) Yes, I do.

Q Directing your attention, then, to the second page, the first unnumbered paragraph, the last sentence,

"The Licensee is unaware of any corrosion or other deterioration of stainless steel in environments similar to the Salem spent fuel pool."

Could you briefly elaborate on what you mean by that statement?

MR. KORNBLITH: Excuse me; could you identify that quotation again, please?

MR. ONSDORFF: Certainly, sir.

This is the affidavit of--

MR. KORNBLITH: Yes, I have that. What page and paragraph?

MR. ONSDORFF: This is the second page, the last

wb2

sentence in the unnumbered paragraph, which begins at the top of the page.

MR. KORNBLITH: Thank you.

CHAIRMAN MILHOLLIN: For the record, you're referring to the affidavit which accompanied the Licensee's Motion for Summary Disposition, Mr. Onsdorff?

MR. ONSDORFF: That's correct.

MR. WETTERHAHN: That has now been designated, Mr. Chairman, as Exhibit 2 in this proceeding.

CHAIRMAN MILHOLLIN: Thank you.

WITNESS LIDEN: The statement as indicated there simply states that we are unaware of any corrosion or deterioration of stainless steel, in particular of the type 304 which is used in the Salem pool, in similar environments. This type stainless steel has been used for many years in this type environment.

MR. ONSDORFF: I had difficulty in hearing the answer. People seem to be moving around the room.

CHAIRMAN MILHOLLIN: Would the Reporter repeat the answer, please?

(Whereupon the Reporter read from the record as requested.)

BY MR. ONSDORFF:

Q Directing your attention to page 7 of your affidavit, Exhibit 2, paragraph No. 12, you indicate your

wb3

familiarity with the problem encountered at Monticello and Connecticut Yankee.

Would you be able to elaborate on the differences between those experiences and the proposed material to be used in the Salem expanded racks?

A (Witness Liden) The Monticello instances which were described by Mr. Eckhart involved the hydrogen gas being produced due to leakage and swelling, or the swelling from the hydrogen gas due to leakage in the cells.

Q Excuse me; may I interrupt?

What was the material that allowed the leakage of the pool water into the cells? What material was penetrated or breached?

A It was the-- The surrounding material was stainless steel.

I think what you're looking for is, Did the stainless steel deteriorate?

Q Did it?

A The fabrication for the Monticello plant was different from that used at the Salem plant.

Q How so?

A The Monticello fuel storage cells were welded together in place with very, let's say, limited quality control. The concern was-- There was no concern really that the stainless steel would be breached.

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The Salem design is such that all the welding of the encapsulating stainless steel is done at the manufacturer's facility under strict quality control conditions, particularly in light of what happened at Monticello.

The basic fabrication of the racks is different between the two. Our rack module structure contains the racks in a different manner. The fuel storage cells are not welded together at Salem.

Q They're not welded? Then what type of bonding is used?

A To go into the specific bonding I would ask that Exxon respond to that.

Q Thank you. I appreciate your deferring to-- Is it Mr. Eckhart you're deferring to?

A (Witness Eckhart) The Exxon design for the Salem storage rack employs discrete cells, storage cells, for each and every fuel assembly, which is not true for the G.E. design for Monticello and Browns Ferry. To make up a cell, another cell, you would have to use a conglomerate of all the fixtures. In our case we have a discrete number of cells, each one for one fuel assembly. And there are upper grids or grid members which hold the fuel assemblies in place at the top -- the fuel cells in place at the top, and at the bottom of the cells they are individually welded, not to each other, but below the sealed portion they are welded to a base plate.

wb5

So there is no welding done to the completed Exxon storage cells for Salem, other than the longitudinal welds that make this all up to begin with.

Q Mr. Liden, may I ask you again: In the Connecticut Yankee situation, what was the problem that was encountered there?

A (Witness Liden) The rack swelling involved the decompcsition of a polymer type bonding agent used in the boron-carbide matrix. It was not a boral matrix. And it does not relate at all to the Salem facility.

Q What is the difference between this and-- You say they're not related. Specifically, what are the differences that you conclude there are?

A Well the Salem design utilizes boral, which is a boron-carbide-aluminum matrix. The Connecticut Yankee facility used a boron-carbide product, I believe it was from Union Carbide. And it used a polymeric type bonding agent rather than aluminum.

Q This was inside the stainless steel shroud?

A Yes.

Q And the water succeeded in getting beyond that barrier?

A Yes. I'm not familiar with the specific leak.

Q Mr. Eckhart, if I might ask you a question--

A (Witness Eckhart) May we confer for a moment?

wb6

Q Could I ask what it is you're going to confer about?

MR. WETTERHAHN: Objection. There's no pending question.

MR. ONSDORFF: My pending question is, What is the purpose of the conference?

CHAIRMAN MILHOLLIN: If you're objecting to the conference then I'll overrule your objection.

MR. ONSDORFF: I don't know if I am. I want to know if I have a basis.

Gentlemen, I think the Chair is ruling and the conference is going on.

CHAIRMAN MILHOLLIN: If you're objecting to their having a conference, your objection is overruled.

MR. ONSDORFF: Well I don't know unless I know what they're planning on conferring about.

CHAIRMAN MILHOLLIN: Well, whatever it is you're objecting to, your objection is overruled.

MR. ONSDORFF: How can you, sir, object on something when I may have a legitimate ground but don't know what they are?

CHAIRMAN MILHOLLIN: I think you stated your ground already, your objection with respect to conferences. And I've already ruled on your objection.

MR. ONSDORFF: Respectfully, sir, I indicated that

wb7

we might wait to find out, if I understood your ruling correctly.

CHAIRMAN MILHOLLIN: I think I ruled earlier, when you objected to conferences, that your objections to those conferences were overruled. And I don't intend to argue about it.

MR. ONSDORFF: It's a generic ruling?

CHAIRMAN MILHOLLIN: It's a generic ruling, Mr. Onsdorff.

BY MR. ONSDORFF:

Q Has the conference concluded?

A (Witness Liden) Yes, it has.

Something was just pointed out to me that escaped my memory at the present time.

Q What was that?

A In the Connecticut Yankee situation it was not leakage that caused the swelling of the racks due to the decomposition of the polymer; it was the gamma radiation from the spent fuel stored there that decomposed the polymer. The racks did not leak.

Q So that the radiation just passed through the stainless steel; is that right?

A Oh, yes.

Q It didn't actually cause a break, no physical break?

wb8

A There was no break. The gamma radiation reacting on this polymer bonding agent caused it to decompose, and gas evolved.

