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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

In the Matter of: 243rd Meeting.

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

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243rd MEETING

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Nuclear Regulatory Commission
1717 H Street, N.W.
Room 1046
Washington, D.C.

Friday, July 11, 1980

The 243rd meeting of the Advisory Committee was convened, pursuant to adjournment, at 8:30 a.m.

Members Present:

MILTON S. PLESSET, Chairman
J. CARSON MARK, Vice-Chairman
CHESTER P. SIESS
STEPHEN LAWROSKI
MYER BENDER
DADE W. MOELLER
WILLIAM KERR
MAX W. CARBON
WILLIAM M. MATHIS
JESSE C. EBERSOLE
HAROLD W. LEWIS
DAVID OKRENT
JEREMIAH J. RAY

Staff Present:

R. SAVIO

P R O C E E D I N G S

MR. PLESSET: The meetin, will now come to order.

This is the 243rd meeting of the Advisory Committee on Reactor Safeguards. The specific items for today's meeting are the discussions on the Tennessee Valley Authority application to operate the Sequoyah Nuclear Power Plant, our meeting with the NRC commissioners and discussions of the ACRS repo.t on the FY 1980 Safety and Research budget.

This meeting is being conducted in accordance with the Federal Advisory Committee Act and the Government in the Sunshine Act. Dr. Richard Savio is the designated Federal employee for this portion of the meeting.

A transcript of the meeting is being kept, and it is requested that each speaker first identify himself or herself and speak with sufficient clarity a d volume so that he or she can be readily heard.

We have received a request from General Electric for permission to make a brief oral presentation, and we have allotted time for this today. We have not received any written statements o. requests from other members of the public with regard to th.. portion of the meeting.

The first item on today's agenda is the Subcommittee Chairman's report on the Sequoyah Nuclear Power Plant. I ill call o Cq- Maqj sn lajd sghr qdonqs-

Dr. Mark.

Oh, yes. I should mention before Dr. Marks's report that I received a letter from Commissioner Gilinsky in which he asked us to pay particular attention to two items: first, an assessment of whether the ice would adequately suppress the steam pressure in a large loss of coolant accident; and second, the Committee's view on whether additional hydrogen control measures should be required for full power operation to limit the effects of large amounts of hydrogen such as that generated during the Three Mile Island accident.

So the Committee should pay particular attention to these two points which we should address in our report on Sequoyah. Thank you.

Dr. Mark, would you take over?

MR. MARK: On the Sequoyah review, Sequoyah is to be considered for an operating license. The hope is entertained by TVA people and by the staff that it might be possible to give a committee opinion on the operating license at this meeting. There will be more said about the schedule of the plans for Sequoyah, I am sure, in the course of the presentations.

There are quite a number of questions which will have to be thought through or checked off before it would be possible to decide if the latter is possible. I suggest people have it in mind in that sort of context. There was a subcommittee meeting on Tuesday of this week which went over all of the items still requiring attention, and perhaps a few more than that.

We have asked for presentations this morning on the items which were felt to be of the most continuing significance or appeared to raise the most obvious questions, but I will mention some of the items discussed which, in our opinion -- by us, I mean Mr. Mathis and myself and the Subcommittee -- the items which we felt received enough discussion on Tuesday not to warrant a presentation to the full Committee. All of those, of course, are open to question if anyone should ask for details on them.

The ones I thought I would mention were the item of protection against floods that has been considered in the context of two floods: probably maximum flood, which you arrange by having first a three-day storm delivering between [illegible] and 7 inches of water in a 21,000 square mile watershed, followed immediately by another three-day storm in which you get 16 or 17 inches of water in the same watershed.

Such a flood would be thought to bring the water about 15 feet above grade level, and if you make an allowance for 50 mile an hour winds, you get waves 5 feet above that. So the question has been examined as to how the plant would fare if there were water of that sort at the plant.

The general picture emerging is that they had a Phase I plan for battening things down which would take about ten hours to get people there and shut off the plant, put it in cooldown, switch the power sources to the diesel generators, and a number of other steps which would require about ten hours, followed by a more particular Phase II battening down sequence of rearranging water sources and moving materials and closing drains, which would take about 14 hours.

Minimum warning of a flood of this general nature would be 27 hours, in their opinion, and they feel they are prepared to cope with such an event.

Another flood, which I judge is no more severe or perhaps slightly less is the one which might have a seismic component coupled with about half probable maximum flood. The seismic component contributes by claiming in an optimal way the breaking of core upstream. These thoughts on the matter seem to us to cover the point that has been given our attention. We don't propose to have more discussion here today unless it is asked for.

Another question which was discussed and had come up at a previous meeting was the arrangements that need to be thought through on the operation of the first unit before the second unit was ready to operate. They do have some connections, in particular through the auxiliary building, and there is a secondary containment enclosure in the auxiliary building, so that the possible releases of anything from the first plant would be shielded from proceeding to the Unit 2 part of the installation.

Thought has been given to the water sources, both with respect to Unit 1 and Unit 2. There is a source which is very specifically aimed at Unit 1, a new pumping station, and it looks as if the period of operation of the first unit before the second unit is brought on has also been thought through.

There was a question on Tuesday of the status of the low power test program. It does not deserve any further report, as far as I can see. The SER covering that operation either appeared yesterday or today, if it was on the same schedule that was pictured on Tuesday, and the lower power test operation is then expected to start tomorrow.

There was a presentation on Tuesday of the staff's present consideration of the vented filter containment. This is really not specific to Sequoyah. It did not seem to call for discussion in connection with Sequoyah.

I think that those are the items which were discussed at the Subcommittee. Barring questions from members, they would not be the subject of presentations today, although questions can certainly be answered. Unless there are questions which the designated Federal employee feels I have left out, and since Charlie isn't here --

MR. PLESSET: I can apologize for him. He is on an urgent matter. He will be in later.

MR. MARK: We talked about what would be covered. So I doubt if we would have gotten anything from him important. I would propose that we proceed with presentations.

I would call on Mr. Stahl of the NRC staff to say what is necessary about the schedule and the status of items which are either recently closed or still not quite closed.

MR. OKRENT: Can I ask a question? What was the nature of the presentation on the vented filter containment? Who presented what?

MR. MARK: Jim Murphy -- Jim Myer. It is a somewhat generic study.

VOICE: What he did was review the status of Zion and Indian Point, the fact that licensees are doing parallel review.

MR. OKRENT: I am familiar with that study. Was there anything specific to Sequoyah?

VOICE: No, sir.

MR. MARK: No, I thought not. It was a generic study.

MR. OKRENT: Okay. Last month I asked that the applicant be prepared to comment on his response to ACRS recommendations in its letter on the final report of the Lessons Learned Task Force, that each operating and NPOL reactor look at the pros and cons of a vented filter containment; also, that each one do an IREP kind of thing.

So I would like to hear from --

MR. PLESSET: We will wait until the applicant comes on, Dave. I am sure he has made a note of that.

Before we go to Mr. Stahl, Carson, if I might ask the staff to be sure to include any information they might have regarding questions about the ice condenser system. There has been experience with the system at D.C. Cook, for dx'lpkd, tg't I he'rd questions about, the status of the inspection of the doors on the ice columns, and what information they might regarding the possibility of hot channels through the ice columns. Those are two questions that I have.

When you get to it, we would like to hear a remark on it.

The other thing is there is no SER. We noted that, but I understand you should have one. Are you going to make a comment about that?

MR. STAHL: Yes.

MR. MARK: That is part of the scheduled discussion.

MR. PLESSET: All right, fine.

MR. CARBON: Will they also address Commisioner Gilinsky's second question?

MR. PLESSET: Yes, I am sure. I am sure they will. That is on the agenda.

MR. MARK: It was on the agenda before Gilinsky's letter.

MR. PLESSET: Yes. Both of those items have a fair amount of time on the agenda, which is this colored sheet. Okay, why don't we go to the staff's presentation?

MR. STAHL: My name is Carl Stahl, the project manager for the Nuclear Regulatory Commission on this project. My task today will be to summarize the status of issues that were discussed at the Subcommittee meeting. There are selected members from the staff here to assist me in this review, including a representative from I&E to assist in this matter.

To set the stage for the review today, I will start off with the schedule. First and foremost, plant status. Initial criticality was achieved on July 5. Zero power test commenced. It is my understanding such tests will be completed today or tomorrow.

On this basis, initiation of a lower power test program could begin on Saturday or the first of the week. Assuming things go well, lower power test program could be completed by the end of July. That could then be followed by, of course, power ascension tests sometime the first week of August, and then subsequent full power operation several weeks later.

In order to initiate the lower power test program that was required in the Safety Evaluation Report and the License Amendment, the Safety Evaluation Report needed to consider the safety aspects of the program, the procedures to conduct such a program, tech spec changes that would be required, and last but not least, any necessary emergency procedures that may be needed in the unlikely event that they should be called on.

As indicated previously by Mr. Baer in our review of the Safety Evaluation Report, we have concluded formally in this report that no additional risk would be introduced as a result of this program. I am pleased to say today that yesterday we were able to sign an amendment to the license, and therefore we have authorized TVA to proceed with the low power program as soon as possible.

Now, the issuance of an amendment, I would say, is consistent with the plant readiness, and this did require a very expeditious effort on the part of the staff and the applicant to meet this status. I should add that to the extent possible, our reviews are scheduled to be in step with plant status.

With this in mind, I would like to introduce Mr. Tedesco here, who would like to make some introductory remarks on the related schedules to our review of the full power test issues.

Mr. Tedesco.

MR. TEDESCO: Thank you, Carl.

What I would like to do for a few minutes with the Committee is share where we are with our review of Sequoyah and to underscore the need for our support based on the review of Sequoyah. Carl has given you a background of some of the major elements of the review. I think it is good to bring into focus that we have issues in the SER for Sequoyah back in March 1979. That was the original SER. Supplement 1 started to pick up some of the requirements on Three Mile Island. It was issued in February of this year.

What we are looking forward to now is Supplement number 2, which would then deal with the balance of items in non-TMI areas, and this would pick up the full power items based upon the TMI requirements.

Now, we expect to go ahead and complete our review this month and be able to issue the supplement sometime at the end of July or early August. We then expect to be prepared to go through a Commission briefing in early

August, and then with expectation of issuing the full power license in early August.

Now, this would be all predicated upon a favorable letter from the ACRS this month, and if we are not able to succeed in this endeavor, it is very possible that we would have to come back in August and then that might cause us further delay.

Now, there have been a number of changes. We went through these at four subcommittee meetings, a site review meeting, and five full committee meetings, so I believe that we all have had an opportunity to get some insights into where we are with the review of the Sequoyah plant.

I recognize also there are some new aspects that we are dealing with, which are unique with Sequoyah, that deal with the ice condenser, and then the question on the hydrogen.

These matters will be discussed today. The staff believes that it can resolve the remaining items that deal with TMI and non-TMI issues. We did a quick survey last night, and there are about 40 TMI issues that have to be dealt with. We feel that nine of them remain to be resolved. There are 13 non-TMI issues, 5 of which remain to be resolved, so I think these data suggest quite a bit of progress made in our review.

We are confident that TVA is willing to support and cooperate with us on the remaining items, so it is on that basis that we outlined that we are asking for a favorable letter from the Committee this month. I realize there is a supplement yet to be written. We will add that we would be prepared to keep the ACRS informed on the resolution of these items as we move forward.

In any case, we would request a letter from the Committee that would deal with the question of hydrogen. If the Committee found it was not able to go all the way for Sequoyah, at least as a minimum we would request a letter on the question of hydrogen. It is one of the issues we have to deal with, a rulemaking proposition.

I ask the Committee for a favorable report on Sequoyah this month.

MR. PLESSET: Thank you.

MR. STAHL: Let me then take up the status of the review from Mr. Tedesco. I will start off with a review of the non-TMI issues.

(Slide)

As mentioned, we believe eight are complete and five are ongoing. If you look at your Vu-graph, you will find items 9 and 13 are I&E bulletins ongoing that apply to Sequoyah and other plants. Items 4 and 8 require further discussion and will be resolved shortly.

I do want to identify item 6, in particular, which involves quaifications of flexible equipment. I cited before that this was an important item on the crit[illegible]al path, as identified in the SER. It needs to be completed by the time of full power operation. The item is still important.

The Commission order of May 23 provides some relief in the schedule. We are now able to say that an SER schedule in the Commission order dictates that such be produced by February 1981, the completion of it by June 1982. This does not diminish the importance of this item; it simply provides a little more flexibility in our completion of an important area of endeavor.

To emphasize the importance of this item, we are now planning to go to the regions and describe, if necessary in detail, NUREG 0588 that gets into the criteria that remain in this area. With this in mind, however, I believe that this would not preclude us from entering into a license for full power with Sequoyah.

I am confident that the staff will review these items, and items that may constitute a deficiency will be corrected and allow us to proceed. On the basis of this chart, the 13 items will be complete. I also mentioned on Wednesday two additional items are identified.

First we informed TVA that inspection ports would be required from the steam generators, the Westinghouse steam generators, in particular, as a [illegible]sult of racking that has been noted in the steam generators. Second, these ports would have to be installed by the next refueling. TVA's response on this matter was at this moment they are experimenting with a new camera which they believe will be successful and would eliminate the need for additional ports in their steam generators.

However, if this should fail, they are committed to do so by putting new ports in during the next refueling. The staff has accepted this and are anxious and looking forward to the data related to this new camera. We also informed them that the possibility exists of plugging the first row of steam generator tubes, and we are all awaiting the results of ongoing tests pertaining to these tubes, recognizing at some point in time they may have to plug these tubes if the data results in evaluation and it is adverse.

MR. MOELLER: Was it ports or supports?

MR. STAHL: Ports. Inspection ports.

MR. MOELLER: Additional inspection ports.

MR. STAHL: Yes, sir. These would be hand holes to observe the tubes. The second item identified here is that we had a minority opinion from a staff member with regard to the repair of the pressurizer relief line. This is a separate item on the agenda. I will discuss it at the time it appears on the agenda. I may add, however, at this point a substantial amount of discussion took place a. our subcommittee meeting. I believe the subcommittee members have been thoroughly informed on this.

Mr. Halapats, the dissenter in thi matter, was given the opportunity to give a presentation on this entire matter. We expect, however, today I will introduce the subject again. Mr. Gamble from the staff will give a brief presentation, and Mr. Halapats, who is with us today, is available to respond to questions n the part of the full committee if necessary.

TVA is also here to do so, as well as our inspector from the I&E Office, who is involved and thoroughly familiar with this entire matter. As I said before, I believe these items, the non-TMI items, will be completed in time to be consistent with the schedule we anticipate for full power operation of Sequoyah.

Now, let me turn to the status of the TMI issues, and let me repeat some of the background that I did provide because I think it is essential that you recognize, as I have been doing with subcommittee meetings and as I did in June. First of all, let me say the SER Supplement 1 was in two parts. It first dealt with the non-TMI issues, and that review is and continues to be based upon our standard review plan.

Our second part in the Supplement number 1 dealt with lessons learned from the TMI-II accident, but only with the fuel load requirements at that time. Our next supplement that we discussed, mentioned this morning and being issued at the end of the month, deals with first the non-TMI issues that I have just mentioned, and they now deal with the full power requirements. It is now identified in NUREG document 0694.

It also will identify the data requirements that have also been identified in this document. And last, it will also include the NRC actions that are also included in the document. I wish to stress here that the requirements with regard to the TMI-II issues resulted in a formatting here to allow, if you will, reasonable implementation of the requirements that are necessary and that we have learned from the TMI-II accident.

From my point of view as project manager, I regard these as requirements that must be dealt with in one manner or another, certainly technically and administratively, when we come to the point of licensing this plant. With this in mind, I have identified all of these items on a Vu-graph that I first presented to the subcommittee members.