Q And what was the time period over which the gamma radiation acted upon it to destroy the polymer; do you know?

MR. WETTERHAHN: Objection.

The witnesses have already identified that this is a different design from the Salem Generating Station. It doesn't use boral. I fail to see the relevance of inquiring further into any situation involving another plant which has no shown relevance to Salem.

CHAIRMAN MILHOLLIN: Sustained.

MR. ONSDORFF: In response, Mr. Chairman, I would just like to say that obviously we have established by the answer that radiation has an ability to deteriorate and degrade material, independent of the action of the water.

CHAIRMAN MILHOLLIN: Yes, but the material is not present in this reactor, Mr. Onsdorff. And I sustained the objection.

MR. ONSDORFF: I was attempting to draw an analogy.

CHAIRMAN MILHOLLIN: You may ask another question, if you wish.

MR. ONSDORFF: Just for the record, Mr. Chairman, I would like to state very briefly that if radiation has the

wb9

ability to destroy one substance which is deemed at one time to be a protective, an appropriate protective material, it might be very possible to have the capability of destroying other materials.

CHAIRMAN MILHOLLIN: If you want to ask the witness whether radiation can destroy boral, you're perfectly welcome to ask him that question.

MR. ONSDORFF: I certainly wanted to put it in context. That was my next question. I was getting to it.

BY MR. ONSDORFF:

Q Mr. Liden, in light of the experience with the gamma radiation, did you do any analysis of this potential for causing degradation of the boral material?

A (Witness Liden) No, we did not.

Q Mr. Liden, directing your attention to your affidavit, Exhibit No. 2, page 2, paragraph No. 3,

"Unirradiated stainless fixtures have been exposed in pools up to 20 years without evidence of degradation."

Would you elaborate upon that statement, sir?

A That statement was referenced, by the footnote, out of the A.B.Johnson report.

Q You have no personal knowledge as to that statement, then?

A No, I don't.

wb10

Q Well, when you wrote it what did it mean to you? Kind of like the boric acid, it served no purpose?

MR. WETTERHAHN: Objection.

CHAIRMAN MILHOLLIN: That's argumentative, Mr. Onsdorff.

MR. ONSDORFF: I apologize, Mr. Chairman. I just felt a statement in an affidavit--

CHAIRMAN MILHOLLIN: You've asked him a question and he's answered it.

MR. ONSDORFF: I'm sorry; what was the question?

CHAIRMAN MILHOLLIN: It was your question, Mr. Onsdorff.

MR. ONSDORFF: I'm sorry; I've lost my train of thought, I was so taken aback by the answer.

Mr. Reporter, do you know what the pending question is?

Never mind. I've got it.

BY MR. ONSDORFF:

Q What does that statement mean to you today, Mr. Liden?

A (Witness Liden) The first sentence in paragraph 3?

Q That's correct.

A It means the same thing as it did.

Q Well, yes, but--

A I don't understand what you're asking.

wbll

Q Well, what did it mean before? What did it mean when you wrote it: that was my question.

MR. WETTERHAHN: Objection. The question has been asked and answered. The witness stated he relied on the referenced document. He said he had no personal knowledge. And I think that question has been asked previously.

CHAIRMAN MILHOLLIN: Sustained.

BY MR. ONSDORFF:

Q The sentence following the first sentence,

"Zircaloy-clad U.S. fuel has been in pool storage for up to 13 years."

What did that mean to you?

A (Witness Liden) It simply says that fuel has been, in this country fuel has been in pool storage for periods of up toeighteen years. It's also excerpted from the Johnson report referenced below.

Q Do you know how many bundles are involved in this 20-year period?

A I don't recall that.

Q Do you know what the rad field was in that storage pool?

A No, I don't.

Q Would it be relevant to a determination of the criticality of degradation analyses of the Salem-1 proposed expansion to know those type of factors, to rely upon that

wb12

previous experience?

A Well the radiation field, although I do not know exactly what it was, was that associated with spent fuel.

Q Is the radiation field susceptible to change with the change in the amount of spent fuel that you're talking about storing?

A The radiation field would -- that the steel would be exposed to would be the same; it would just be a larger array.

End 3A

3b ebl

6.400

Q Mr. Liden, do you have the referenced document that you relied upon?

A Yes.

Q I direct your attention to page 14.

I direct your attention to Table 3 on page 14. Is that possibly where you -- the material you relied upon in indicating the 20-year experience in your first sentence in Paragraph 3?

A Yes.

Q Now in refreshing your memory by having this document, does this document indicate how many fuel bundles were stored over that 20-year period?

A Yes.

Q How many were there?

A One bundle.

Q How many bundles are we talking about at the expanded Salem facility?

A 1,170.

Q One bundle stored for 20 years. Is that pool environment the same as the environment proposed for the Salem pool?

MR. KORNBLITH: I don't think your question makes sense. Could you rephrase it? At least I don't understand it. Maybe you can explain the question to me.

BY MR. ONSDORFF:

eb2

Q Would there be the same circulating water system with the same boric acid? Is this an identical pool environment that we're anticipating using at the Salem 1 facility?

A (Witness Liden) Mr. Eckhart can address this one in more detail I believe for you.

Q Thank you, sir.

A (Witness Eckhart) Is your question again whether or not that one bundle, the oldest bundle, the one that's 20 years old was in a borated water environment?

Q Well, that is certainly one of the parameters which we are concerned about at the Salem 1 spent fuel pool. There are a number of others.

I'm attempting to find out whether citing this as an example of safe storage for 20 years is a situation which is at all analogous to Salem 1. The conditions, I would submit, should be identical or extremely similar if this is something which is being cited as a basis for making an appropriate conclusion.

So with that stated objective, would you be in a position to enlighten us as to the comparison between these two storage situations?

A As I indicated to your earlier in testimony, the difference in effects on materials between DI water and boric acid water are very, very small. When it comes to stainless steels, there are no reported differences between DI water

eb3

and boric acid water.

But taking one statement or one line of Mr. Johnson's report is a little bit misleading. All he is indicated is the longest period of time and the number of bundles beginning 20 years ago. He has a great deal more information there than just that one line.

MR. ONSDORFF: I would request that that be stricken. It's editorializing for the record. I don't feel that that is at all warranted for a commentary on an affidavit of another person.

CHAIRMAN MILHOLLIN: Your question is whether there is a difference between the spent fuel storage environment which existed during the time when this Zircaloy bundle referred to in the report was stored and the spent fuel environment which is proposed by this application.