(Slide)

For this morning I have taken the liberty to revise the charts, at the risk of maybe confusing the Subcommittee members, to make them more complete and useful for your own use. I will put them on to identify the 40 items that we have, simply identifying the task number, the numbers used in the NUREG 0694, the issue itself, abbreviated titles, and the status on the right-hand side. DI stands for dated item. The asterisk indicates completion that I feel is so.

(Slide)

Let me quickly remove that.

MR. MOELLER: What does a dated item mean?

MR. STAHL: By definition, a dated item is one in which it need not be completed today but must be accomplished on the indicated date.

MR. MOELLER: Thank you.

MR. STAHL: I will attempt to touch briefly on this as I go along. The second Vugraph simply completes the list. If I may, I will briefly remove it and come back to a summary chart in order to provide the perspective on this entire matter as far as our review process

(Slide)

First, on the full power issues, please note that in my opinion 15 items are complete, and this takes the form that I have SER inputs from the staff and are in progress. There are 13 dated items, three of which actually, as stated, must be completed in August. The remaining ten come from January on. One is not applicable simply because it applies to dedicated penetrations that are necessary for combiners that are located outside of containment.

Sequoyah has internal combiners. Therefore, this is not applicable to Sequoyah. One item is a rulemaking here. One is simply an implication that we will issue such a rulemaking here. One of the items is an I&E function necessary to review the ascension power tests. This is under way, and it is my understanding they will be complete.

Therefore, from the 40 items that we have identified on the chart, there are nine that must be dealt with over the next two weeks by the staff, applicant and so on. With respect to the status of information we received from the applicant, we have all the input we have asked for with the exception of two items, and they should be in next week. The staff is reviewing this in a rather intensive way. Further information requirements may be required of the applicant as the process goes on in the most dynamic way.

In my judgment, though, we will have within the next two weeks all of the input on the uncompleted items as well as on all of the completed items I have identified.

(Slide)

I should add that each item was discussed with the Subcommittee members, even though they may be slightly arranged in a different manner. They were presented to the Committee members. Staff and TVA responded to all of these items. I reiterate that we do have a very ambitious schedule in completing this. There are some problem areas here that may not be fully resolved at the time of the issuance of our SER, but I believe they will be suffciently resolved so that we may proceed to a full power license.

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I think TVA and staff will respond to any of the questions that you may have on all the 40 items. I recognize this is difficult to do at this moment.

MR. MOELLER: Excuse me, you have presented a very clear summary of where you stand. You have come up then with five incomplete full power non-TMI issues and nine TMI related issues. Could we quickly hear about the -- hear a review of the more important incomplete items among the five, and among the nine, or will comeone else be doing that?

MR. STAHL: I can touch on these.

MR. MOELLER: What are the real significant ones?

MR. STAHL: I think with regard to the non-TMI items, I have attempted to identify that number six, I regard as the most important item and the most difficult.

(Slide.)

But I indicated, we do have some relief with respect to the schedule for completion. Therefore, I do not regard this as being on the critical path. It most certainly was, as I reported last June, it was an item that needed to be completed fully in conformance with NUREG-0588 by full power.

I regard this now only in that we do have some schedule relief. Certainly no relief in conforming with the document itself and all its criteria. This is the Commission's order memorandum, an order that provided the relief for oursel s and others.

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MR. MARK: WOuld it be correct to say that with the possible exception of dates having fully conformed with those things in item six, the applicant is committed to meet the requirements of NUREG-0588?

MR. STAHL: Yes, sir. He is committed to conform to these. Of course, there is an element of interpretation that is required in many of the associated pieces of equipment. I think this is a definite commitment, maybe Mr. Mills could speak to this.

MR. MILLS: Yes, we understand the commitments. I would like to add, Mr. Stahl, that with regard to these items, in particular item six as you pointed out, I believe TVA has submitted three to four weeks ago -- there is a review going on right now in the NRC staff. Is that correct?

MR. STAHL: Yes, sir. We had in the middle of June received a substantial amount of information on this matter from TVA. The process is in review. I know they, themselves, have defined certain deficiencies, if that is the appropriate word. Matters that will be addressed; the staff is going through this process at this moment.

The deficiencies in the sense of fully conforming with the document; and certainly the review to assure that whatever these deficiencies are they are not ones that would preclude us from issuing a full power license.

MR. BENDER: What is the nature of item three and item ten?

MR. STAHL: Number three is complete. The staff reviewed this entire matter at the site. What we are looking for is a confirmatory letter that officially endorses the information that we received at the site during our visit.

So, the safety evalutation report is complete. Our analysis is finished. We are simply awaiting our documentation to complete this item.

MR. BENDER: How about ten?

MR. STAHL: The safety evaluation report is complete on the basis of TVA. At this moment, I have not discussed three items that will need to be corrected with regard to the diesel generator system.

These, of course, need only be corrected. I believe, as I recall, by the time of the nest refueling. I do not foresee these items precluding a full power license. The long term aspect, as we first introduced it -- as it is now complete as far as the safety evaluation report. It is now a matter of implementing the staff's results, if you will, that were just available a few days ago.

MR. BENDER: Thank you.

MR. MOELLER: You were, among the 40, going to tell us which are the major hang-ups. Perhaps you have done it, but I missed it.

MR. STAHL: No, I did not single out any item of the nine that are more significant than the others. At this point, I will regard all nine as being significant. They would preclude us from issuing a full power license.

MR. MOELLER: Is the first one then number seven? I mean, the first four are dated items. Five and six are complete. I was trying to know how to read your chart.

Are seven and eight both remaining open?

MR. STAHL: Yes, sir.

MR. MOELLER: Okay.

MR. STAHL: Both are at this point -- it you like, we can comment on that first item, I.C.1., if you wish, on procedures.

Mr. Clayton is here from the staff if you would like to hear comments on that. Brent, would you comment on I.C.1, that item, number seven?

MR. CLAYTON: We are in the process of reviewing selected emergency procedures from the plant in accordance with the task action plan I.C.1. We are goin to be talking to Sequoyah in a meeting here the first of next week. We will be going down to the plant and the simulatory, and walking through some of these procedures the following week.

We anticipate having completed our review by the end of this month.

MR. STAHL: Those apply to both seven and eight. If I may -- if you wish, I can go through all of the items. Of particular interest may be item 13, reactor coolant system vents. This was discussed at the subcommittee in some detail. It is ongoing. The sta:f did provide questions to the Applicant.

It was provided informally on the basis to expedite the review. TVA responded to these. I understand they are coming in, I believe, within a two-week period. We will also close this item out with respect to meeting it as a full power requirement.

MR. MOELLER: Is 19 the next one?

MR. STAHL: Yes. No comment other than this is ongoing at this moment. I do not have a base point, any staff information. Simply, it is ongoing.

MR. MOELLER: This is training for the operators. What are you doing that you have not done in the past?

MR. STAHL: On the II.B.4? Let's see, our reviewer is not here at the moment. Perhaps TVA could address this item. Mr. MIlls?

MR. MILLS: I will ask our plant superintendent, Jerry Ballantine to brieily address this item.

MR. BALLANTINE: A part of this training is presently in progress. We need to conclude it very shortly. We are working with Westinghouse and the Westinghouse owners group on the final definition of whatthis training consists of.

MR. MOELLER: Will that be then completed in a couple of weeks?

MR. STAHL: This is one of our late items, yes. By the end of the month.

(Slide.)

I may have been in error in item 20, which is hydrogen control. As I see it, staff has arrived at an interim position. this has been thoroughly discussed at the subcommittee meeting. It will also be discussed again. I took the liberty -- from what I see, it is a completed item. You may differ on this.

MR. EBERSOLE: This plant has a highly qualified auxiliary feedwater system.

MR. STAHL: Yes, sir.

MR. EBERSOLE: I understand it is going into power operation with no claim to feed/bleed or reflux conden.

MR. STAHL: We have not established that as a requirement.

MR. OKRENT: It is my impression that the research staff of NRC has had under way in the past a kind of WASH-14000 study on an ice condenser plant. I wonder whether there has been any -- anything that has arisen out of that study which the licensing staff has found is relevant for their review of full power operation of Sequoyah. If so, why?

MR. STAHL: I am not able to respond to that, except -- risk assessment was discussed Wednesday.

MR. MARK: Some of that will be a separate agenda item on the duscussion of risk assessment studies for the ice condenser.

MR. TEDESCO: There was a presentation made by Matt Taylor from Research that gave some insight into that question.

MR. OKRENT: Excuse me. I am interested to know whether the licensing staff has found anything from that study that they thought in some way would influence their review of Sequoyah?

MR. TEDESCO: The simple answer at this point would be no. Obviously, there is more to be followed.

MR. OKRENT: Could I ask this? Have the people in the licensing staff who have been responsible for the review of Sequoyah familiarize themselves with the information that the Research staff has learned?

MR. TEDESCO: I would say, yes. Mr. Butler, who is responsible for containments in licensing was here last Tuesday when we were talking about -- when we did talk about the research results and the overall question of the ince condensers.

He will be here within the hour. If that is different, I will let you know.

MR. OKRENT: I would assume the questions are not only related to the containment. The question is more general.

MR. TEDESCO: In a more general way, I will say, yes, we are aware of it.

MR. OKRENT: Yes, and there are no changes. Is that the answer?

MR. TEDESCO: None that I am aware of.

MR. STAHL: I could proceed through the list, if you wish; 21 is a rulemaking that I touched on. 22, of course, is relief safety valve testing; that is also a dated item. We just mentioned the auxiliary feedwater. That is a dated item.

22 is the SER that has been completed, as far as initiation indication. That is a dated one. It will be completed in January. Possibly, I could skip to the area of upgrading emergency preparedness plans. That is an area of considerable importance.

I can mention the status as we have it. It is my understanding that the TVA report is an ongoing review. Based on my understanding, I believe the questions, comments that we have at this point in time will be satisfactorily resolved by the end of the month.

With respect to the plan, the state and local plan, it has been my understanding, reviewed by FEMA and found acceptable; in particular, a drill recently was conducted. The staff informs me it was quite satisfactory.

It complies with requirements that have been identified in our action plan, as well as NUREG documents. Barring, of course, any unforeseen problems in the next two weeks, I think they will have an acceptable document on emergency preparedness.

We have treated this, you know, with a special organization, an item that has been handled in a most rigorous way. I am quite pleased with the progress that has been made in this area. In particular, the fact TVA has conducted in the past year

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two major drills to assure the practicality of the procedures. If you wish, TVA, I am sure, could provide more information.

MR. MOELLER: I think that is fine. Could we go on to the remaining items?

MR. STAHL: Item 36, here, Mr. Stoddard here could comment on that.

MR. STODDARD: Okay. Item number 36 is the primary collant sources outside containment. TVA has stated that they have completed the leak tests of the primary coolant systems outside containment and the waste gas system.

Results of those tests which we need to have for our check-off have not yet been received by the staff. In addition, TVA has provided the procedures for the liquid leak testing. We have reviewed those procedures and found them satisfactory.

We have not received the procedures for the tests of the waste gas treatment system for leakage. Again, TVA has stated that those will be provided.

MR. MILLS: I would like to interject there that the documentation referred to will be submitted to the staff today.

MR. STAHL: The question on control room habitability, it is my understanding from the staff --

MR. MOELLER: What is 37?

MR. STAHL: Let me see. I think we have a staff member here on 37, off site dose measurements. I think all I can add at this point, it is ongoing. I spoke to him the other day. The fm10

information is in house. I believe it will be completed in the next week. I foresee no problems there.

MR. MOELLER: Does this relate to the NRC monitoring system, or to the Applicant's monitoring system?

MR. STAHL: I think it is the Applicant's monitoring system. TVA could correct me on this if --

MR. MOELLER: What basically are the remaining questions?

MR. STAHL: I am not sure of it other than the information is simply being reviewed. At this moment, I do not believe we have any questions other than to simply complete our review.

MR. MOELLER: Okay. What is 38? I know it is a dated item, but what is the radiation plant monitoring? What are the questions there.

MR. STAHL: Larry Mills?

MR. MOELLER: Number 38, could you expand on it?

MR. LAMBERT: The remaining part -- the remaining part -- I am David Lambert with TVA. The remaining part of item 38, in plant radiation monitoring, there are some additional questions provided by the staff on justification of our containment.

Radiation monitors are high range radiation containment monitors.

MR. MOELLER: It mainly applies to the adequate range for them and reliability?

MR. LAMBERT: To the adequacy of the monitors and justification of their location.

bfm11

MR. MOELLER: Okay. Thank you. Then, that leaves 39.

MR. STAHL: Yes. Control room habitability. Possibly Mr. Crew could just note the problem here. Mr. Crew, could you just state?

MR. CREW: It is our understanding that TVA will shortly be giving us a letter indicating they have conducted a review in accordance with Standard Review Plan 6.4, and that they find the control room at Sequoyah does, in fact, meet the specifications and guidelines.

MR. MOELLER: Does that Standard Review Plan -- when was it written, and does it take into consi eration some of the questions that have been raised by the Committee on this particular topic?

MR. DREW: The Standard Review Plan was written in 1975. It does, in certain of its aspects, take into account some of the things that have been of concern to the Committee, such as the internal pathways to the plant for flow of radioactive materials to the control room.

However, it does not of course take into account all the concerns that the Committee has raised after Three Mile Island.

MR. MOELLER: If you are just reviewing it in conjunction with Standard Review Plan 6.4, how does that factor in the TMI issues?

bfm12

MR. CREW: The Commission approved NUREG-0694 recently, which specifies those requirements which must be satisfied.

MR. MOELLER: So, it goes then substantially beyond the standard review plan. Is that what you are saying?

MR. CREW: No, sir.

MR. MOELLER: I have a problem if it just is being reviewed in accordance with the Standard Review Plan written in 1975. I do not understand how that takes into account the TMI issues. That is what I need clarified.

MR. CREW: What I am saying is within the Standard Review Plan -- I gave you the best example -- there is provision for taking into account some of the things that were highlighted by the TMI experience.

It is my clear understanding that to go much further than this in terms of the TMI experience would really take us immediately into questions of degraded core; complicated questions. Questions that will not permit the isolation of the control room from other major features of the plant design.

Therefore, we are in agreement with the thrust of NUREG-0694. We expect to be looking at the major impacts associated with Three Mile Island concerns in the degraded core considerations.

end t3

bgn t4

MR. MOELLER: So you are handling a portion of this under a different item. Is that what I am understanding?

MR. CREW: I am sorry, sir.

bfm13

MR. MOELLER: You are handling a portion of this under a separate item related to degraded core conditions?

MR. CREW: That is right. Under the chielding consideration -- I believe Mr. Serpo is here from the Radiological Assessment Branch -- the control rooms have been looked at in terms of whether or not GDC 19 can be met with the TID sources in the systems external to containment and the evaluation which I am familiar with in this particular case shows clearly that the control room can.

MR. MOELLER: Thank you.

MR. STAHL: The remaining item --

MR. OKRENT: Excuse me. What was it that the staff was telling us then that they feel that there are no more questions concerning the adequacy of the control room, or just that it meets the current criteria?

MR. MOELLER: The way I understood it, Dave, was they have looked at it in terms of past criteria. They are futher looking at it in terms of item 21, the degraded core rulemaking proceeding. So, there will be more evaluation in the future. Is that correct? Did I hear correct -- correctly?

MR. CREW: Yes, sir. That is correct.

MR. MOELLER: Thank you.

MR. STAHL: The last item, maybe I could have Mr. Westman simply indicate to you this item and its status. It is the power ascention test. I indicated, it is an I & E function.

MR. WESTMAN: I am Dick Westman from the Office of Inspection and Enforcement. The I & E staff is reviewing the licensee's power ascension procedures. They are committed and intend to witness portions of the power ascension test program and for the resident inspectors on site.

They will complete this function.

MR. [illegible]AHL: This completes -- this does complete my brief status review of the items that were covered at the subcommittee meeting with regards to TMI and non-TMI issues. If there are no further questions, I will move to the next item -- the issue I mentioned earlier.

That was with regard to the fact that there is a minority opinion related to the pressurizer relief piping failure. I will briefly touch on this item. Mr. Gamble will follow after my brief presentation with a statement. Then, others from the staff as well as Mr. Halapats are here to answer any questions that you may have.

(Slide.)

Now, in April of 1979, during the hot functional testing of Sequoyah 1, the pressurizer relief piping failed to slide in the vertical direction as the pressurizer expanded during heatup of the reactor coolant system, item 33 shown on the schematic.

As a result of this failure, the pressurizer relief pipe was bent. The two options opened to TVA. One would be to replace the pipe or to proceed with a technique called weld draw bead

bfm15

technique for straightening out this pipe. They chose the weld draw bead technique. This involved, as I understand it, two 270 degree grooves around the pipe opposite two, and straddling the kink in the pipe.

The grooves were then filled with weld metal and based on shrinkage of weld metal, the shrinkage provided the necessary stressing to straighten the pipe. The technique worked with regard to straightening the pipe. From then on there was a series of discussions that evolved, starting from April on.

The I & E office, in which the technique was discussed the process, the methods involving the I & E inspectors in Region II, proceeding to the point where in the latter part of 1979 assistance was requested of th- NRR staff. At that point in time, we requested a consultant, a former NRC employee, that he visit the site, that he review the matter and provide a report.

The report was provided in December of 1979. Additional information was provided in January. The item was closed, based on the satisfactory report of Mr. Gustauson, as well as I & E. At that point in time, Mr. Halapats raised the question with regard to the adequacy of the weld repair.

Since that time, February, discussions have been ongoing involving many people, many events here. If I were to follow through the chronology, it would take a substantial amount of time. However, let me highlight at least one or two of the events that occurred. One of which occurred at a March meeting bfm 6

in Bethesda, at the director level, the AD level.

The meeting resulted in agreement on additional work which should be done at the site with regard to this weld. I should mention before this -- prior to this meeting, Mr. Halapats did visit the Tennessee Laboratories, went through this entire material. Of course, this colminated still in his report of February on his dissatisfaction with the information that he had in hand.

At that point in time, the proposed method of what was to be done, basically an in situ type inspection of the weld, was carried out with I & E observing, reviewing, and analyzing all this information in that report.

It was completed in April, as I understand it. This matter has been completed to their satisfaction. Let me stop at this point and ask Mr. Gamble to provide a brief presentation to recap this, as far as NRR's position on this matter.

MR. GAMBLE: My name is Ronald Gamble. I am with the Materials and Engineering Branch, NRR. As Carl mentioned, there have been a number of investigations that have taken place concerning this particular weld. This morning, I am not going to deal with the details of the past investigations. What I would like to do is give a brief summary of the last investigation, the last look at this particular problem.

That look, and my presentation, will include some of the items and many of the significant items that have been discussed

bfm17

in these past evaluations. My presentation today will focus primarily on the integrity of the existing weld. The NRR staff evaluation did not concern itself primarily with certain areas of non-compliance that have been noted with this procedure.

There were certain deficiencies, perhaps in documentation of this procedure. What we did try to do is make an engineering assessment of the integrity of the weld. The criterion that we used to do that was that if this particular repair, in our judgment, was no worse than any full penetration weld would have been, or is made in thie particular line according to the code, then it would be an acceptable weld.

If, however, in our judgment the weld was such that it could not be judged as good as a full penetration weld in this line, then we would have required it to be removed.

MR. OKRENT: How do you define worse? How do you compare this to the full penetration weld? What are the criteria for judging that it is nor worse then a full penetration weld or equivalent to?

MR. GAMBLE: Two primary -- as I will mention in the presentation -- two primary items we looked at were heat input during the welding process and the welding procedure itself. That is to say, how the weld metal is laid into the weld.

MR. OKRENT: Why are they the right criteria and only criteria?

MR. GAMBLE: The question that came up, the differing

bf 3

opinion was that these particular welds, the repair weld that is, was not adequate. There was no question about the weld that were made -- full penetration welds that were made to attach the pipe.

So, our felling was that we have no question that the full penetration welds are adequate according to code procedures, and have been used for years.

MR. OKRENT: I understand that, but I am just trying to understand how you compared this one to the usual full penetration. Go ahead. I will listen.

MR. GAMBLE: Let me just briefly put up a vu-graph that indicates the full scope of the presentation.

(Slide.)

It is really in three areas, necessary conditions for stress corrosion cracking. I want to discuss our evaluation of the weld repair using these conditions for stress corrosion crac- king. Finally, I just want to present conclusions and licensing actions that we are going to take, relative to this weld repair.

(Slide.)

First, we generally considered there were three neces- sary conditions for stress corrosion cracking. That is, stress, there has to be a sensitized material and an unfavorable environment. Generally, the stresses are considered -- the stresses necessary to contribute to stress corrosion cracking are considered to be generally very high.

bfm19

That is, at or hear yield. Primarily in pipe welds, the residual stress is usually the dominant stress component. Here we are talking about steady state stresses.

Sensitized material, the sensitization of the material occurs when the heat input during welding. Essentially what it does is degrade the material and make it less resistant to a corrosive environment. Of course, you also have to have an abrasive environment. I want to point out that all three elements are necessary to produce stress corrosion cracking.

All three elements must exceed some level before you can have stress corrosion cracking.

(Slide.)

Very briefly, is our evaluation which summarizes the key points for each one of our items necessary to produce stress corrosion cracking. The first item is the stress. We do not know the exact stress condition in the repair weld.

We felt it would be extremely difficult to ever know the exact stress condition of the weld, particularly the residual stresses. So, we just assumed that the residual stresses in the weld were really no different from the full penetration welds. That is to say that they were certainly high enough to be an active contributor to stress corrosion cracking.

We were not willing to assume the stresses were low.

MR. OKRENT: Could they be higher?

MR. GAMBLE: Higher than full penetration welds? Is

bfm20

that your question?

MR. OKRENT: Yes.

MR. GAMBLE: Generally, the residual stresses on full penetration welds are, I assume, to be at or near yield; very close to yield. If they were somewhat higher at that point, it would not make too much difference.

MR. OKRENT: You said they are assumed to be. I was just wondering if anybody looked at this weld versus the full penetration and judged the stresses are no higher.

MR. GAMBLE: No sir. They did not. TVA in their first submittal said they believed this weld was in a residual compression stress. They really did not provide any justification for that statement.

Quite frankly, we did not see how that was possible. So, we just made the assumption that, in fact, the stresses were tensile. They were quite high.

MR. BENDER: Do you have any better picture of the weld than this?

MR. GAMBLE: No.

MR. BENDER: I find it very hard to envision -- reading it from this. It looks like it is a piece of straight pipe.

MR. GAMBLE: The weld was made in a run of straight pipe.

MR. BENDER: So, the working stresses in it are likely to be the normal stresses that would be in a pipe that is

bfm21

subjected to internal pressure, unless there is some bending in the pipe. Are there bending loads?

MR. GAMBLE: I don't know. Again, we did not do a stress analysis of the pipes. TVA did not submit one. We felt difficulty in defining whether it was bending stresses or residual stresses. We did not feel we would get an accurate picture of the stresses. So, we assumed it was as high as yield.

MR. BENDER: That is probably an invalid assumption.

MR. GAMBLE: Well, I think our assumption is that is the primary --

MR. BENDER: That is the dominant condition.

MR. GAMBLE: That is generally true in full penetration welds, certainly the dominant condition is the residual stress due to the welding operation.

MR. BENDER: There is no stress releif, I take it, in this particular case.

MR. GAMBLE: That is correct.

MR. BENDER: All right. The residual stresses could be in compression. As a matter of fact, it is more than likely that they are. At least in some areas -- it looks to me like you could not really make that judgment unless you looked at the weld detail.

If they were in compression, I assume you would not worry about stress corrosion.

MR. GAMBLE: That is exactly right. The question would

bfm22

go away immediately.

MR. BENDER: I don't feel comfortable discussing this thing, if someone is going to show the weld detail.

MR. GAMBLE: I don't know if anyone from I & E -- perhaps Joe has a picture of the weld itself.

(Laughter.)

I don't think that is a weld detail he is looking for.

MR. HALAPATS: There were two grooves carved, 2T/3, roughly ground into the pipe wall; 2T/3 opposite the kink. These grooves were filled with weld metal.

The weld metal was then gound out again. The grooves were then again filled with weld metal. Each time they were filled, the weld shrinkage drew the pipe -- weld draw bead. That is the history of the repair. It means it was penetrated -- this is a six inch schedule 160, which is a nominal .718 wall.

So, you are talking a groove depth of 1/2 inch. I believe in one case, at least the dimensioning that I read, they did get a reading here, a calculated number of .133 as the base metal underlying the groove.

MR. BENDER: Does the heat effective zone go all the way through?

MR. HALAPATS: This I think is the question.

MR. BENDER: What kind of welding technique did they use?

MR. HALAPATS: This, I think, develops into the story --

bf 3

the story develops this.

The code requires that the procedure be qualified and tested by the authorized inspector. A mock-up was made, but I think I am preempting his presentation.

end t4

MR. GAMBLE: Go ahead if he has a question.

jl flws t5

MR. BENDER: I think I know enough now to know what kind of questions to ask.

MR. GAMBLE: That is what is the central issue in this particular question. If you assume that the stresses are -- you immediately get the question of sensitization. In fact, you assume you have to present stress as a probability. Of course, I think it should be obvious that probably all welds in stainless steel piping at Sequoyah are sensitized to some degree. I don't think there is any question about that, including the repair weld, and the central issue is to what degree.

The question we had, is it to a greater degree than you had on full penetration. Our feeling was, if it were not sensitized to a greater degree than the full penetration weld, it could be no worse than the full penetration weld in that sense, and therefore it was no more susceptible to stress corrosion cracking.

The two items we use to try to reach a conclusion on a degree of sensitization was, we noted that the repair well was completed using the same procedures used to make full penetration welds. That is, the heat input was basically the same, or it was at the lower range, actually, of the allowable heat input to make a full penetration weld.

As Joe mentioned, there in fact was a removal of material from the repair weld which added heat through a second pass, but again, this procedure is allowable for full penetration welds, and although this procedure may have not been used for full penetration welds in this line, it is a code acceptable procedure.

MR. BENDER: What would that weld look like if it had been a full penetration weld?

MR. GAMBLE: Just what the joint design would look like.

MR. HALAPATS: A full penetration weld would simply be that you would be fully penetrated. You would have a V groove. You use a consumable insert, don't you, on your welds?

VOICE: Sometimes.

MR. HALAPATS: The consumable insert, had they used a full penetration weld, the consumable insert is simply an insert of this type, that is, fused in with -- generally using an inert gas backup. Inert gas backup was not used here. They could not use it. So, one would think in terms of an oxiiized ID, you see.

MR. BENDER: They made a mock-up, I take it. What did the inside surface look like? Was it oxidized? Non-oxidized?

MR. GAMBLE: That is one of the problem areas that I mentioned before, that perhaps the code compliance documentation is not what it should be. TVA in fact did make a mock-up. Information that TVA has submitted to us is that the mock-up was not made using the same heat input parameters as was used to make the actual weld. The mock-up received much higher heat input to a later weld than did the production weld.

Joe Halapats did in fact go down to TVA and looked at the mock-up. He has a lot of pictures of the mock-up. So, TVA's position, and our judgment is based on the information that we have received. The mock-up is not representative of the field weld.

MR. BENDER: It is probably sensitized. You just don't know the degree.

MR. GAMBLE: It is certainly likely to be sensitized, and the question is to what degree.

MR. BENDER: It also seems to me it is likely to be in suppression. It would be -- for a weld like that, the pipe would just pull in.

MR. GAMBLE: It is not clear to me that it is in compression around 270 degrees of that type in that system.

MR. BENDER: It depends a lot on how the weld is made.

MR. GAMBLE: One of the problems we had, we looked at the stress and we asked ourselves the question, do we think we have a chance of demonstrating what the residual fabrication stresses are in this weld. The answer is, not very readily.

Rather than go into that kind of analysis, we simply assumed stresses were high enough to be contributive. We did not feel it was appropriate just to neglect it and eliminate the problem on that basis.

MR. BENDER: I think it is also true that you could look at almost any weld and come to the same conclusion, that you cannot be absolutely certain. Have you tried to make some probability judgments about how much the likelihood of failure in the piping system is increased as a result of the uncertainty about this weld?

MR. GAMBLE: Our belief is, based on our review of the procedures that we used to make the repair weld relative to the procedures that were used and could have been used in a regular full penetration weld according to the code, and the fact that this weld, although again we have some inconclusive evidence, this weld did pass AST and sensitization tests on the outside.

It does indicate we do not have gross sensitization of this weld. Our conclusion is, this weld is within the same population of the full penetration welds that are made in pressurizer lines. If that is true, the probability of failure due to this weld would not increase.

MR. BENDER: I think you are probably right.

MR. GAMBLE: There was a question about the environment, the degree of aggressiveness of the environment. And it was stated that the environment in the pressurizer line is not the same as the remaining part of a primary coolant pressure line. That is to say, the oxygen content perhaps is higher.

What we did to evaluate the aggressiveness of the environment is simply to look at service experience, and based on service experience with operating plants, with welds of this type, that is to say, welds that encompass -- a population of welds that would encompass this repair, there have been no service-induced cracks ever observed in an operating PWR.

It is our belief that this environment, plus the combination of sensitivity, does not create a high potential for cracking in this line. That is basically our conclusion.

Just to summarize our conclusions, and the action that we plan to take for this particular weld --

(Slide.)

MR. GAMBLE: Again, based on our review, we find that the repair weld was fabricated using the same basic procedures allowed for full penetration welds. Therefore, the weld may be sensitized. However, it is included in the same population as the full penetration welds.

Service experience indicates that sensitized full penetration welds in pressure lines -- in pressurizer lines do not have any history of in-service cracking in operating PWR's.

Furthermore, based on all the inspections that have been performed on this particular weld, there have been no defects found in the repair weld. Consequently, we conclude that the integrity of the repair weld is at least equal to full penetraton welds, and would not change the integrity of the system.

MR. KERR: In trying to decide whether it is in the same population as the full penetration welds, it was my impression from reading the materials supplied to us that a full penetration weld would have been subject to a hydraulic test.

MR. GAMBLE: That is correct.

MR. KERR: In that sense, it seems to me this weld does not fall in the same population. The hydro test I do not think is a test that -- since we know that this is true -- even if this particular weld were highly sensitized and received a hydro test, I do not think the hydro test would have in any way been a judgment of the integrity of that particular weld. Itr would not have caused any type of failure or any indication that you had degraded weld.

You would have to have a very significant through wall defect for the hydro test to indicate anything about --

MR. KERR: What is the purpose of the code requirement that if one made a full penetration or if one cut out a pipe and replaced it, one would then have to subject the system to a hydraulic test?

Is that just sort of Mickey Mouse, or is there some reason for that requirement?

MR. GAMBLE: Certain components, I think it is a good test. For example, on ferritic components, where you may have the potential for brittle fracture, hydro tests are used to ensure that you do not have large flaws that you may have missed.

MR. KERR: On this particular case --

MR. GAMBLE: On stainless steel, you would have to have an extremely large through wall flaw, and therefore leak.

MR. KERR: This particular case is perhaps over-conservative in your view?

MR. GAMBLE: My personal opinion is, the hydro test for a stainless steel line, unless you have an extremely large through wall flaw, does not tell you much about the integrity of the stainless steel line.

MR. BENDER: Hydro tests do not tell you much, period. They sometimes tell you whether a system will leak or not, and it is usually prudent to do it if you break a line. I think there is not much more than that in the hydro testing philosophy in the ASME code. It has been a long time now since people looked at it as a way of determining whether weld integrity was all that good.

MR. KERR: Why don't your mechanical engineers come up with something better?

(General laughter.)