MR. KORNBLITH: Excuse me. Can I ask what may be a foolish question, but I am all confused now.

There are two sentences that you've been discussing in the affidavit. One relates to stainless steel fixtures and the other relates to fuel.

Now which one are you addressing yourself to at the moment?

CHAIRMAN MILHOLLIN: The second I believe.

MR. ONSDORFF: The second one.

MR. KORNBLITH: What's the relationship between that

eb4

and the contention which has to do with degradation of the stainless steel and the boral?

MR. ONSDORFF: I think we have the entire reliance upon this affidavit to resolve the contentions of unanalyzed safety questions which we have raised in long-term storage of spent fuel in a water environment in a pool. In order to assert in a legal document in opposition to that contention that prior experience is indicative of future results, there has to be a relationship that the environments are similar or identical in order to draw the conclusion stated.

We have a situation where degradation of stainless steel and/or breach of the stainless steel can result in degradation of the neutron absorption material. If that neutron absorption material is adversely affected you have the potential for criticality.

MR. KORNBLITH: Then you're not talking about fuel, you're talking about the first sentence, the stainless steel. Is that right?

MR. ONSDORFF: Well, I'm certainly talking about both sentences.

MR. KORNBLITH: Well, I don't see the relevance to the second sentence. You haven't explained that to me yet. The second sentence has nothing to do with either boral or stainless steel.

MR.ONSDORFF: I am at a bit of a loss to--

eb5

CHAIRMAN MILHOLLIN: Mr. Kornblith's question, if I could help perhaps clarify this, is directed to the seeming lack of connection between your questions concerning the Zircaloy clad fuel and your contention Number 2.

MR. ONSDORFF: Well, my only problem is that--

CHAIRMAN MILHOLLIN: For example, suppose we decide that the circumstances of storage which existed with respect to the report are different from the proposed circumstances of storage, which is to assume the answer to your question, which I don't think has been given yet, but even assuming that were the answer, still you haven't connected that with your contention. I think that's Mr. Kornblith's point.

MR. ONSDORFF: I recognize that. My only concern is that the affidavit was prepared in response to our Contentions 2 and 6, and I was attempting to elicit the exact information that Mr. Kornblith is concerned about.

I don't see the connection and if there is none, it shouldn't have been in the affidavit.

MR. KORNBLITH: It does appear that there is an irrelevant sentence in the affidavit. Now where do you go from there?

MR. ONSDORFF: Well, if we will stipulate that the prior experience with stored spent fuel pools is no indication of safety, then I think we've accomplished the point that this material does not prove the assertion that it was placed

eb6

in here to prove. That's my point.

We don't have any reliable data to suggest that this can be done in a safe manner. If that's a fact they shouldn't cite previous data to suggest otherwise.

CHAIRMAN MILHOLLIN: Mr. Onsdorff, you're asking for this to be stricken from the filings in the case. Now the filings in the case go beyond your contention. You can hardly ask us to strike everything in the case which wasn't relevant to your contention, could you?

MR. ONSDORFF: I certainly didn't ask this to be struck from the case, Mr. Chairman. I asked that the editorial comments of the witness be struck from the record.

CHAIRMAN MILHOLLIN: Well, the Board will disregard any statements which are editorial.

MR. ONSDORFF: Thank you.

CHAIRMAN MILHOLLIN: The fact remains that you have to-- Well, go ahead, Mr. Onsdorff.

BY MR. ONSDORFF:

Q I believe Mr. Eckhart was responding to the question as to whether or not the experience was in any way relevant to the Salem proposal.

MR. WETTERHAHN: I'm sorry, I'm not sure where we stand. I would like to interject a formal objection to any question related to storage of fuel. The storage of fuel per se is not an issue here.

eb7

CHAIRMAN MILHOLLIN: Mr. Wetterhahn, why don't we let Mr. Onsdorff pose a question which is specific enough so we can all understand it, and then you can make your objection to it.

MR. WETTERHAHN: I withdraw my objection.

MR. ONSDORFF: Should I rephrase my question?

CHAIRMAN MILHOLLIN: Yes, please do.

BY MR. ONSDORFF:

Q I will ask this of the entire panel since we seem to have adopted that procedure.

Are any of you gentlemen prepared to affirm the first two sentences in the affidavit to indicate that they provide any assurance that the prior experience cited therein is in any manner relevant or probative of the predicted future success with Salem 1's spent fuel pool dense racks?

MR. WETTERHAHN: Objection as to the second part of that question dealing with the Zircaloy clad fuel. I have no objection to his asking about the stainless steel fixtures. I will admit that's part of the new racks.

CHAIRMAN MILHOLLIN: Why do you object to the reference to Zircaloy clad fuel?

MR. WETTERHAHN: Again, as I started in to explain previously, the ability to store fuel for any length of time is associated with the issuance of an operating license. I

eb8

don't think we're here to determine whether and for what length of time fuel could be stored.

As an example, even in the old racks if, for some reason, the Licensee decided to keep one particular element in a corner and never remove it, that would be permitted under the present license.

So again I think, as the Board has previously ruled, the question of fuel storage per se is not at issue, only whether there would be degradation of the racks which includes the stainless steel and the boral.

CHAIRMAN MILHOLLIN: The question as I understand it is directed to whether the reracked pool-- Excuse me.

The question as I understand it is whether either of these two sentences are probative with regard to the reracked pool.

Is that correct, Mr. Onsdorff?

MR. ONSDORFF: That is certainly an accurate characterization, yes, Mr. Chairman.

CHAIRMAN MILHOLLIN: Then we'll permit the question.

MR. SMITH: Mr. Chairman, I'd like to pose a point of clarification. Are we asking the witness to make a legal conclusion on relevancy or probative value? Are we asking them to talk about the conclusions relating to degradation?

CHAIRMAN MILHOLLIN: As I understand the question, it is whether either of them is prepared to stand behind the

eb9

first two sentences as probative of the safety of the re-racked pool.

MR. SMITH: I have similar problems of using those terms in the sense-- I understand what Mr. Onsdorff was trying to arrive at, his problems with the legal terms of--

CHAIRMAN MILHOLLIN: It is not to call for a legal conclusion of the witness. I think Mr. Smith's objection is well-taken.

You seem to be asking the witness whether he's prepared to say that these two sentences are probative.

MR. ONSDORFF: That may be a term of art to us in the legal profession.