MR. BENDER: You would be surprised how many fully welded welds are not fully welded.

MR. KERR: It is pretty good for lousy welds.

MR. BENDER: Yes.

MR. GAMBLE: I think the main indication of the integrity of the weld are inspections, volumetric inspections that are performed not only on this repair weld, but on the whole system. This repair weld will be required to be included in an augmented in-service inspection program, and the reason it is is to make sure that we in fact have evaluated this correctly and have not made an error, and our conclusion then based on that requirement and our past evaluation is that the weld is acceptable. No further action is required by the NRC or the applicant, provided that the augmented in-service inspection is conducted.

VOICE: Could you describe an in-service inspection?

MR. GAMBLE: What is suggested is that it be looked at during the first three refueling outages.

MR. MARK: What can you see in such an inspection in this location?

MR. GAMBLE: What you are looking for and what you can see is if in fact stress corrosion cracking has initiated and is growing in either of the two weld repair groves.

MR. MARK: But you cannot see a flyspeck that way. You can see cracks which are about how big?

MR. GAMBLE: Well, I would have to guess, and I would say something like an eighth of an inch.

MR. EBERSOLE: Pardon me. Can't this pipe have been cut and rewelded with the ordinary weld, and the problem be made to go away?

MR. GAMBLE: That was the point of our investigation. If we felt this repair weld produced conditions in the pipe worse than a full penetration weld, that is what we would have required, but we did not want to require that unless we were certain, in fact, that that was true.

MR. BENDER: I don't find much more comfort in just using a weld insert as a way of showing there is a non-sensitized weld there. It is hard for me to believe there is that much difference.

MR. GAMBLE: I don't think we said the weld was non-sensitized.

MR. BENDER: A weld that is worse sensitized -- worse welding stresses in it. This configuration -- There is not all that much difference in the --

MR. GAMBLE: I think we felt it was certainly no worse, and we did not want to cut it out unless we judged it was in fact significantly worse.

MR. BENDER: Does TVA have a welding engineer there at the site that supervises this particular operation?

MR. JESSE: I am TVA's welding and materials engineer, and we did have an engineer at the site to supervise the operation.

MR. BENDER: Thank you.

MR. OKRENT: What kind of in-service inspection was it they were going to do again?

MR. GAMBLE: A volumetric in-service inspection. They will have to inspect it during the [illegible] three refueling outages.

MR. PLESSET: Any other questions?

Yes?

MR. OKRENT: We heard a persuasive presentation that we really did not hear the concerns of the member of the staff who has concerns, and it seems to me that there is something faulty about a procedure where we do not really hear firsthand what concerns the individual has.

MR. PLESSET: If he is here, we could do that.

MR. OKRENT: I think we should have a short summary of t'.is, an in fact I would recommend in the future the staff a1d our subcommittees, if they are involved, always -- the committee, I think, should hear firsthand the principal concerns of the individual involved. You don't get them the same way from somebody trying to make the case the other way. It just is not natural.

MR. PLESSET: Fine. Why don't we do that? We want a summary, of course. We do not need a complete lesson which would not do some of us much good, I am afraid.

MR. HALAPATS: The concern is not particularly with the adequacy -- My name is Joe Halapats, incidentally. The minority -- the concern is not with the adequacy of the weld repair at the moment. The concern is that we have not yet conclusively demonstrated that the weld is not sensitized to an extent that may give us a problem.

I happen to be a graduate of Carnegie Tech, and in the curriculum, very little time was devoted to crystal ball gazing. So, I am of the opinion that rather than attempt pontifications, I think we would be better off where we could take another close look at what we have here.

We had the alternatives presented in the meeting with TVA and the NRC staff of preparing another mock-up or, Number Two, doing the in-place metallography. The in-place metallography to me, having viewed Xeroxes of the metallography performed, my judgment is that the results are inconclusive. I cannot tell anything. I see smeared metal.

I have done this type of work. It is not easy to do. The individual who did this work, Paul Guthrie, is an outstanding engineer. He is an excellent metallographer, but he was working under severe handicaps. I know what he was faced with, and I could not have done a better job than he did.

But in any event, it is my conclusion that the results are inconclusive. We really do not have a handle on the extent of sensitization, and the question which is apparently academic, whether or not the production welds were fully penetrated, I do not think that has been answered.

An attempt was made to radiograph the weld and thereby on the film try to distinguish between the underlying base metal that presumably was not molten in contrast with the weld metal.

I do not think -- using the technique that was used, I do not think it is possible to draw that conclusion. This is where we stand. I am reluctant to speculate, pontificate, when it is relatively easy for us to get a better handle on exactly what exists in the production repair.

TVA procured some 18 pieces of pipe, six-inch Schedule 160 same heat. The QA 10 CFR 50, Appendix B requires that material identity be maintained. My proposal was simple. Since we have this alternative, we have inconclusive results as far as what we have in hand now, we can calculate, sure, but we can demonstrate pretty easily by simply mocking up the repair weld using the same parameters, same heat inputs, cutting the pipe up, looking at it metallographically, and most importantly, performing intergranular corrosion tests in the environment that the repair weld will see.

That environment happens to be .2 ppm oxygen bearing steam, not .005 oxygen bearing water that the population of welds see. I think it is a speculation that one could assume the same metallurgical history for the installation welds that was experienced by the production repair. One can speculate -- and that is -- I think we have an easy way, an easy means to arrive at a more conclusive answer.

I think simply mocking up another 12 inches, I think the total cost of cutting it up, welding it, I think you are talking, what, $200, performing the ID test.

Now, this I want to call to the attention of the committee, and this, I think, is very important, and it has been overlooked. The surface that was tested on the mock-up was the ID surface. Okay. Now, the cracks propagate through the wall. That is the surface that we should be testing. We should be examining the propensity to stress corrosion cracking through the wall.

If cracks generate here and stayed there for 40 years, beautiful, we can live with it. This is what we are concerned with.

MR. BENDER: In the non-part of the weld, in the virgin metal?

MR. HALAPATS: You would test material here. You would take a through-wall. You would do a side bend. Okay, instead of the face bend. Okay, you would do a side bend. That, I think, is something that we should be giving much consideration to.

What I have here is the mock-up, what we did in the case of the mock-up. Here is the mock-up. The weld is fully penetrated and if that mock-up was supposed to represent the production weld as required by the code, the exemption to hydrostatic testing would be denied, but it is stated now that the mock-up is not representative and simply is intended to demonstrate that the straightening procedure would work.

Okay. What I did, we in Knoxville, the weld, the mock-up weld was sectioned, and what we did was simply take further micrographs away from the fusion line, both along the ID and transwall. The purpose was to establish whether a potential crack path existed. This mock-up was not welded with the parameters used in the welding of the production repair.

Okay. It is not representative then. We do not have anything that can tell us today -- that can give us a reading on just what we can expect through the wall. This is the weld fusion line here. This is the ID, okay, taken at different positions, different positions from the weld fusion line.

Okay. Along the ID and transwall, here we are going up in this direction. We are going transwall in this direction. In this direction, we are going away from the weld fusion line.

What is significant here is that I see here at three-eighths of an inch away from the weld fusion line, from the root of the weld, I still see evidence of carbide precipitation. This is polarized light, simply to highlight the precipitated carbide in the grain boundaries. I see different levels as I proceed up through the wall. I still see that the carbide precipitation exists.

I get here -- I still see it. We could have taken more shots here. This work was done at the University of Tennessee, and the class was scheduled to meet. I think we were about 1.3 minutes ahead of the class, so that is why we did not.

In any event, what this shows is that there is in the mock-up a potential crack path which should be troubling us. We do not know whether or not that potential crack path exists in the production repair. We do not know that. We do not have a handle on that.

So, given the fact that I have -- I have concluded that the in situ metallography was inconclusive, we still have an alternative, and that is the alternative of building another mock-up, do exactly what you did on production repair, cut it up, test it in the environment, .2 ppm oxygen bearing steam. You are talking $200.

This is all I have to say.

MR. PLESSET: Bill?

MR. KERR: Mr. Halapats, I had though that this pipe led up to the pressurizer, and that pressurizers usually have water, at least in the bottom. I must have the wrong picture.

MR. HALAPATS: Here is the situation here. This is right at the top of the pressurizer, and it can't be isolated.

MR. KERR: It is beyond the pressurizer. That answers my question.

MR. HALAPATS: This is a problem. The licensee has identified as the safety implication of failure the "uncontrolled blowdown of the reactor coolant system." This is where -- This is what generates the concern. I don't think we have a good enough handle on it right now at this point. I do not make the statement it is inadequate. I do make the statement I do not know. I am not sure. Let's take another look.

MR. BENDER: Are you concerned about whether there is full penetration of the weld?

MR. HALAPATS: Whether or not the well is fully penetrated or not is a technicality which relates to whether or not that system has to be hydrostatically tested. A hydrostatic test is 1.05, or something, no big deal.

MR. BENDER: I am just trying to sort out the thing.

MR. HALAPATS: It is a technicality. What I am concerned about is this. What is going to happen after that plant is in operation? My position is that the time to hassle and argue is now, before the plant goes into operation, rather than try to ressurect why something cracked.

MR. BENDER: Have you tried to compare these photomicrographs with those of full penetration welds that exist elsewhere?

MR. HALAPATS: I have looked at quite a few before I came to the NRC.

MR. BENDER: Is this very much worse than those?

MR. HALAPATS: It depends. When you talk heat inputs, you have to be very careful. A heat input in a thin section is a lot different than heat input in a thicker section. It is heat synch. You know. You don't know what you are going to get until you look at it.

MR. BENDER: You made the right point, but I think I have to say I do not know any more about the full penetration welds in this pipeline than I do about this one. I know more about this one, as a matter of fact.

MR. HALAPATS: Right, exactly. So --

MR. BENDER: Unless I want to go back and look at all the full penetration welds in the same way, I am not sure that I -- I would concede the point you make. There is a likelihood that there is some propensity for stress corrosion in this piping system. How much is what we don't know about.

If I took a spectrum of metallurgists, I could get views extending from, gee, it is terrible, to gee, it is great.

MR. HALAPATS: You are looking at the guy who says it is terrible.

(General laughter.)

MR. HALAPATS: What I am saying is, we do not know. That is the whole point. It is such a simple thing, such a simple thing to make another mock-up, cut it up, look at it, test it. You know, the philosophy of talking about populations of welds, if one were building toasters and washing machines, good. Then one could look on occasion into the crystal ball. But here, this may be the one data point that falls out of bounds.

MR. EBERSOLE: Isn't it true that a few feet downstream from this thing is a valve attachment which was made by a full penetration weld?

MR. HALAPATS: That is right.

MR. EBERSOLE: Why isn't this just like that?

MR. HALAPATS: Simply because I am not sure what the metallurgical history of that weld is. I know that this weld was filled once. The weld was ground out again, and then it was filled with weld metal again. Can I say definitely that that fill penetration installation weld has the same history?

MR. EBERSOLE: You just got outside the statistics with this one thing here. You can get back in it by doing it the same way the other one was done.

MR. HALAPATS: At least it is a means -- a means of getting some numbers.

MR. MARK: These pictures, I believe, are on a background of 304 stainless. Can you say anything about the propensity of 316 versus 304 to look that way?

MR. HALAPATS: Given the same history, same environmental exposure, one would generally accept the fact that 316 would be less likely to undergo intergranular corrosion. This is a generalization which is accepted.

MR. MARK: Intergranular corrosion, you said. How about this carbide deposit?

MR. HALAPATS: The carbide deposit, you see, if I could just take an additional moment of time here, for the record, I want to make the statement that this may enter into the academic field, but I did not graduate at the head of the class, so bear with me.

Okay. The reason carbide precipitates is that the solubility of chrome carbide decreases with decreasing temperature. At room temperature, roughly .03 percent carbide remains in solution. There are people who are going to argue it is .027, things like that.

Between the temperature range of approximately 800 to 1,500 degrees Fahrenheit, the carbide, the solubility of chrome carbide decreases, and the carbide is precipitated at the boundaries, thereby depleting the grain area of chromium, which gives you the stainlessness. Okay?

This is what happens. One would expect, given the same carbon chemistry, one would expect the same thing to happen here with some modification. This curve may change in slope. It is this sort of thing. You may be talking a slightly different thing, but you will get carbide precipitation.

Now, the change in the slope, you are looking at an equilibrium diagram that is -- I don't think anyone can predict, you see. I would not expect it to be the same. I cannot tell you how much different it will be. It should be less, but I would be speculating.

MR. BENDER: It is a matter of how fast you go through that temperature curve.

MR. HALAPATS: The numbers have been around for many years. Three minutes is the time. If you are exposed for three minutes or more to the sensitization range, you will sensitize it to the extent that it will fail the intergranular corrosion test. Three minutes is a good number. That has been checked out in nuclear power plant welds.

MR. PLESSET: Thank you very much.

I think that we will have a break of ten minutes.

MR. SIESS: I have one question.

MR. PLESSET: Oh.

MR. SIESS: Could you explain briefly why it was necessary for the staff to review Xerox copies rather than originals?

MR. PLESSET: I think that is a question to the staff, not to this man.

MR. SIESS: It is a question to whoever can answer it. I don't care. Staff. TVA. Even an ACRS member.

MR. PLESSET: Mr. Stahl, I think, was starting to.

MR. GAMBLE: I think the Xerox copies that you mentioned were in the I&E report in May. Is that it? You went down to look at the mock-up. Which Xerox copies are we talking about here?

MR. HALAPATS: That I talked about?

MR. GAMBLE: Yes.

MR. HALAPATS: The latest report, the TVA report.

MR. GAMBLE: We had a meeting back in March where it was agreed that certain things be done out in the field and that I&E would witness these particular items, evaluate them, and write a report. I&E did that work. They had all the original photographs down in the region, and they sent their report to I&E headquarters. I&E headquarters transferred that report to NRR.

It was I&E's responsibility to complete that particular evaluation, not NRR's responsibility. So I&E kept the photographs. Just about that time, Joe Halapats read the I&E report, said he still had some problems with that evaluation, and NRR management meant to decide what to do about this problem, whether we should continue on with it or whether we should just make a decision and consider it resolved.

The decision was in fact. It was resolved. And that is why no further evaluations were done, and we never asked I&E to submit the original photographs to us. We felt enough evidence had been presented to resolve the issue.

MR. SIESS: So the fact that I&E had the original photographs and had based their conclusions on the original photographs and your review of the Xerox copies that you felt confirmed their views --

MR. GAMBLE: You did not review the Xerox copies?

MR. SIESS: You did not review it. You left it up to I&E.

MR. GAMBLE: That is correct.

MR. SIESS: They have the competence?

MR. GAMBLE: I think so, yes.

MR. SIESS: How did NRR get involved if I&E has the competence? It is not operating reactors.

MR. GAMBLE: NRR got involved several months before that, back in October, when TVA performed this repair, and after the fact submitted to NRR as a licensing item a request that they not have to do the hydro test that would be associated with this particular weld repair.

That was back in October of 1979. We had several evaluations and discussions with TVA, with I&E, up until March, when I&E got involved in the field examination on the actual repair weld -- on the actual field repair weld itself.

There was considerable interaction between I&E and NRR on this item.

MR. SIESS: Thank you.

MR. PLESSET: Let's recess for ten minutes.

(Whereupon, a brief recess was taken.)

MR. PLESSET: Let's continue.

There is one question that I would like to have cleared up. Mr. Halapats indicated that he only saw Xeroxes of these metallurgical pictures. Now, is that correct, that you did not see originals?

MR. HALAPATS: That is right.

MR. PLESSET: I want to know why not.

MR. HALAPATS: That I cannot answer.

MR. PLESSET: All right. Make it brief.

MR. GAMBLE: There have been many sets of photographs since March. The photographs that Mr. Halapats is talking about are those photographs that were made for the field repair -- made of the field repair for the items that I&E reviewed in the field as Sequoyah.

That was done in either late March or April, and it was I&E's responsibility to do that. I&E's report was sent to NRR. Mr. Halapats read that report, and that report included the Xerox copies, and he said he did not feel he could make a judgment on this.

NRR's management reviewed this issue, and decided that enough of the staff had looked at this, including I&E, that this should no longer be considered an open issue, and

NRR's management decided the issue was resolved, and we were not going to continue any suggested course of action, including the review of photographs that Mr. Halapats was suggesting.

Mr. Halapats was never the primary reviewer on this item. It was decided he would not be allowed to continue to proceed until he was satisfied alone.

MR. PLESSET: Would you repeat that last sentence?

MR. GAMBLE: I said that it was decided that this issue was resolved, and we would not keep it open until Mr. Halapats was totally satisfied that everything he wanted done was done.

MR. KERR: If he had requested the originals under the Freedom of Information Act, could he have gotten them?

MR. GAMBLE: He can get them today. He can get the radiographs. He can get the photographs. They are available to anybody. They are certainly available. It does not matter who he asked. They are available, and they are available to anyone.

The point is that NRR decided this issue -- enough evaluation of this issue had been conducted, and considered it resolved.

MR. PLESSET: Okay.

MR. GAMBLE: When Mr. Halapats found out that the NRR did consider it resolved, that is when he filed his differing professional opinion.

MR. PLESSET: That clarifies that point, but it might be helpful if he did look at the originals.

Yes, sir?

MR. STAHL: Mr. Chairman, I would suggest that Mr. Van Dorn from the I&E office and the inspector that has been involved in this work at least make a few statements for clarification. I think he would like to do so. He feels some misimpressions may have been given to the committee. In view of the fact you now have heard the NRR picture, the minority opinion, I think it is most important that you hear from the inspector himself. He assures me a few moments would only be necessary.

MR. PLESSET: I hope it is just a few moments.

MR. STAHL: I will have Mr. Van Dorn restrict himself to that.

MR. VAN DORN: My name is Peter Van Dorn. I am a metallurgical engineer with the Region 2 I&E staff. I witness all the inspections performed on that weld. I would like to say that we -- as I say, we did witness all of the in situ metallography that was performed. I physically saw the original photogrphs being made, and physically saw the metallurgy through the microscope as it was being performed.

In addition, we definitely feel that the mock-up was not representative of the field, and it does not present a strong case against the actual field condition. There was some very minor degree of sensitization noticed in the field. Just very slight ditching. Maybe one or two grains in the whole field of view.

Another metallurgical point that has not been brought out is that the material in the field was much smaller grained than the material in the mock-up, which further is a better situation, less susceptibility to sensitization.

We definitely feel -- the Region 2 position is that full penetration was not achieved based on the radiography. We feel there would have been oxidation since the internal ssurface was not purged.

We feel the radiography was sensitive enough to show internal oxidization if it was there. There were two inspectors that witnessed this. The other fellow and I independently reviewed the radiographs, and the other fellow has some 28 years' experience in radiography.

MR. PLESSET: Okay. Yes, Carson?

MR. MARK: You say the mock-up was not representative. Had the mock-up been the best representation possible, would you have considered it alarming or okay anyway?

MR. VAN DORN: I think I would have considered it somewhat alarming if I saw the degree of sensitization we saw in the mock-up.

MR. MARK: You are counting on the expectation that the degree of sensitization in the real thing is less than that?

MR. VAN DORN: That is correct. I believe it is quite a bit less.

MR. OKRENT: Procedurally, should there have been a mock-up made that had the kind of energy input and so forth that was used in the actual correction?

MR. VAN DORN: That weld repair is characterized by full penetration joint qualification for all of the welds. There was no code required additional qualification in this case.

MR. OKRENT: Thank you.

MR. PLESSET: Any other questions?

MR. TEDESCO: The resolution on this matter, it had been requested from our research people to conduct a peer review of this situation. One might ask, what are the potential consequences at the site. There are a couple of points I would like to speak to on this.

Based on the nature of the concern that we are having, the belief is that we would have a leak before break occurrence if something did go on. It would not be a catastrophic failure of the six-inch line.

During the analyses of TMI, we have been putting a lot of emphasis on small break LOCA's. One has been a concern about a small break in the pressurizer area. The Westinghouse analysis looked at a .01 square inch break. They have developed a procedure for the operator to deal with this type of event, so from that viewpoint, that while you don't want to enter into a situation of probability of failure, it has been analyzed.

MR. PLESSET: I think that the -- there is a limited value to further pursuing this right here by further discussion with the people we have heard from, so I would like to call for TVA, which is the next item on the agenda, to make their response to the staff report, and including this item.

So, would you take over, please?

MR. MILLS: Yes. I think with regard to the items that have been discussed by Mr. Stahl, we do not have anything to add to that list, or any comments on them.

I think with regard to the pressurizer pipe weld, we have had many meetings with the NRC staff, including Mr. Halapats, and it has been stated -- he has been at our laboratory. We could go into probably a ten-hour dissertation here, which we have done previously. I do not think it would add to the information that the ACRS members would have. We stand ready to answer any questions that you might have regarding any of it.

We do have our metallurgist here with us today. I would like to say that if you would like for us to, we can respond to any question you might have regarding this pipe weld.

As it has been stated and summarized at the end here by the staff, we are in agreement with those conclusions.

MR. PLESSET: This is your general response to the staff report, as well as this item?

MR. MILLS: Yes. I recognize we are running somewhat behind schedule. I would like to make a couple of comments. We do feel like with regard to our total application that Sequoyah has responded fully at the plant.

I believe it is clear from the presentation that practically all the items are resolved. Remaining paperwork will be completed in a very short few days. Hopefully, the committee will consider this, and will be able to give us a favorable decision.

We are ready to answer any questions on any subject that you might have today, and it is our belief that we, TVA, would have very little more information in another session at a later time than we have today.

We told you our possible schedule, and I think it s very clear that if we do not receive an ACRS letter, this time it would impact our already much delayed schedule.

Thank you.

MR. PLESSET: Mike?

MR. BENDER: In view of the fact -- Are you going to permit questions, Mr. Chairman?

MR. PLESSET: Oh, yes, I was encouraging it.

MR. BENDER: All right. I have been reading in the papers lately about something called igniters for hydrogen combustion control.

MR. PLESSET: That is not the item. That is coming a little later on our agenda. Do you want to ask the TVA metallurgist any questions?

MR. BENDER: Only one question. How much would it cost to run this test which is alleged to cost $200?

(General laughter.)

MR. JESSE: I am not sure I truly understand the scope of the test, but I would think that it would be up in the neighborhood of several thousand dollars. When I heard one item there where we were talking about running a stress corrosion test in the environment, that it is going to see that would be an extremely time consuming test in that we

MR. BENDER: Let me limit it to doing the reweld and looking at the metallography again. Would that be a $200 test?

MR. JESSE: That would not be a $200 test either.

MR. BENDER: I am looking at the number of people around here that are wasting time carrying on this argument. The cost of the people's time is more expensive than the test.

MR. MILLS: Mr. Bender, I hope it has become clear here today that this has been discussed previously. I think the determination was made some time ago that the in place additional radiographs and tests at the site would be much more beneficial. I think TVA and the NRC staff -- most of the NRC staff came to that conclusion.

MR. PLESSET: Yes?

MR. MUSCARA: Quite a bit of discussion on this in place metallography and a lot of emphasis is placed on its relative value. If you look at the photographs, regardless if they are Xerox copies, that that test was not relevant to the question that is being debated. It has been shown to research results, both NRC's results, EPRI, and GE, that you get very little correlation between the level of sensitization that is measured on the outside of the pipe versus that on the inside of the pipe.

So that test is really quite inconclusive. As a matter of fact, you already get less sensitization on the outside than you do on the inside. The only time there is a good correlation is when you have a tremendous amount of sensitization on the inside, way above that level that you need to cause cracking.

At levels that are adequate to cause cracking, you can have no sensitization on the outside of the pipe. Therefore, even if the test is run over again or better photographs are supplied, the information that you are getting on the outside of the pipe is not relevant. There are some techniques that would allow you to get to the inside of the pipe.

It may not be useful or practical. You may have to work through the outside, get close to the inside diamater, and then look at that specimen.

MR. BENDER: I think you are commenting on the wrong test. The proposal was to get a couple of pieces of pipe or a piece of pipe, cut a groove in it, and weld it the way this pipe was welded, and then cut it and look at it. I thought that was what was proposed.

MR. OKRENT: His comment was relevant because we had heard they had already looked at the pipe, and that those tests were satisfactory. What he is pointing out is, the test that they did did not tell you enough about the inside of the pipe to have answered the concern. I think his comment is very relevant, and I think we should have heard this before from the staff, if that is a possibility.

MR. PLESSET: Well, any more comments?

MR. DILWORTH: I just want to say, there was one comment made by Mr. Halapats about us having 18 pieces of pipe that we could run another test on. We don't have another piece of pipe to run the test that he is requiring -- pipe of the same heat.

MR. PLESSET: Could you make it very brief? We don't want another lecture on metallurgy.

MR. HALAPATS: You are shown to have 18 pieces of pipe. Your requirements commit you to maintaining the identity of scraps, and you certainly did not use the full 20-foot multiple lengths. There must be six inches around.

MR. MERRICK: What you saw had 18 tubes listed, 17 of which were first order utilities or somewhere else.

MR. HALAPATS: They could be searched out by going to your supplier and he may even have in stock some of that same heat.

MR. PLESSET: Well, let's go to the item -- status report on ice condensers -- nozzle cracks. I am sorry, I misread.

MR. MILLS: We will have Tom Timmons from Westinghouse to report on that.

MR. TIMMONS: My name is Tom Timmons, with Westinghouse. Last Wednesday I came down and gave a brief overview of the reactor vessel nozzle cracking problem that had been discovered by our French licensee. The French licensee had found a method of using ultrasonic to detect cracking in the base metal underneath the stainless steel clad and reactor vessel nozzles.

They characterized the cracking as in the base metal, in a broad area of the nozzle bore, but more prevalent in the thicker section as being confined to the heat effctive zone of the -- produced by the second later of cladding, oriented perpendicular to the cladding direction, amd at tgd timd they s'id the maximum length was about one inch and the maximum depth was about .28 inches, and they discovered -- they were able to correlate the UT examination by destructive examinations.

They took some samples from some nozzle bores and also did some progressive grinding to verify the actual lengths and depths of the cracks.

Subsequent to this, they did a metallurgical examination of the samples, and determined that the cracking was believed to be hydrogen induced, and as a result of the welding process and heat treatment use in the cladding, it was determined that the cracking was most probably produced because of the lack of pre-heat prior to the deposition of the second layer of the cladding.

Subsequent to this, there was a large number of activities that were undertaken by Westinghouse to determine if there were vessels in the United States which were produced by the French licensee and used the same procedures to determine that there were two vessels in the United States that were produced by the French. Those are located in the Northern States Power Prairie Island Reactors.

Prairie Island has committed to do an in-service inspection with an ultrasonic technique to determine if they have underclad cracks. Those inspections are scheduled for some time later this year.

In terms of investigating other vendors, other reactor vessel vendors that may have used procedures that are similar to those of the French, the vessels produced by the Rotterdam Dockyard for Westinghouse were determined to have used a process that was similar to the process the French used.

TVA's Sequoyah Unit 1 vessel was determined to have been manufactured by the Rotterdam Dockyard.

Subsequent to that, meetings were held with TVA, Westinghouse, and the NRC staff to discuss this. A UT examination of the nozzels of the Sequoyah Unit 1 vessel was conducted, and it was determined that there were indeed some instances of underclad cracking in the nozzles in the Sequoyah unit.

Subsequent to that, it was determined that based on the French experience, the samples that had been taken, the characterization of the depth of the cracks and the actual length of the cracks, it was found from the UT examination that all of the cracks were detected in the nozzles of the Sequoyah vessel. They were acceptable within the limits of the ASME code.

In conjunction with this, Westinghouse submitted a fracture mechanics evaluation that showed that even though they were acceptable under the ASME code, the cracks would mnt frow vdry mubh over the life of the vessel, and if they did grow, that the growth that was shown would not present a problem, and the cracks would eventually remain well below the critical crack size for accident conditions and for normal operation.

Any questions?

MR. PLESSET: Any questions?

(No response.)

MR. PLESSET: I guess not.

MR. MATHIS: I have one comment. I talked to Paul Shewmon on this subject.

MR. PLESSET: The previous one or this one?

MR. MATHIS: This one. He is familiar with the problem. He has gone over the whole subject, and he has no particualr problem.

MR. PLESSET: Okay, thank you.

Thank you.

I guess that takes care of that item on the agenda. Could we go to the next item, which is a status report on ice condensers?

MR. MILLS: We will have Mr. Bob Cristy from our engineering design group respond.

MR. CHRISTY: My name is Bob Christy, Nuclear Engineering Branch, Tennessee Valley Authority.

I would like to discuss with you today some of the studies that have used what are commonly referred to as probability techniques in the evaluation of the Sequoyah plant.

Basically, there have been four studies performed which I believe might be applicable to today's discussion. The studies are a study performed by the Sandia Laboratories, known as the systems interaction methodology applications program. The second is another study performed by the Sandia Laboratories, which is the reactor safety study methodology application program, and two studies, one of which has been performed and one will be performed in the future, performed by the Kaman Sciences Corporation of Colorado Springs, Colorado, the first one on the auxiliary feedwater system and the second on a full plant model of the Sequoyah Nuclear Plant.

(Slide.)

MR. CHRISTY: On the systems interaction methodology applications program, the NRC was attempting to determine if certain connections between systems could be systematically evaluated in order to get a feel for whether certain failures could be predicted between systems.

The Sandia Laboratories were contracted by the NRC to perform this study. The study had an objective of determining potential interactions that could cause failures of more than one system. It also had an objective of looking at the standard review plan to see if some of these potential interactions were already covered in the standard review plan.

A sidelight of the objective was that the plant that was chosen for the study was to be examined for plant specifics, and as stated on the slide, it was not the purpose of the study to judge the plant, which happened to be the Watts Bar Plant, the sister plant to the Sequoyah.

It was concluded the facility was generally well protected against interactions considered within the scope of the Sandia study. The Sandia study was a fairly limited scope, and we will have a slide here that talks about this.

(Slide.)

MR. CHRISTY: The study basically was to determine if there were events that would cause what the Sandia Laboratories defined to be unacceptable core damage, and the procedure that they used to define unacceptable core damage was failure of, one, the reactor subcriticality, two, failure of the decay heat system, or failure of the reactor coolant protection boundary when connected with failure of the mitigating systems.

Sandia Laboratories essentially evaluated three fault trees, and this was the procedure that was used to try and connect the system interactions. There were three fault trees, one fault tree on reactor subcriticality, one on decay heat removal, and one on failure of the reactor coolant protection boundary.

They did not look at failure of the mitigating system. The fault trees were developed for the ANSI 18.2 conditions. They did not look at LOCA's, for instance. They did not model anything to do with the consequences if you had a failure or unacceptable core damage. They did not model any of the consequences. They did not include anything along the lines of fire, earthquake, hurricanes, tornadoes, floods, or sabotage.

What they did do was, they looked at the three fault trees, and they took the cut sets from the fault trees which were just those events that would cause the top event to occur. That is to say, if there were three separate failures, that would cause perhaps the failure of the decay heat removal system. They would have it printed out as part of the computer program used to evaluate the fault trees.

They would then look at those three independent cut sets or three independent events in that cut set to see if there were any connections between those three supposedly independent events that will indicate that possibly those three independent events were not independent but had some connection.

The things that they looked at to connect these independent failures are shown here.

(Slide.)

MR. CHRISTY: In Sandia terminology, they are known as linking characteristics, and basically what they looked for were connections with the power systems, either the AC power system or the DC power system. They also looked for connections with the actuation. For instance, if a pump were being actuated by a pressure sensor, they would look to see if that same pressure sensor was used to actuate all the pumps in one system.