BY MR. ONSDORFF:

Q I'm sure in the context of the witness, in the scientific frame of reference in which they would respond, as a scientist, can you say with assurance that the experience there established in those instances referred to has a basis for predicting the expected experience of the increased density racks at Salem 1, based upon evaluations of the conditions of those experiences in comparison to the conditions anticipated at Salem 1?

A (Witness Eckhart) That was an awfully long statement or question. I am prepared to state that upon reviewing Mr. Johnson's report in its entirety, that I do agree with his conclusion that there has been no degradation of materials

eb10

mentioned in Mr. Liden's affidavit in the type of environment which we are now addressing.

Q And I haven't memorized the entire report, and I was focusing on Table 3 which was specifically referenced in an affidavit filed in this case, and I asked if the conditions established for the 20-year and 18-year periods are such that they lead to any indication as to the conditions and results at Salem 1.

Are they similar conditions, identical conditions, or what?

A The question as phrased is not complete. Table 3 does not have one line in it. It does not stand on that one line by itself. Table 3 is constituted of four different types of plants, a total of well over 100 bundles. The oldest one happens to be 20 years old and it's one bundle, but in terms of your question on stainless steel, even that 20-year-old piece of data is relevant to this hearing.

3b

3C wbl

CHAIRMAN MILHOLLIN: You may proceed, Mr.Onsdorff.

BY MR. ONSDORFF:

Q Mr. Liden, I believe you testified previous-- Or I might just ask: Do you share Mr. Eckhart's view as to relevance? Or is that Mr. Eckhart's opinion alone?

CHAIRMAN MILHOLLIN: To whom are you addressing the question?

MR. ONSDORFF: To Mr. Liden.

WITNESS LIDEN: I agree with Mr. Eckhart.

BY MR. ONSDORFF:

Q You indicated previously in your testimony that the present racks were now in use; is that correct?

A (Witness Lifen) That's correct.

Q If the application is approved the present rack will have to be replaced with that fuel in the storage pool; is that correct?

A That's correct.

Q Have you designed or formulated a procedure which will be implemented to effectuate that reracking of the contaminated pool?

MR. WETTERHAHN: Objection. It's beyond the scope of the contentions.

MR. ONSDORFF: Mr. Chairman, in response to that, I believe Mr. Eckhart's testimony pertaining to the solving of the Monticello and Browns Ferry problem was based upon

wb2

quality control at the factory. We're going to have some rather sensitive manipulations of rack structures at the contaminated pool. I would submit that there certainly is a question of fact as to the mechanisms that will be used to assure the continued integrity of that quality control which was so laboriously implemented at the factory.

CHAIRMAN MILHOLLIN: I'll sustain the objection. If you want to ask a question about installation with respect to integrity, you're welcome to do so.

MR. ONSDORFF: Well that certainly is the next question. But I felt it needed a little foundation.

CHSIRMAN MILHOLLIN: Well perhaps you should get to it, Mr. Onsdorff.

I'll sustain the objection.

BY MR. ONSDORFF:

Q In regard to a reracking procedure which will be implemented, have you given any consideration to any safeguards procedures that will be utilized to protect the quality control efforts made by Exxon at the factory, Mr. Liden?

A (Witness Liden) Yes, we have.

Q Will you tell us what those are?

A The spent fuel racks were designed such that they could be handled properly without, let's say, twisting or applying loads to them at places where they were not intended. If you would like that elaborated upon, we can do that.

wb3

Q Yes.

A (Witness Eckhart) A consideration of loads to this very rack during all phases of fabrication, shipping, handling and installation, has been considered both by Exxon Nuclear and the Licensee. Compared to the level of duty which the storage racks will receive during use, particularly with fuel inserted in them, the fact they're also designed for seismic conditions, there is at no time during the fabrication, shipping, installation and handling, that you will approach the loads on any member of the storage racks within a factor of 4 or 5 beyond which they were designed for with fuel in them in the storage rack.

Q Mr. Liden, you indicated that-- You were turning the microphone over to Mr. Eckhart. You indicated that both the Licensee and Exxon Nuclear had considered these. I assume he was referring to some other member of the Licensee, since you deferred to him on that question.

A (Witness Liden) The members of our Engineering Department, yes.

Q You yourself have not made that analysis?

A No, I haven't.

Q Now in addition to the loading factor, have you evaluated, Mr. Eckhart, the potential for piercing, a piercing episode, a transient?

A (Witness Eckhart) Could you be a little more

wb4

specific?

Q Is there a possibility that you might be concerned about perforation of the rack structure?

A By what mechanism?

Q During the reracking with spent fuel already in the pool?

A I don't believe it makes any difference whether there's fuel or not fuel in the pool, as to piercing. But could you possibly postulate a specific question?

Q Well my concern is that the fuel is going to be moved about. Is there any consideration being given to the potential in that scenario for perforation or piercing of the rack structure?

A I'd like to clarify that. The storage cells which are themselves encapsulated in stainless steel sheaths are inside the storage rack structure that is surrounded by very heavy plate steel on the side, by a massive base frame on the bottom, and by lead-ins on the top. There is no external face of the storage cells which has been sealed up from the pool water environment which can be damaged during the handling and use of the storage racks.

Q Mr. Liden, is the Licensee proposing to use the fuel handling crane at any time during the reracking operation?

A ((Witness Liden) No, sir; not for handling the racks.

wb5

Q What would you anticipate using it for?

A Handling of the fuel.

Q Is that the fuel in the pool?

A Yes.

Q What mechanism, or crane will be used to handle the rack?

A We will have to bring in a temporary crane for that purpose.

Q Do you know what temporary crane is going to be obtained?

A No, I'm not familiar with those details. We are going to an outside machinery rental rigging outfit and contracting their services.

Q Does this involve an unreviewed safety question?

MR. WETTERHAHN: Objection. We're clearly getting beyond the scope of the contentions. If the contention is that some lifting, by whatever mechanism, will damage it, that's been explored. I don't see the relevance of deciding who the manufacturer of the crane is to install, actually lift the new spent fuel racks.

MR. ONSDORFF: Mr. Chairman, before I respond, may I have a minute?

(Pause)

MR. ONSDORFF: Mr. Chairman, our point in this question is not the identity of any manufacturer; our concern

wb6

is -- and I'm sure the Staff is well aware of this: there are two cranes in the spent fuel building which are specifically designed with weight limitations as to the access and the vulnerability of the pool if there should be a drop accident over the stored fuel.