They looked at lubrication on the pumps. They looked at the coding pumps, valves, whatever it is. They looked at all the hydraulic valves, whether or not some of the hydraulics were connected on the valves. They looked at the compressed air system, and all the air operated relief valves, and they looked at locations.

These, as I say, were the things they looked at, and basically, it is a common cause search for what I would say -- what I would call a common cause search on a limited scope. And I believe that the conclusion of the report was that as far as the Watts Bar plant was concerned, which is, as I say, a sister plant to the Sequoyah, the separations and the criteria that were used in the design of the plant indicated that the interactions they were looking for did not occur, and that the plant was well designed for this particular area.

(Slide.)

MR. CHRISTY: All right. The second study was also performed by the Sandia Laboratory. It is known as the reactor safety study methodology applications program. In the acronym world, it is RSSMAP, which is what you hear it as.

The basic objective of the study, after WASH 1400, there was some feeling among the NRC and a belief that they ought to look at some of the other plants besides the Peachbottom BWR and the surry PWR to determine if some of the sequences would be different for the different types of reactors and for the different types of containments.

The reactor safety study methodology application program looked at four plants. They looked at the Sequoyah nuclear plant, which was typical, they believed, of a Westinghouse ice condenser plant, the Calvert Cliffs plant, the Duke Oconee plant, and the Grand Gulf plant.

As a result of the study, what they did was, they compared, for instance, in the Sequoyah study, they compared the Sequoyah plant versus the surry plant, and they tried to determine whether or not there were differences between the Sequoyah plant and the surry plant that would be important in a risk study.

They constructed simplified event trees and simplified fault trees. They did not do the detailed calculations that were done in WASH 1400. They were basically qualitative fault trees that were done, and basically they would compare the surry system, for instance, on core injection versus the Sequoyah system on core injection, and would say, I believe, that system is a factor of 10 better or a factor of 10 worse, a factor of 2 better or a factor of 2 worse, with some simplified calculations to back it up.

The results of the study can be summed up, I believe, in the following, that the ice -- it is true that the ice condenser plants have different dominant accident scenarios. However, as a result of the evaluation by the Sandia Laboratories, they believe -- the conclusion of the report is that even though the dominant sequences are different, the overall risk of the Sequoyah nuclear plant is similar to the surry plant, which is the plant being used, and the risk is similar for an ice condenser and a large dry containment plant.

The Tennessee Valley Authority, we have performed our own internal studies, similar to the Sandia study. Basically, we have some differences with the Sandia study which have not been resolved. The study has not yet been issued, even though parts are available and have been used elsewhere, as Mr. Taylor will discuss with you later, but this is what we believe is the conclusion of the study.

One of the questions that was asked earlier was, had there been some things that have come out of these studies that have changed some of the things in the process? One of the dominant sequences in the Sequoyah nuclear plant was believed to be a failure to remove the drain plugs after refueling.

In an ice condenser plant, you have the upper and lower compartment. They have drain plugs for refueling to fill the refueling cavity up with water. Failure to remove these plugs would fail the core recirculation -- I mean, the containment spray recirculation. This was a common mode failure. It was pointed out in the Sandia study.

Internal to TVA, since the study we have taken steps to provide more inspection, to in fact indeed assure ourselves that those drain plugs are pulled after a refueling.

(Slide.)

MR. CHRISTY: The third study that was done was a study performed by the Kaman Sciences Corporation, Colorado

Springs, Colorado, for TVA on the auxiliary feedwater system. At the end of last year, 1979, TVA was approached by EPRI and came in to perform a full plant availability model of one of the TVA plants in conjunction with a computer code known as the GO computer code, which has been developed by Kaman in the last 15 years, and essentially has been funded in the last couple of years, at least, by the EPRI people.

We were asked to participate in this. As a result of this request, we felt in order to evaluate whether we wanted to participate, that we should understand the GO code. We signed a contract with Kaman to evaluate the Sequoyah auxiliary feedwater system. The EPRI code -- the GO code is an EPRI code today. It has been acquired by TVA, and we are using it in some of the studies that we have in progress, and also have checked the results of the Kaman people on the auxiliary feedwater systems study.

We have here a quick mock-up of what the Sequoyah auxiliary feedwater system looks like.

(Slide.)

MR. CHRISTY: It is a three-pump system. We have one turbine driven pump and two motor driven pumps, four steam generators. Success criteria is water to two out of the four steam generators. Basically, the GO computer code is what is known as a success tree code. It works by taking an initiating event and following that initiating event through the components. It is an opposite -- well, it has a somewhat opposite logic to that of the fault trees.

The fault trees take an event that you don't want to happen and work your way back. You say, I do not want, you know, this to fail, and work your way back to how you would fail it. The GO code takes an event such as a start, do we have water in the condensate storage tanks to provide to the steam generator? They start back with the water, and work through the steam generator. The fault tree code would start at the steam generator and work back to the water.

We have prepared the codes. We have not yet found a problem that the same results do not occur out of both a fault tree code and a GO code.

To our knowledge today they both give about the same results. There are differences in the procedures that you use in the logic, but as far as we can tell today, they come up with the same results.

MR. OKRENT: Could you put the previous vu-graph on for a moment?

(Slide.)

MR. OKRENT: The one that gave the summary of the Kaman results.

(Slide.)

MR. OKRENT: The one earlier. Those are very high reliability numbers. Has TVA reviewed the results, and do they agree with them?

MR. CHRISTY: TVA has reviewed the results. The reliabilities of the system are high. We believe the reliability of the Sequoyah auxiliary feedwater system is high. Whether or not it is as shown, for instance, assuming you have off-site power, and you have the three pumps, and you have the water, .99999 is subject to debate by a lot of people. However, I would say that the results that were indicated on the qualitative way of doing it, that is, looking at what the Kaman people called the fault sets, did indicate that the logic was probably correct.

The numbers that were used for failures of the components are again subject to a lot of interpretation. You pick what you believe to be the best estimate of component failures. You plug them into the computer code and the number is put out.

We have performed sensivity studies to look at some of the changes that might happen in the system if we change the failures of some of the components, and you can get effects --

MR. BARRY: The effects, depending on how you want to vary the numbers that go into the computer code. However, I would say that the Sequoyah auxiliary feedwater system is a very reliable system. It has been checked out many times, I believe, by a lot of people, and I will believe it to be fairly -- a fairly accurate representation by those numbers.

MR. OKRENT: I do not know what was excluded as a possible failure source in this study, because it does not say anything was excluded except the specific things shown, but if I were not excluding various failure sources, I suspect I could get numbers much bigger than you have here.

MR. CHRISTY: Again, this is a hardware study, such things as a detailed common cause failure where you look at the effects of major fires, major earthquakes, et cetera, were not done.

MR. OKRENT: Excuse me. Then it should say here on the page that this is a detailed hardware study, and there may be other things that could give much bigger answers, because that is not on this page, and it leaves an impression which may be unjustified, I would say.

MR. CHRISTY: Perhaps.

MR. PLESSET: Let me follow up that interesting line of thought. This is an ice condenser plant, and you had some kind of a data base, I presume. Now, did you use any data from D. C. Cook, where the doors are freezing all the time? Will your doors be better or worse?

MR. CHRISTY: For this study, which is the auxiliary feedwater system --

MR. PLESSET: I am talking about the one preceding this one.

MR. CHRISTY: The study that was used for the reactor safety study methodology application program by Sandia Laboratories and TVA basically used the numbers that existed in the WASH 1400.

Okay, now, the failure of the ice condenser doors was included in the study, and numbers were used. Estimates were made, for instance, of the failure of the ice condenser doors. They are included in the study.

MR. PLESSET: That is interesting. I am not worried about the study, the computer code and all that. Are your doors better or worse than the D. C. Cook doors, and if so, what is the basis for your answer? That is a very practical question. You do not need to go to a big computer to answer that question.

MR. CHRISTY: I would suggest that perhaps Jerry Ballentine --

MR. MILLS: We will address that.

MR. BALLANTINE: Our experience with the ice condenser is not just theoretical.

MR. PLESSET: I was hoping that it wasn't.

MR. BALLANTINE: Our ice condenser has been loaded now with ice for nearly a year and a half, and during that year and a half, we have been performing very frequent inspections and maintenance work on it as required. I have no firsthand way of comparing o-- doors with the D. C. Cook doors. However, we have not noticed this icing and frosting that would make these doors inoperable at Sequoyah.

MR. PLESSET: You are very confident about that? I mean, are they going to be required to inspect these doors regularly as D. C. Cook does?

MR. STAHL: Yes, there is an inspection program for these doors.

MR. PLESSET: You say your doors have not been freezing shut.

MR. BALLANTINE: No, sir. We have not had that occur at Sequoyah during the inspection program that we have been doing, and the program that we have been doing is the same program that we will continue to do.

MR. PLESSET: All right, and what about the inventory. Have you been following the inventory?

MR. BALLANTINE: Yes, sir, we have. We have been losing ice at, I think -- at, I think, the expected rate. We just completed a program of weighing ice baskets just last month.

MR. PLESSET: Yes. Mike?

MR. BENDER: Just to amplify our understanding of the ice questions, what can you conclude from the existing operation that can be extrapolated to operation that would enable you to make a judgment about the behavior of the ice condenser system under operating conditions?

MR. BALLANTINE: We have only had since loading the ice three periods during which the primary system in the building was at temperature during hot functional, a period during late March of this year, and we have been at temperature about the last month.

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All the other times, the building has been at a cooler termperature than it is running. Ordinarily, the guilding is around -- an ambient of around 80 degrees. It is now 115 degrees. We are confident that the ice inventory program, the maintenance program of the ice bed will be sufficient.

MR. EBERSOLE: Mr. Chairman?

MR. PLESSET: Yes.

MR. EBERSOLE: They work great if the worse thing happens, but they don't work great if much less things happen, like a smaller break versus a large break. The ice condenser packs.

MR. BALLANTINE: Starting the air return fans will cause enough pressure in the lower compartment to spring the doors open. We have had that occur during hot functional and at other times.

It is a matter, then -- we have detection of that even by limits, which is on the various doors that show them to be open. We simply would have to shut down and go into the lower compartment and reclose the doors by hand.

MR. EBERSOLE: Does it melt the ice?

MR. BALLANTINE: It would if the doors were allowed to remain open for any appreciable time.

MR. EBERSOLE: I'll have a small break or something, but not a big one. I get the response of this fan, but not much of a break. The ice proceeds to fall down. It does not turn completely to water, but just plugs the whole process. Have you looked at that? Do you follow me? I am taking a modulated view of the break.

MR. BALLANTINE: I understand what you are saying. I think our program would readily detect that.

MR. EBERSOLE: It would detect it. I am wondering whether the consequence itself would not result in a choked system such that you would not have an ice condenser in that period of time.

MR. BALLANTINE: The requirements we have for surveillance and the definition of operability and the technical specifications for the ice condenser would require us to correct that condition before proceeding.

MR. EBERSOLE: You might go in and find you no longer have an ice system, because it is just blocked up. You would have to survive until you got it back, which I guess would not be too unreasonable.

MR. BALLANTINE: It would.

MR. MILLS: We would ask the Westinhouse Corporation to respond to this, Mr. Ebersole.

MR. BRUCE: I believe the question is a small break opening up the ice condenser doors and --

MR. EBERSOLE: And a partial ice melt, a plugging of the drains with cascades of ice falling and so forth.

MR. BRUCE: I think the problem you are worried about would be a very high pressure increase in the lower compartment, because you are blocked up the ice condenser. We have not analyzed that, but I do not think it would be reasonable for, you know, the ice condenser to be blocked to such a complete extent that the blowdown from a small break would not automatically melt its way through the ice.

I cannot envisage that at all.

MR. EBERSOLE: Okay.

MR. PLESSET: Well, I notice that you don't have any freezing of the doors, but is the environment such that you would detect it? I mean, in operation, you might have a lot more humidity inside the containment which would contribute, perhaps significantly to the freezing of the doors.

,, I am not convinced that your experience has been a lot better than D. C. Cook's. Do you see my point?

MR. EBERSOLE: I was trying to invent a mechanism, Dr. Plesset, that would freeze the doors as a matter of fact.

MR. PLESSET: They have not computed that. They have not made any analyses of that. Nobody has, I guess.

I gather that they have not, so I was going to the case where their doors might ordinarily be forzen shut.

MR. EBERSOLE: Yes.

MR. PLESSET: He will answer that, I think.

MR. BALLANTINE: Yes. I think that our inspection program will tell us whether our experience worsens. Up until

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this point, we have not had that experience. Also, in answering Mr. Ebersole's question, I think I was assuming, although not knowing the mechanism by which it would occur. I was assuming that it did occur. If it did, our corrective action would be to shutdown and restore the ice condenser to an operable status.

MR. PLESSET: They would be shutting down anyway, I suspect.

MR. EBERSOLE: I expect you would. Of course, shutting down does not get you anywhere. It just brings you face to face with the real problem.

MR. PLESSET: Right. Max?

MR. CARBON: You said you had no first hand knowledge of the D. C. Cook doors, I believe. I presume you have checked to se what kind of problems they are having and why and how it compares with yours, and whether you would expect the same problem and so on.

MR. BALLANTINE: Yes, sir. When I said no first hand problem, I myself have not been at Cook. I have had on my staff and also other members in TVA have spent considerable time at Cook. It is almost first hand.

MR. CARBON: Thank you.

MR. PLESSET: Yes, Jesse?

MR. EBERSOLE: Are we done with the ice condenser?

MR. PLESSET: No.

MR. EBERSOLE: Caryy on.

MR. PLESSET: What assurance do you have that you will not get hot channeling where the steam does not interact with the ice overall, but just makes a hot pipe up to the melt, and the pressure can stay high? What is the answer to that?

I am worried about his data base. That is all, and trying to relate it to some physical things.

MR. EBERSOLE: Isn't it true that an ice condenser, you can say, it is basically unstable in character. If it develops a hole through itself, it tends to make it worse and it creates an ever enlarging bypass?

MR. PLESSET: That is what I think we would like to see what information they can give us. That would just ocntribute to its data base, as he mentioned.

MR. LAO: I am Wang Lao with TVA. I would like to go through a history of what we study about this burn-through problem, and relate it to what we call the maldistribution problem.

Westinghouse studied this problem many years ago. They concluded that there is no burn-through problem. The Maldistribution does not lead to a burn-through problem.

TVA, back in 1973 or something like that, we contracted with Battelle-Northwest to do an independent study on the subject. the chief investigator was Dr. Rudy Adelman.

We constructed a code which in more detail --

MR. PLESSET: Was this study theoretical?

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MR. LAO: Yes, sir.

MR. PLESSET: Okay.

MR. LAO: Computer analysis.

MR. PLESSET: Okay.

MR. LAO: It was not a test -- the conclusion for that test confirmed Westinghouse's study that there is no burn-through. I guess in retrospect -- I began to understand why, after the research was out -- it concerned me. I was involved myself.

I asked the same question. I think in you gentlemen's minds, you probably want to know why once you start burning out, the channel will have less resistance. That is what went through my mind when we started the investigation.

After the results came out and we looked at the number and we understood why. The reason was that if the flow came through one of the doors, okay, into the lower plenum, the lower plenum is so large in flow area that the flow resistance around the plenum is small compared to the flow of the channel.

Therefor^, the flow has a tendency to spread out horizontally moreso than going up. Therefore, the flow, the meling will have a tendency to spread itself out. That is exactly what the code told us.

MR. PLESSET: What lower plenum are you speaking of?

MR. LAO: The flow into the ice condenser is horizaontal. There are 24 pairs of doors. It is like a header.

MR. PLESSET: Let me see if I understand. You are talking about the steam having access to many columns. Is that what you are saying?

MR. LAO: Yes, sir.

MR. PLESSET: I would be willing to -- I am talking about let's look at what is going on in the columns now. That is what we are concerned about. You can have a burn-through through a narrow channel in several columns.

I am willing to grant you the steam will spread out in the lower bay of the containment. Could we get to the other question? It now is at a column. What does the computer code say, and can we believe it?

MR. LAO: Yes, sir. I was just told that the --

MR. PLESSET: Which test -- there was some testing.

MR. LAO: You see, in the lower plenum the horizontal flow is very free to move. So, the computer code does not say you can restrict to one channel.

I mean, obviously, you tell the computer code there is one sideways movement. It won't burn-through the travel. If that is the assumption that you will burn-through, you will.

MR. PLESSET: What is the Watts Bar test?

MR. LAMBERT: The Westinghouse Corporation conducted --

MR. BRUCE: In the early days of development of the ice condenser, an extensive series of tests were conducted at the Waltz Mill test facility.

MR. PLESSET: Okay.

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MR. BRUCE: The problem of the blow down through the ice condenser and maldistribution is you want to make sure that you trap the vast majority of steam from a blowdown, condense it in the ice condenser, and you do not get too much bypass flow right to the ice condenser which would create additional pressure in the upper compartment.

The various things that have been talked about, the maldistribution code and the Waltz Mill results produced a number -- I can't remember exactly -- the maximum maldistribution relative to average was about 150 percent.

This kind of number was tested at Waltz Mill. There was still a relatively small bypass of steam through the ice condenser. So that typically in a blowdown, even with maldistribution of the full peak pressure, it amounts to about 10 psig; maybe half a psi would be due to bypass of steam through the ice condenser.

MR. PLESSET: The test was adequate, of sufficient height in the column, the ice column.

MR. BRUCE: What I am really saying is that: let's suppose your steam went into the torus under the ice condenser, and your uniform distribution of flow through the many ice condenser channels -- okay.

You can run a test then with that kind of blowdown and find out for a full 48 foot ice condenser height how much condensation you get, and how much bypass you get right through to the upper compartment.

I believe those tests were also run with higher maldistributions like up to 150 percent. I would not want to be held to that exact number. I don't remember that properly. We also showed a relatively low bypass of steam right through the ice condenser.

MR. PLESSET: Is staff familiar with this question?

MR. STAHL: Yes.

MR. GOODRICK: Back when we were reviewing the Waltz Mill test results for the D. C. Cook plant review, we did look at distribution, early melt-through through selected bays. We concluded that number one, one point that was not brought up was the fact that you do not have your upper compartment sprays.

You get early melt-through through one of the bays. The bypass steam will be condensed. Secondly, they did do a series of blownowns ranging in mass flow rates, I think, up to 150 percent in the Waltz Mill facility.

There are -- I think it was a representation of one bay at Waltz Mill. They got, more or less, even melt through the individual baskets, indicating they did have a uniform flow within the ice condenser mock-up.

It was full-scale. We concluded that you would not have a substantial problem of premature melt-through.

MR. PLESSET: At that time, you were convinced that you would not get a pressure pulse at any time in the condensa-

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tion process. It is possible it might have a higher pressure for a short time if you had a maldistribution in the upper compartment.

MR. GOODRICK: The peak pressures in the ice condenser do not occur early in time. I believe the pressures are in the neighborhood of about 8 psi during the blowdown.

MR. PLESSET: 8 psi, that is a bit upsetting already, considering the design. This one is an 11 psi containment, 12?

MR. GOODRICK: This is due to the air carry-over.

MR. PLESSET: Yes. Okay. Well, I just wnated to get your data base straight.

MR. CRISTY: The last study that was --

MR. PLESSET: Do you want to say some more?

MR. GOODRICK: I wanted to indicate that all the numbers I gave to you were for a large break, so the pressures would be maximized.

MR. CRISTY: The last study to discuss is the Sequoyah Nuclear plant, full-scale safety and availability analysis. This is a joint effort between the EPRI, Kaman Sciences Corporation, and Tennessee Valley Authority.

Basically, the original thrust of this study was to develop a plant availability model. However, recent developments have also impressed upon us the need to add plant safety. So, some of the safety systems, the mitigating systems will also be modelled. The manpower that is involved in this is as shown.

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It has started on July 1, 1980. It is a two phase program. Phase one to be approximately six months, and phase two to be approximately one year. It will be completed, hopefully, around December 31 next year, 1981.

MR. OKRENT: What does it mean to say some of the safety systems will be modelled? I do not understand what you are telling us.

MR. CRISTY: The systems that will be modelled we will have approximately 75 systems that are eligible for modelling in the plant. The capability to model those number of systems within the time frame, and with the money that is available will probably not permit us to model all 75 systems in detail.

The systems to be modelled will be those that -- in detail, anyway, will be those that the Kaman Sciences people, the EPRI people, and the TVA people believe to be the most significant, either to plant availability or to plant safety.

The number to be modelled has not yet -- in detail, has not yet been determined. I don't believe it will be determined until we get approximately half-way through and find out how many man-months it takes to do the full-scale modelling type of affair.

If we could model all 75 systems, we would model all 75 systems. However, I do not believe we will.

MR. OKRENT: I have read and I think even heard Mr. Freeman, the Chairman of TVA, indicate that he is very safety

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conscious and so, I would like to explore his statements and so forth in terms of what you are proposing to do here. Let me, by example, indicate the kinds of things I want to understand, whether you will pick up in what you are doing.

I read recently that an operating reactor found that there was a single failure mode, a passive one, but a single failure mode for the RHR system. There happened to be a common piece of pipe that if it failed, loss of cooling water to the RHR pumps, if I remember correctly -- therefore, it represented possibly a higher probability failure mode for an important system.

It might or might not lead to difficulty. It would depend on the circumstance, obviously, in which the failure occurred. If you go back through what has occurred in TVA reactors and other reactors, we see other kinds of what I will call susceptible situations. You know, where aux feedwater has depended on AC power, not necessarily that people knew it or recognized it, but it was there.

What I cannot tell from what you have told me is whether your look at the Sequoyah reactor will have identified what some people call "outliers." Potentially, high probability initiators or high probability failure modes of systems you need, given an accident or so forth. In other words, will you have done a sufficiently comprehensive job to have identified within the capability of existing techniques; which means you cannot pick up design areas by this method and so forth.

Will you have done that in what you have outlined on the board or on the vu-graph?

MR. CRISTY: I do not believe, for instance, that the depth of study that will be done in this study would be, for instance, comparable to the depth of study that might be done, for instance, on the Surry Plant for WASH-1400.

I do not believe that the man power and the money would allow that. However, I do believe that the study will realize and use the experience of quite a few of the studies that have been done in the past to pick out what I believe to be the high probability events and the so-called dominant sequences.

I cannot guarantee that we will cover 100 percent of all the events that might occur for the Sequoyah nuclear plant.

MR. OKRENT: I am relatively unimpressed when people tell me they are going to look at the high contributions to risk kind of events as identified from previous studies. What I seem to see for specific reactors is they have their own characteristics.

MR. CRISTY: This is true.

MR. OKRENT: It is likely, that if there is a weak point, it may be different than the ones you have already learned, while you certainly should not ignore what you have learned from other plants. I am very unconvinced that that in fact constitutes an adequate job in my own evaluation and in the sense of what I heard Mr. Freeman say, is TVA's approach to safety.

I do not know what you mean when you say it is not enough money allocated to this. Are you suggesting that TVA cannot find -- I will invent a number -- a $25 million to try to review this plant beyond whatever you are going to do for your availability analysis to see whether there are important contributors to an accident which could lead to severe core damamge?

I am not talking about consequence analysis, you understand?

MR. CRISTY: That is correct.

MR. OKRENT: What are you telling me about resources?

MR. MILLS: I believe Mr. Cristy is referring to the present contract for this study right here. Certainly, Mr. Freeman is very concerned about safety. I think he has made the point before that when it comes to safety, there is no question about money.

We have continuing studies going on. Certainly, we are not going to be limited by resources on any study that needs to be done to improve the safety of the Sequoyah nuclear plant.

I think Mr. Cristy was merely referring to this contract.

MR. OKRENT: Well, as you know, the Committee has recommended that in addition to the IREP program, whatever it is, which the NRC staff is somehow leading or doing or both, that

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each reactor apply this methodology to see whether there are potentially important improvements. I cannot remember the exact wording. You know what I mean?

I am trying to see, in fact, whether Sequoyah thinks this is, in fact, something it is doing already; in which case we do not have to discuss it anymore. If it is not doing it, why it thinks it should not be done; in which case, I might want to discuss it a little bit more.

It does not sound to me like you are quite proposing to do what I understood to be the sense of the thing. Maybe you have something other in mind than we see here.

MR. CRISTY: I believe the study as proposed by EPRI and TVA and the present existing contract with the work that is being planned would fulfill their requirements of what we now -- again, they are unclear -- what we now believe to be the requirements of an IREP study for the plant.

MR. OKRENT: Actually, you know, I would prefer if you did not tell me what you now understand to be the requirements of an IREP study. In fact, I had hoped, I must say, that TVA would take the lead and become what I would call the model utility, and maybe find out what kind of study, in fact, should be done.

They might not agree that what the staff is going in the IREP study would give the most significant information from a safety point of view. It may be some other things. In certain

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cases, you might do less. In certain cases, you might do more than they do. But for you to tell me you are going to -- I will use the words, once again conform to something that is in a staff letter or a regulation or so forth -- you have not arrived at what you think it --

MR. CRISTY: If I could address that.

MR. DILWORTH: Let me make one statement here. I have the responsibility for the work that Mr. Cristy's section is doing. I would like to say that we feel we have the beginnings now of probably one of the strongest efforts in doing risk assessment reliability work as probably any utility in the country. We intend to expand it.

Mr. Cristy has been specifically talking about one particular contract with Kaman that has somewhat been tailored with the EPRI work that is now going on.

Sequoyah, all of the follow-on plants after this, we intend to do considerably more work. I will assure you that our commitment is just as strong as Mr. Freeman's. There will be no backing up by TVA or any relaxing in our efforts to provide the kind of risk assessment studies that are capable in this country to be performed.

We really have this as a strong planning effort and expansion of efforts in this regard. We don't have all the answers right now, Dr. Okrent. We are going to get them.

MR. OKRENT: I was not asking you to come in with

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answers. I was trying to understand whether you were going to do an appropriately thorough job, whatever that may mean.

MR. DILWORTH: Yes, we are.

MR. CRISTY: I would like to point out that TVA recognized the probabilities of having some sort of a check of some of the work. This is an alternate -- the GO code is not the same code being used in many of the studies. One of the reasons EPRI is funding the study is to see if there are alternate methods of looking at some of these systems besided the fault tree methosd what would indicate some of the possible completeness -- whether the fault trees are complete and entire.

This is an alternate method. One of the reasons TVA is participating in it is to provide us with a capability of doing it either with fault tree or GO code.

MR. PLESSET: Mr. Bernero wants to make a comment.

MR. BERNERO: We had a meeting about three or four weeks ago with the subject plants for the next stage of IREP that was not quite satisfactory, amont other reasons, because we, in the staff, the research staff in particular were not able to furnish lucid documentation of what the scope and content of this phase of IREP is.

We have that nearly complete for sharing it with the people who are subject to IREP and for anyone else for that matter. TVA at that time, Mr. Ralston of TVA spoke to me and indicated an interest on the part of TVA, not only to cooperate with IREP,

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but to do other things in some coherent relationship to that.

I do not know exactly how far they are ready, willing, and able to go, but I do recognize their need to know a little bit more about exactly what an IREP is, its scope and content.

MR. PLESSET: Do you want to hear more of this, Dave?

MR. OKRENT: No.

MR. PLESSET: We would excuse you, if you don't mind too much to get to --

(Laughter.)

MR. EBERSOLE: Before you let him go, let me ask a question. Way back a long time ago, there was quite a hassle between TVA and WEstinghouse. In trying to get improved secondary relief capacity, including circuit reliability on Sequoyah, do I understand at present it is just a standard grade atmospheric relief valve with standard circuits, and no particular QA and so forth?

We were attempting to depressurize the secondary to enhance the chance we would always have auxiliary feedwater for any source could find, like a fire pump without having to worry about having it at high pressure. We failed miserably at that time to get that done.

I wondered if anything had been done in the interim.

MR. CRISTY: I am not aware of it. Perhaps someone else at the table might be.

MR. PLESSET: You have drawn a blank -- maybe not.

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MR. DILWORTH: If your question, Jesse, is the atmospheric relief valves, they are not safety grade.

MR. EBERSOLE: They are unqualified systems to dump into atmosphere on secondary side.

MR. DILWORTH: That is correct.

MR. EBERSOLE: They leave the same requirement for auxiliary feedwater as previously existed.

MR. DILWORTH: Yes.

MR. BENDER: How does this relate to the licensing of Sequoyah? Does TVA perceive the need to do any risk studies further than it has gone now prior to getting a license to operate Sequoyah?

MR. DILWORTH: We believe that the risk of Sequoyah as it is designed today is at least comparable to or better than any plant in the country. We do not see any other need for the operation of Sequoyah. We intend to continue working in the risk assessment area and identify anything we can do to improve Sequoyah and any other plant we have.

MR. BENDER: Are you planning to deal with the ice condenser plants as a generic class of installations?

MR. DILWORTH: Yes, sir, since we have four of them.

MR. BENDER: Are you going to join with other ice condenser owners?

MR. DILWORTH: Yes. We already have joined with other ice condenser owners in discussions over the last two or three

bf 0

months. These will expand, as far as we are concerned. We are ready, willing, and able to cooperate completely with others.

MR. BENDER: Is this your own risk assessment or is this collective risk assessment.

MR. DILWORTH: There has been some risk assessment plans, maybe some work done by the others. We will try to make our work available, and we may collectively do some work, but his decision has not been made yet.

MR. BENDER: Thank you.

MR. PLESSET: I would like to have a brief presentation on the hydrogen control studies. We cannot allow the full allocated time, so it will have to be very brief.

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MR. MILLS: We will call upon Mr. George Dilworth to make this presentation. Dr. Plesset, I would preface this by stating that George will bring this out in his presentation, I believe. We will talking about, hopefully, an implementation schedule if the safety studies, the NRC reviews and so forth are accomplished, but we are not talking about this with regard to our request of you and our request of the staff for a full power license.

MR. PLESSET: All right. What I am hoping is if we can get the essential points in 15 minutes --

MR. MILLS: Yes, sir.

MR. DILWORTH: Mr. Chairman, if I would be allowed to, I think I can get through a brief presentation in about ten minutes, if the Committee will indulge me and let me finish the presentation.

MR. PLESSET: We will let you talk continually for ten minutes.

MR. DILWORTH: Okay.

(Laughter.)

My name is George Dilworth, chief nuclear engineer for engineering design, TVA. I want to discuss with you TVA's efforts in the evaluation of hydrogen above design basis at Sequoyah. At TMI the core was uncovered to the extent of severe core damage, with resulting hydrogen reaction. This led hydrogen release to the containment atmosphere and subsequent assumed hydrogen burn to produce a 28-pound pressure spike.

The hydrogen release, a portion of which burned, resulted from a zirc-water reaction that has been estimated by various sources to be in the range of 25 to 50 percent. We recognized in our nuclear program review in 1979 internal to TVA the need to thoroughly investigate the hydrogen generation as a result of core damage in all of our plants beginning with Sequoyah.

Our initial efforts in the study of hydrogen were focused on the TMI event and the capability of Sequoyah containment to sustain hydrogen combustion. Since these efforts we have made a limited study of this similar to WASH-1400 that has been mentioned here this morning. We have identified representative transients which could lead to some core degradation and evaluated the more important concepts, whether prevention or mitigation of the consequences of hydrogen combustion.