Our concern is that a new crane brought in certainly would have the potential for exceeding the weight limitations, which could involve a drop accident on the stored fuel, which is precisely the eventuality which was intended to be avoided. And we would not be in a position to evaluate that unless that documentation was able to be explored through this questioning.

MR. WETTERHAHN: Again,--

CHAIRMAN MILHOLLIN: So what is your question? The question is the identity of the manufacturer of the crane?

MR. ONSDORFF: Certainly it is not. I was wondering whether this selection process had reached sufficient formulation that -- I assume it has to be an actual proposal to the NRC staff for its review. And, if so, would it be made available to the parties to the proceeding, if it would involve such a movement of heavy material over the spent fuel pool.

CHAIRMAN MILHOLLIN: You've asked the witness how the reracking will be done, or with what crane. And the witness has answered that question. Then you asked

wb7

the witness whether there was an unresolved safety question.

MR. ONSDORFF: When he indicated there was an outside crane that would be employed.

CHAIRMAN MILHOLLIN: And I will sustain an objection to the question "Is that an unresolved safety question."

BY MR. ONSDORFF:

Q Has there been a proposal made to the NRC staff in regard to this?

A (Witness Liden) The NRC staff will review and approve our procedures for installation, prior to the installation being accomplished.

Q And have you any idea as to the timing of that NRC review?

A The staff has preliminary drafts of our procedures.

Q Has that been made available to the parties to this proceeding?

MR. METTERHAHAN: Objection. We're going beyond the scope of the issues.

As I think I explained in the prehearing conference, there are certain issues before this Board. The Board is here to decide contested issues, and the remainder of the matters dealing with spent fuel racks and the reracking are to be handled by the NRC staff, and approval given.

We're not denying that the NRC must be satisfied

wb8

with the procedures that we have submitted. But that is not a question before this Licensing Board.

CHAIRMAN MILHOLLIN: The question is whether those documents have been made available to the parties in this case. And so I will overrule your objection to the question.

You may answer the question whether they have been made available to the parties in the case.

WITNESS LIDEN: No, they have not.

3D agb1

BY MR. ONSDORFF:

Q Will there be an opportunity for those documents to be made available?

MR. WETTERHAHN: I think that calls for a conclusion, a legal conclusion as to their relevance to this proceeding.

CHAIRMAN MILHOLLIN: Overruled.

You may ask the witness whether the witnesses intend, or the Licensee intends to make the documents available.

7.140

WITNESS LIDEN: When the documents are in their final form for NRC Staff review, yes, they can be made available.

BY MR. ONSDORFF:

Q You have no need to keep them secret, they're not proprietary or anything like that?

A (Witness Liden) That's correct.

Q Mr. Liden, in venting, if that procedure becomes necessary, in venting the stainless steel shroud, has there been an analysis of what type of drill will be employed?

A Well I'm not quite sure what you mean by analysis. However --

Q Have you selected a particular drill?

A Yes, in our -- in Exxon's design, yes, they have. If you would like to go into more detail, Mr. Eckhart can address that.

Q All right. I appreciate that.

Before I direct any questions to Mr. Eckhart, have you

agb2 evaluated the possibility that, in addition to drilling the shroud, there might be penetration of the boral material also?

A We have looked at that and, again, Mr. Eckhart can give you much further detail on this.

Q Well, what is your view before we turn to Mr. Eckhart?

A What is my view on what?

Q As to your concern for that possibility?

A The possibility of drilling the boral?

Q That's right.

A We don't want to do that, no.

Q What about penetrating the fuel, would that give you cause for concern?

A Certainly it would.

Q Have you analyzed the potential for that?

A Certainly.

Q And what is your conclusion.

A That we will not drill into the fuel.

Q How are you going to avoid doing so?

MR. WETTERHAHN: Please, I think Mr. Onsdorff is inquiring into the design details of what kind of drill they're going to use. The witness has indicated that another member of the panel is the proper person to respond. I don't see any reason not to direct the question to the indicated member.

CHAIRMAN MILHOLLIN: If Mr. Liden is unable to answer the question, he can say so and then we'll turn to someone who

agb3

is.

BY MR. ONSDORFF:

Q Let me just take a second --

MR. KORNBLITH: What is the pending question, or isn't there one?

MR. ONSDORFF: There is, but in light of Mr. Wetterhahn's statement it kind of threw me for a second, and I would like the opportunity to pause.

(Pause.)

MR. ONSDORFF: Could the Reporter read back the pending question?

(Whereupon, the Reporter read from the record as requested.)

MR. ONSDORFF: I think I had a better one, but that will have to do because I can't recall a better one.

CHAIRMAN MILHOLLIN: Do you withdraw the question?

MR. ONSDORFF: No, I would propose that question, if I may.

WITNESS LIDEN: Is that how do we avoid drilling into the fuel?

BY MR. ONSDORFF:

Q That's correct.

A (Witness Liden) Through the design of the drilling mechanism, physical stops on the drill bit or on the drill assembly itself.

agb4

As I indicated before, I'm not familiar with the detailed design details.

Q Would Exxon be operating the drill or would Public Service?

A I'm not sure that's been determined. Someone operating the drill would be someone who had been trained on it and qualified, whomever their employee may be.

Q I would certainly hope so.

Mr. Eckhart, you've been nominated, I guess, possibly you could enlighten us as to this potential hazard.

CHAIRMAN MILHOLLIN: Do you have a question you would like to ask Mr. Eckhart?

BY MR. ONSDORFF:

Q I thought Mr. Eckhart understood. We were concerned with what type of cautions, if you will, would be utilized to insure that the drill did not pierce or in another fashion degrade the fuel when it was drilling through the shroud.

A (Witness Eckhart) Mr. Liden summarized pretty accurately that there would be physical stops on the drill mechanism to prevent it from going anywhere near the fuel.

Q What margin of safety are we talking about?

A In terms of the tolerances on the fixture and on the racks, it's not being facetious to say orders of a thousand.

MR. KORNBLITH: Thousands of what?

WITNESS ECKHART: The tolerances on the fixture and the

agb 5

mechanism are on the order of plus or minus a 32nd to a 16th of an inch. You're going to be five or six inches above the fuel in the area of which you are drilling, number one, and, number two, you will be -- that's the vertical distance. You will be one to two inches away in the horizontal plane anywhere near the active fuel, that's specifically what I meant by the margins of safety.

BY MR. ONSDORFF:

Q Now just for my own edification, you maintain that this is going to be physically prevented. Is this somehow held by remote control or is the operator holding the drill above the shroud while suspended over the pool on some sort of a walkway?

A (Witness Eckhart) He would be suspended, not necessarily on a walkway. The device he's going to be utilizing for doing the venting that's required is the same kind of mechanisms you would use taking the kind of standard measurements, both in installation, removal and measurements schniques of the cool floor.

What you're going to have is a device which is physically larger than the opening to the fuel storage cell. Whether it was dropped or mishandled or whatever it could not fall inside any fuel storage cell, once it is properly positioned, you now have such tolerances.

MR. ONSDORFF: Mr. Chairman, may I inquire at this point in time, I was wondering how far we're going to proceed. I feel

agb6

like spent fuel at the moment, it's been a long day.

CHAIRMAN MILHOLLIN: The Board's intention was to go another 30 minutes.

MR. ONSDORFF: If I might reserve the right, if anyone else would like to spend some time cross-examining, I would be more than willing --

CHAIRMAN MILHOLLIN: You're saying you have no further questions at this time?

MR. ONSDORFF: Not at this time. I'm saying I would feel more comfortable if we could utilize this time for someone else's cross-examination for the reason that I feel like I'm beginning to reach my tolerance.

CHAIRMAN MILHOLLIN: Well you can decide whether you want any more questions or not, that's up to you, Mr. Onsdorff.

MR. ONSDORFF: Well I certainly will if that's the Board's wish.

CHAIRMAN MILHOLLIN: The Board has no wish whatsoever. One way or the other, it's up to you, you decide.

BY MR. ONSDORFF:

Q Mr. Liden, can I direct your attention to your affidavit once again, Exhibit Number Two, Page Four, paragraph number five, the first sentence says:

"Licensee has assured that fabricated racks are built and installed to a high level of quality in accordance with design specifications."

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What are the assurances that you're referring to in that sentence?

A (Witness Liden) By review and approval and monitoring of Exxon and their subcontractors' quality control, quality assurance program as well as our own quality assurance monitoring.

Q Specifically what type of quality control monitoring has Public Service developed?

A We have an approved quality assurance program that has been approved by the NRC Staff for conduct of all operations, procurement, fabrication, et cetera, et cetera, involved in nuclear power plants.

Q Well specifically in regard to the fabricated racks, how are you going to examine these when they are shipped from the factory to determine that, in fact, they are now safe and appropriate to install in the pool?

MR. WETTERHAHN: Objection. We're going a little far afield of the contention. We seem to be getting into quality assurance and the general program. I would object to the question as being beyond the scope of the contention.

CHAIRMAN MILHOLLIN: Can you relate your question more specifically to your contention, Mr. Onsdorff?

MR. ONSDORFF: Yes, Mr. Chairman.

We have the past experience which indicates that the materials are susceptible to the action of the spent fuel pool water reaching the stainless steel shroud. These Monticello

agb8 and Connecticut Yankee experiences have been refuted, or attempted to be refuted by the Exxon Nuclear cells which are fabricated in a manner which is superior to the ones used at the other two plants. This is the contention. And the Licensee has an assurance that these racks will not experience the problems that we have addressed.

CHAIRMAN MILHOLLIN: Well if you have a specific question as to the method of fabrication or quality control which would be relevant to your contention, why don't you ask the question.

MR. ONSDORFF: I thought I had, but I'll try to rephrase it, Mr. Chairman.

BY MR. ONSDORFF:

Q You refer to non-destructive testing of fuel cells to assure a 95 percent leak-tightness. What was this non-destructive testing?

A (Witness Eckhart) The non-destructive portion to insure leak-tightness took two forms, the primary form was the quality assurance program of process controls that were employed by the fabricator and supplier to insure that these cells were welded properly, that's both the procedures and methods of welding.

When we were through evaluating their program and testing the results of their program, we already determined through our own statisticians that they were already leak-tight

agb9

with 95 confidence level.

Over and above the QA process control employed during fabrication, we required that the supplier of the poison cells do an independent and separate helium leak check of the completed storage cells on a basis which puts your confidence level slightly above 97 percent. But the helium leak check was not over and above the normal process controls employed during fabrication.

Q Now that's the Exxon Nuclear quality assurance program, if I understood your testimony, Mr. Eckhart.

A No, that's the Licensee's, the Licensee has to approve all of our programs and all of our suppliers' programs, so that there's only one real program in effect here.

Q That's what I'm getting out. Mr. Liden, if I might ask you, have you adopted in essence Exxon Nuclear's -- you have no independent tests beyond what we've just heard about, is that correct?

A (Witness Liden) That's correct.

Q All right.

Now these measures, Mr. Eckhart, which you testified to -- Mr. Eckhart? I'm sorry, I didn't think I had caught your attention. Are these quality assurances undertaken prior to delivery of the racks to the Licensee?

A (Witness Eckhart) You mean the specific tests that I defined to you done before the racks are delivered?

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Q That's correct.

A The answer to that is yes.

Q Mr. Liden, then what consideration or analysis has been done or will be done to determine any possibility of hazards in shipment for their impact on the quality assurance that was arrived at prior to shipment to the plant site by Public Service?

A (Witness Liden) Upon receipt by Public Service at the site, we would perform a very detailed visual inspection of the racks, looking for any type of damage at all.

Q That's visual by the unaided eye?

A I'm not familiar with the details. Whatever the appropriate quality assurance standards define visual as.

Q And that's when the racks arrive at the site prior to installation, is that correct?

A That's correct.

Q Does Public Service have any post-installation inspection program that it intends to use once the racks are placed into the pool?

A Are you referring to a surveillance program or --

Q Not in the long term, we'll get to that. My concern at this point is, at the end of the installation process prior to moving on and concerning yourself with the pool environments impact, I'm solely directing my present question to any type of handling during installation that might have an impact in this

agb11 regard.

A All handling will be done in strict accordance with the detailed installation procedures which will be monitored by our quality assurance personnel. The appropriate sign-offs, checkout lists and whatnot will be filled out as each step is accomplished and measurements taken or whatever.

Q Are you aware of any non-destructive testing which is going to be utilized after installation?

A No.

Q The second sentence in paragraph five on Page Four -- if I could just summarize it for brevity -- indicates assurance of at least a 95 percent leak-tightness with a 95 percent confidence level.

Does that mean that you could have a 5 percent leakage rate, Mr. Liden?

Mr. Liden, are you deferring on that?

A Yes, I am.

Q That statement in your affidavit you're not going to vouch for, is that correct?

MR. WETTERHAHN: I'm sorry, I didn't hear you, Mr. Onsdorff.

MR. ONSDORFF: I asked if he was not going to vouch for the statement in his affidavit.

WITNESS LIDEN: No, I didn't say that.

CHAIRMAN MILHOLLIN: That's an improper question.

MR. ONSDORFF: I'm sorry.

3E wb1

BY MR. ONSDORFF:

Q Are you deferring to Mr. Eckhart, Mr. Liden?

A (Witness Liden) Your question, the answer is true. If you want some more details as to how this is determined, Mr. Eckhart will answer.

CHAIRMAN MILHOLLIN: By your statement, "The answer is true," what doyou mean?

WITNESS LIDEN: Maybe we had better repeat the question.

CHAIRMAN MILHOLLIN: As I understand, it means that you have 5 percent leakage; is that correct? Is that the question?

MR. ONSDORFF: Yes.

CHAIRMAN MILHOLLIN: The question is whether the statement in your affidavit means you have 5 percent leakage.

BY MR. ONSDORFF:

Q As much as.

A (Witness Liden) There could be as much as. It doesn't mean that we do have 5 percent.

Q Mr. Liden, if the cell is vented, would that cell continue to be used in its vented state?

A What is your assumption? You say "continue to be used." I assume you're saying that there is a fuel assembly installed in it when it is vented?

Q That's correct.

wb2

A Yes, it could continue to be used.

CHAIRMAN MILLOLLIN: Would it be your intention to continue to use it in the normal course of your operation?

WITNESS LIDEN: I can see no reason why we would, of necessity, want to pull the fuel assembly out and not use it.

CHAIRMAN MILLOLLIN: Thank you.

BY MR. ONSDORFF:

Q Would you envision any additional, or any monitoring of the vented cell to evaluate its continued resistance to degradation?

A (Witness Liden) We have a surveillance program.

Q Could you describe that briefly?

A Certainly.

We have a number of sandwich coupon plates and miniaturized, let's say, or shorter fuel storage cells that have been made up by the same manufacturer, the same processes, that will be installed in the fuel storage pool and examined on a periodic basis.

These sandwich coupon plates, some of them are designed to be leak-tight through the same processes. Some of them had intentional holes drilled in them in various configurations to allow exposure to the pool water. And now over a period of time these speciments would be removed from the pool, visually examined, dried and weighed, to determine

wb3

the amounts of corrosion. These are the intentionally leaking ones.

Q In essence, you're attempting, I believe, to draw an analogy by a representative situation to extrapolate from that to the actual vented storage cell; is that correct?

A Yes. It's the same material exposed to the same environment.

Q Is that necessary for drawing such a conclusion?

A Which conclusion?

Q The same material exposed to the same environment, is that a necessity for achieving extrapolation data which you can rely upon?

A Well I think it's the best way. There can be, you know, every little disagreement with the fact that, you know, it was the same environment, it's in the same exact pool.

Q That was my next question. Thank you for anticipating it.

Where exactly in the pool will the coupons be placed?

A They will be placed in a location that varies, actually. It will be in an empty storage cell location that is as close as practical to the most recently discharged fuel.

Q At what depth in the pool?

wb4

A I believe it is planned to put them about mid-way down the rack; which means it will be about the mid-fuel height in the storage cell.

Q But it will be in an empty cell, as opposed to a cell that has fuel?

A Yes.

CHAIRMAN MILHOLLIN: Mr. Liden, you have testified that you are prepared to leave a cell which has been vented in the pool. I take it by that that you mean to say that there would not be any increased safety -- that there would be no decrease in your confidence in the safety of the pool by the fact of having the vent, the cell vented?

WITNESS LIDEN: That's correct.

CHAIRMAN MILHOLLIN: Would the venting have the effect of exposing the boral to the pool water?

WITNESS LIDEN: Yes, it would.

CHAIRMAN MILHOLLIN: Thank you.

MR. WETTERHAHN: I hate to testify, but let me try to repeat what the witness said previously. The only reason for venting is if the cell has come into contact with water already.

CHAIRMAN MILHOLLIN: The Board is aware of that; yes.

MR. SMITH: Is the Board going to go beyond five-thirty?

wb5

CHAIRMAN MILHOLLIN: No, we have no intention of going beyond that.

MR. SMITH: Because htere's one matter I would like to discuss before we end the day.

CHAIRMAN MILHOLLIN: Perhaps it would be an appropriate time to take it up now.

MR.SMITH: My question is addressed to Mr.Onsdorff, just for clarification as to what will proceed on their Contentions 2 and 6. We had prior discussions before the State of New Jersey had asked to introduce the Crockett letter -- I forget what exhibit it is: No. 9, I believe -- that Mr.Onsdorff may introduce that letter for certain purposes for his Contentions 2 and 6.

I was just wondering if that is still going to be done now.

CHAIRMAN MILHOLLIN: You're referring to his direct case on 2 and 6?

MR.SMITH: Yes.

MR. ONSDORFF: I think that in all likelihood it's probably one of the first things we would endeavor to do tmorrow morning, would be to make that offer of the document. At that time certainly the parties would be entitled to argue the substantive relevance and materiality which they have all reserved.

CHAIRMAN MILHOLLIN: You say you intend to--

wb6

Excuse me; Mr. Smith, is that a satisfactory response to your question?

MR. SMITH: It lets me know what he plans to do, yes.

MR. WETTERHAHN: I would have an objection, or clarification: I would ask the Board if this is being used for impeachment or other purpose of cross-examination rather than its introduction into evidence as the affirmative case?

CHAIRMAN MILHOLLIN: Are you saying, Mr. Onsdorff, that you're going to reach your case in chief tomorrow morning?

MR. ONSDORFF: Well, I would think that we would go through the cross-examination first. So I would assume that it will probably be out of order. I would intend to use that whenever it was that my case in chief had been reached. But it would probably not be tomorrow morning, now that I think about it.

CHAIRMAN MILHOLLIN: You think probably your cross-examination will end -- will be fairly short tomorrow?

MR. ONSDORFF: I anticipate, yes, that there will be not too much more tomorrow.

CHAIRMAN MILHOLLIN: Perhaps it would be a good time to just talk about tomorrow in general now.

Mr. Smith, does that answer your question?

MR. SMITH: If the answer is Exhibit 9 will be introduced as their affirmative case on these contentions, then

wb7

I have a clear understanding of what's going on.

CHAIRMAN MILHOLLIN: I take it it might also be used on cross-examination as well. Is that how I interprat your response?

MR. ONSDORFF: There is a potential for that, yes. Possibly both.

End 3E

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MR. SMITH: Mr. Chairman, I think the parties are entitled to know if the Colemans are going to put on an affirmative case, and if Exhibit 9 will constitute their affirmative case, or if they are--

CHAIRMAN MILHOLLIN: All right, that's fair.

MR. ONSDORFF: I believe I answered that. We would offer that as our case in chief.

CHAIRMAN MILHOLLIN: Very well.

I take it that you may have other matters which will also be part of your case in chief or not, or is that your case in chief?

MR. ONSDORFF: I believe that would be-- There may be some additional documents which were referenced in my letter, indicating that they deal with the boric acid concentration in the water in the reactor. Those documents would be the only other substantive evidence in my case in chief, Mr. Chairman.

MR. SMITH: Mr. Chairman, I don't recall any documents, specific documents being identified. There was a general acknowledgement that maybe we'll put in something. I think it is only fair that the Board and the parties know what is going to be introduced.

MR. ONSDORFF: Mr. Chairman, if I might indicate an error, because there were a series of reportable occurrence reports which were specifically identified over a period of

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at least several months.

CHAIRMAN MILHOLLIN: Yes. Can you be more specific now? Tell us what reports you intend to introduce tomorrow, if you do intend to introduce reports. That was the purpose of my question to you, was to ask you whether you have any other matters which you intend to use in your case in chief, other matters other than the Crockett letter, so that the parties will be on notice as to what your intentions are.

MR. ONSDORFF: Yes. Those reportable occurrences cover a period of a number of months. They were identified.

MR. KORNBLITH: Can you provide copies of them to the Board tonight?

MR. ONSDORFF: If a copying machine is still available in the building, that may be possible. I don't know at this point in time.

CHAIRMAN MILHOLLIN: It would certainly help us and help the other parties if you could give us those documents if you intend to rely upon them tomorrow.

MR. ONSDORFF: I'll endeavor to do that if they are available and if a machine is available.

MR. WETTERHAHN: Mr. Chairman, again could you give us the numbers of those reportable occurrence reports with the dates? I don't think that the transmittal letter indicated anything other than that there were some reportable occurrence reports. It would be just impossible for us to

eb3

identify them.

Can you give us the numbers and dates of them right now?

MR. ONSDORFF: I don't have them right in front of me. I was working on my cross-examination. I will endeavor to see whether that material is with the files that I have in my possession or whether they are in another location at this point in time.

MR. KORNBLITH: Well, wasn't the object of providing the testimony several weeks ago that we'd have these things available to study before the hearing? I don't understand how you're coming up with these things now.

MR. ONSDORFF: Well, I don't know that I am.

MR. KORNBLITH: You just said that you were, didn't you?

MR. ONSDORFF: I said, you know, if I were going to use them I would come up with them. I haven't made that final determination as of yet.

MR. KORNBLITH: Well, I think the determination may almost have been made for you because you haven't provided them in accordance with the rules. Can you respond to that?

MR. ONSDORFF: I certainly would say that these were documents which were on file with the NRC and available to all the parties. There is not any surprise involved, and therefore, I don't believe--

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CHAIRMAN MILHOLLIN: Well, perhaps this is a question we will decide tomorrow, but you are on notice as to the generality of the manner in which you identified these documents and the burden that creates. And so when the time comes, if there does come a time at which we'll have to decide this question, I assume you'll be on notice.

MR. ONSDORFF: I will be indeed.

CHAIRMAN MILHOLLIN: I take it then your answer to Mr. Smith's question is as definite as you can be at this time.

MR. ONSDORFF: I believe it is. The only other point I would like to make in further elaboration would be that we would anticipate quite possibly addressing the Board questions of interest so our case in chief may very well include additional direct testimony on, for example, Three Mile Island.

I didn't have that frame of reference because I didn't anticipate reaching it this week. I wasn't intending by my remarks to suggest that our case in chief did not encompass that matter of Board interest.

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CHAIRMAN MILHOLLIN: As the Board understands it, your case in chief tomorrow will have to do with Contentions 2 and 6.

MR. ONSDORFF: That's certainly what I was directing my remarks to, yes.

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CHAIRMAN MILHOLLIN: Very well.

MR. WETTERHAHN: Mr. Chairman, one last question, the in camera session. Perhaps we can make a decision or could inquire of Mr. Onsdorff whether it will be necessary, and the most convenient time to plan for it.

MR. ONSDORFF: As I previously indicated, Mr. Chairman, I would think it would be most convenient for all parties concerned to have that first thing tomorrow morning.

CHAIRMAN MILHOLLIN: Very well. Then your cross-examination first thing in the morning, beginning at 9:30, will concern itself with the proprietary document?

MR. ONSDORFF: That's correct.

CHAIRMAN MILHOLLIN: And when that cross-examination is finished, the executive session will terminate at the same time?

MR. ONSDORFF: I would believe so, yes, Mr. Chairman.

CHAIRMAN MILHOLLIN: Is that agreeable to all parties?

MR. WETTERHAHN: Perhaps we could start at nine o'clock since all the parties are here or near Salem.

CHAIRMAN MILHOLLIN: I think that's a good suggestion. We'll start at nine o'clock.

Does that create a burden for anyone?

MS. MAC ARTOR: It is noticed publicly, in case members of the public are planning to attend, for 9:30.

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CHAIRMAN MILHOLLIN: Well, I'm assuming that our executive session will last a half hour.

MS. MAC ARTOR: I see. Perhaps it will.

CHAIRMAN MILHOLLIN: Perhaps it won't.

MS. MAC ARTOR: No, there is no problem.

MR. VALORE: It creates a burden, but one that I can carry. But on the subject, I can be here at nine o'clock but speaking of carrying things, in the nature of housekeeping, are we allowed to leave our briefcases here in this room somewhere, or are they going to be using the room in the evening?

MR. FRYLING: Mr. Chairman, perhaps I can respond to that. I did talk to Mr. Speers this morning, who is involved with the physical building. He indicated that this room would have to be cleaned up for a Freeholders Meeting tonight, must be returned to the state it was when we got here at eight o'clock this morning.

CHAIRMAN MILHOLLIN: Thank you.

Are there other matters which any party would like to address at this time? Any other questions or matters for discussion?

(No response.)

Very well, the hearing will adjourn until nine o'clock tomorrow morning.

(Whereupon, at 5:30 p.m., the hearing in the above-entitled matter was recessed to reconvene at 9:00 a.m. the following day.)