Concurrent with these efforts, TVA has been pursuing implementation of NUREG 0578 requirements and other NUREG requirements and those which we have imposed on ourselves to substantially reduce the chance of a situation similar to TMI where core damage can occur. We believe because of its low risk level, overall low risk level, that Sequoyah is safe to operate at full power based on the present capability of the ice condenser containment, its recombiner and hydrogen purge system and the substantial improvements in equipment and training which are being implemented.

We believe the additional reduction of overall risk may be achieved by protecting the containment from consequences involving metal water reactions from hydrogen releases beyond design basis which is identified for Sequoyah. We have initiated what we believe to be a positive approach to the problem by committing substantial resources in an effort to install a minimum ignition system and provide the interim system, and after a thorough review by TVA and NRC staff over the next couple of months, improve this system later to a permanent system as development work that we have planned proceeds.

I would just like to put up a few slides here that would kind of give us an overview of what we are doing.

(Slide)

We have for the last nine months been studying the hydrogen issue. Sequoyah can withstand substantial amounts of hydrogen above design basis. Significant modifications have been made or are now being made to reduce the potential for degrading core conditions. Limited risk assessment has been made, and we are comparable to the dry containment PWR, Surrey, in specific.

Proposed concepts for a resolution of the hydrogen issue have been evaluated in much detail. We have contracted out with a number of people to do concept studies, and starting in early February of this year, going through May, we spent a lot of time with this. We now have an interim distributed ignition system that we have chosen for implementation at Sequoyah. Development work on control ignition is proceeding for final implementation of a permanent system at Sequoyah, and halon suppression is also being studied.

(Slide)

The capability of the Sequoyah containment is as shown on this slide. A yield pressure of -- design pressure is 12 psi. Yield pressure is 33 psig. The ultimate is 42-1/2, a volume of 1.2 times 10 to the 6 million cubic feet. We feel we have done very conservative analyses on trying to determine how much metal water reaction the core containment could withstand, and on a very conservative basis we have come up with approximately 25 percent metal water reaction as the plant stands today.

These assumptions we have listed here, that the burn is instantaneous -- and by instantaneous I mean that all of the energy that would be produced in the burn would immediately be transferred in pressure -- I am not talking about detonation. I am talking about rapid burn.

MR. BENDER: Does 25 percent mean 42.5 psig.

MR. DILWORTH: That is correct. I was going to say something about risk assessment, but I believe Mr. Cristy has covered it at length, and we have already talked about it. But we do feel that the changes -- I would like to emphasize again, changes that were made post-TMI have had a significant effect on reducing the level of risk.

When we talk about comparing Sequoyah to the Surrey Plant in WASH-1400, we are talking about pre-TMI. So there have definitely been improvements made.

(Slide)

In our study of the last nine months we have looked at the following three major areas that hydrogen might be mitigated or controlled or prevented. The mitigation concepts we looked at were vented containments. We classified those in three different types: filtered vented containment, additional containment volume that you would relieve the present containment to, and then coupled containment where we would couple the two units at Sequoyah together and take advantage of the other units containment as a place to vent to.

We also looked at controlled combustion, controlled ignition sources, and out of this has come our recommendation on the interim controlled ignition. To prevent combustion, we did extensive work in looking at the possibility of inerting the containment with nitrogen, and also we have started work in trying to develop a halon system that would suppress hydrogen burn.

MR. EBERSOLE: Could you describe what you think to be the ignition process? Do you have to accumulate a certain density?

MR. DILWORTH: If you would let me finish, please.

MR. EBEQRNLE: Go ahead.

MR. PLESSET: He has two more minutes before you can ask him questions, Jesse.

(Laughter.)

MR. DILWORTH: Two concepts which we found have the fewest problems from an operational safety viewpoint is the controlled ignition sources and halon, but there are some problems that we know exist in any method. So we have to try to find ways to answer these problems. Of course, they cannot all be done today in this meeting.

Halon, for instance, we know in a sufficient concentration it will prevent hydrogen combustion, but it is not known what effect containment sprays may have on halon. Also the amount of halon decomposition products that would be generated is not known, and the effect these products might have long-term post-accident could be a problem. We need to determine an answer on this.

So today we come to the recognition that ignition sources appear capable of controlling hydrogen generated by most accidents. We feel we are no worse off by putting in a controlled ignition system today than we would be if we did not put in one. As TMI has already demonstrated, there is an ignition system already existing in any containment.

(Slide)

A couple of other things I have mentioned are ignition sources and halon suppression. We feel like there needs to be significant improvement made in the physical models and computer codes that have been used up to date in predicting core degradation events, and the physical models of how hydrogen is produced and released and burned.

Filtered vented containment concept -- I will get to this, Dr. Okrent, when I finish this -- some of the disadvantages and advantages we see in this. In conclusion, though, as far as hydrogen is concerned, we have found it is unacceptable. Inerting it is not feasible for an ice condenser containment because of the need to do maintenance within an ice condenser containment. It is a different animal. It is the last one down the line from a functional safety standpoint, but you would want to preclude operator entry on a regular basis.

The bottom line here is we have concluded that Sequoyah is comparable to a WASH-1400 plant. Very quickly I will tell you what we have going on an in-house program. We have organized an eight-man, full-time task force for design and development work on degraded core accidents.

(Slide)

We are implementing immediately the design and installation of an interim distributed ignition system to be done in three phases, Phase I to be operational in three months, subject to the review of the staff. The staff stated earlier that they do not believe that it is required to have a system in for the operation of Sequoyah at full power license. We are implementing immediatly development work to upgrade the interim system, and we will improve the interim system as this Phase II development work proceeds.

We hope to have most of the Phase II development work complete by this time next year. We are completing a long-term study and development for controlled ignition systems and the halon system, and it will be through within approximately two years. Some aspects of it may take until December of 1982.

(Slide)

The major task right now is on controlled ignition and starting independent development work by private contractors and research organizations on halon. We will continue the risk assessment work that we discussed earlier. We will be looking at new ways to contain computer codes -- developing these. We will be doing studies on hydrogen burning and containment responses to this burn.

We will be going into more definitive, actual physical means of trying to determine what the containment integrity is rather than the conservative method that we have used so far. The equipment, environmental qualifications we think is something we are going to try to upgrade, the Phase I system, to a safety grade system. We will need to do work there in the next year.

We are looking at new radiation dose codes. We hope to be able to be successful in developing or finding an already developed hydride converter that we can install on the reactor drain tank relief vent. We feel that is one of the highest potential releases of hydrogen, and then the reactor vessel vent as well so we can remove the hydrogen before it got into containment.

We will be looking at fogging and other potential systems as well, and we will be following the rulemaking and the state of the art with the rest of the industry and the staff.

Now, very briefly on the interim ignition system. This is a system that is designed to ignite hydrogen inside the containment in the event of an accident in which hydrogen is generated. It is designed to ignite the hydrogen prior to it reaching a dangerously high level. This system is intended to back up the existing safegy grade recombiner systems. However, it is not a safety grade system in the Phase I aspects of it.

I would like to emphasize again that we feel that the ignition sources are already there. What we are trying to do is put in a controlled ignition source. We plan to complete the design, the safety review and installation of this Phase I of the ignition system in two or three months and hope to have it operational prior to any significant operation at high power levels at Sequoyah.

So, in closing I would like to leave you with our view of the hydrogen issue at Sequoyah and other plants of TVA. We sincerely believe that because of the low risk level at Sequoyah, it is safe to operate at full power based on present capability of the ice condenser containment. Subsequent improvements in equipment and training are being implemented. Additional reduction of overall risk may be achieved by protecting the containment from the consequences involving metal-water reactions.

For this reason, we have begun the design procurement and safety review of an interim distributive ignition system, the details of which will be submitted to the NRC staff sometime this month. We are further committed to development efforts to improve performance of safety grade qualification of the system over the next two years.

This concludes my prepared remarks.

I ha~e here today Dr. Wang Lao, who is the leader of our Degraded Core Task Force, and Dave Gazer of Westinghouse, who has worked with us in some of the work we have done in the last several months. They will assist me n answering any questions.

MR. PLESSET: Before we go into questions, I have to point out to the Committee that we have a commitment at 1:30, and after that meeting at 1:30, we have a commitment to Dr. Siess, so that we cannot come back to this -- beyond your lunch time -- to this discussion. So I would like to have you ask questions for a short time unless you want to have this go over until next month, which is quite possible.

MR. EBERSOLE: I would like to mention one subject. It seems to me there should be some documentation of the distributive ignition system and its intended design accomplishment. I gather it must have been on the principle that a lean burn is much less violent than a rich burn. Whatever burn you get is going to be of a pulsating character. You will receive a concentration which will ignite and then flash off and then accumulate again, and do it again and again. That is a lot better than one big bang.

I don't know anything about this. I have not seen anything in print about it. It seems to be a principle and a process that ought to be laid down.

MR. MILLS: Dr. Plesset, I would like to mention at this point that we have not gone through the details. The NBC staff has not reviewed a system that we would intend to submit our safety evaluations and so forth. We are talking about this time period two to three months from now. We would be very happy to come back to the ACRS next month or the month after next and so forth with the details of this system at that time. We do not intend to install and initiate such a system prior to NRC approval of our safety evaluations.

MR. PLESSET: Let me ask one short question. You come up with an ultimate of 42.5 psig. Is this really intensive and careful structural analysis? Does it take into account penetrations? Does it take into account some homogeneities in the containment, or is it just a kind of an estimate? When you go to ultimate, you have to be concerned about details, it seems to me, that you don't blow a hole somewhere.

MR. DILWORTH: We looked at this containment, the locations of the penetrations, trying to find a weak point, a point of failure that we think would occur, and our analyses show us that it would be at the spring line of the containment where we would expect this to occur, at the 42.5 pounds.

We did look at this containment with regard to penetrations at places we thought would be the weakest point when we made the analysis. In Phase II we are going to do more sophisticated methods of trying to determine what the actual capability of Sequoyah is.

MR. PLESSET: That is what I wondered about.

Yes, Dave.

MR. OKRENT: The Committee has a request from Commissioner Gilinsky to comment on the hydrogen control matter. It seems to me if we are going to do it we should do it after there has been adequate discussion of it. I do not see that that is possible before you break for lunch. I am not sure if it is possible if we skip lunch, but I am not proposing we skip lunch.

MR. PLESSET: That is quite all right with me.

MR. OKRENT: It seems to me we should ask ourselves is there a way we want to try to do it at this meeting. I can propose a possibility for example. I don't know if it is a good one or not, but if we told TVA and the staff that later in the afternoon after we finished with Mr. Siess -- and that might not be until 5:30 or whatever -- that we would want to take topics related to this subject, including the containment behavior and hydrogen control, since they are related, and if they could keep those people here, we could come back to it.

MR. PLESSET: Well, I understand that they are not complete yet.

MR. OKRENT: If we are going to decide that we are not going to address this topic in this letter or we are not going to write a letter from this meeting, then obviously there is no need to talk to them later. But what I am saying is in my opinion it would be a mistake for us to try to reach a position based on a total of 30 minutes on this topic at the full committee meeting.

MR. PLESSET: Is it correct that you have not completed the study of this hydrogen control system?

MR. MILLS: Dr. Plesset, we can certainly expand on our presentations here today. The point I was trying to make is that our safety evaluations are not completed. The NRC staff has not reviewed these. We are basically talking about continuing this with an implementation date hopefully two to three months from now, after a full power license has been granted.

In reading the letter from Commissioner Gilinsky, I thought he was asking the ACRS as to whether additional hydrogen control measures were necessary. I would think we would not be addressing that today. We are looking at this as an additional margin.

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You may say it is necessary. We are going to do it whether it is necessary or additional margin. I wonder if you cannot Commissioner Gilinsky's letter based on that.

MR. PLESSET: Let's pass that for a moment.

Bill Kerr, did you want to make a comment?

MR. KERR: If you interpret Commissioner Gilinsky's letter to mean additional to what TVA is proposing or to what are --

MR. PLESSET: The letter says, "whether additional hydrogen control measures should be required."

MR. KERR: Additional to what?

MR. FRALEY: Additional to what is required by the regulations.

MR. KERR: We should write him a letter saying that his letter is not entirely clear. We would like some elaboration on what Commissioner Gilinsky has in mind.

MR. PLESSET: We could get those --

MR. BENDER: Commissioner Gilinsky's technical assistant is here. Maybe he could --

MR. PLESSET: Could you explain that while we're on it?

VOICE: The intent of that question is that TVA now has installed hydrogen recombiners as their method for controlling hydrogen. Is that adequate given the experience at TMI? Is there something more that should be added as a condition for the license?

MR. BENDER: Might I also ask whether Commissioner Gilinsky would be interested in whether the committee thinks it is a good idea at all?

VOICE: That is the last paragraph of the letter. What are your views on the likely effectiveness of what TVA is proposing?

MR. PLESSET: Steve.

MR. LAWROSKI: Using the same assumption you used in computing that you could withstand up to 25 percent metal-water reaction, how sensitive is the ultimate pressure you calculate to the percent of hydrogen? Could you give us some idea? If it were 30 percent, how many more pounds? If you don't --

MR. DILWORTH: If we had a 30 percent metal-water -- we work backwards from the ultimate strength to determine what metal-water reaction we could --

MR. LAWROSKI: I understand that.

MR. BENDER: If you could tell us what percent per pound.

MR. DILWORTH: I don't know if we have that information.

MR. PLESSET: I don't know if they did it that way.

MR. LAWROSKI: Not necessarily today.

MR. MILLS: We can respond to that just a moment, please.

VOICE: For the same assumptions they used.

MR. PLESSET: No. They'll supply that.

MR. MARK: Without the igniters. You have an estimate that you would withstand 25 percent with the igniters. The hydrogen distributed across 15 or 20 minutes, what will the igniters allow you to stand?

MR. DILWORTH: The assumption of the hydrogen being released in a period of like you say -- some defined period of time, 20 or 30 minutes, that we could burn the hydrogen, and it would be similar to what Mr. Ebersole was talking about a while ago.

You would burn it. It would build back up. You would burn it again. We could go all the way to what we believe to be the maximum amount of metal-water reaction you would get prior to melt-through. That would be 70 percent. In other words, take it all the way until the core falls through. When the core melts through then the igniters would not be very effective.

MR. PLESSET: Well, I think we have a question. Does the committee feel that you could arrive at a letter today? If so, we can ask the involved persons to stay here I would guess until about 5:30 at which time we could come back to it, or do you think we need to carry this item over to our next meeting before we can consider a letter?

I would like to have expressions of opinion on that.

MR. MATHIS: Mr. Chairman, there is just one problem, I think, and that is, I think we heard earlier that TVA did not anticipate that they would be able to give us any more information a month from now than they can today. With that kind of a background it seems to me we ought to try and make a decision today.

MR. PLESSET: At this meeting. All right.

Anybody else?

MR. LAWROSKI: Is that their position, that they will not have any additional information?

MR. MILLS: Our position is basically on the total agenda items. Perhaps a month from now we would have additional information on this hydrogen information. The problem is -- not the problem. What I was really trying to make clear, we are talking about installing this sometime two to three months from now after operation of the plant. This is what we consider an additional margin. We would hope that this would not influence you on an ACRS letter, favorable letter at this time.

We will commit to you to come back at the appropriate time after we have completed our safety evaluation, and I think the staff, NRC staff, would probably, you know, before making any statements, would want to review and approve on our safety evaluation before they make a final statement on the issue.

The only thing I'm really talking about is the igniters themselves and the details of such a system.

MR. PLESSET: Chet.

MR. SIESS: The question the committee has to decide before we recess for lunch is whether we think we can write a full power letter on Sequoyah without hearing the rest of the story on the hydrogen. If we can, we can go about our business and hear about hydrogen later. If we cannot, then the next question is does the committee want to try to write a full power letter this month, in which case if the answer is yes, we must invite them back later today. If the answer is no, then they can go home.

MR. PLESSET: That is what I was trying to get at. You have said it very nicely. That was the sentiment I was trying to --

Bob.

MR. DILWORTH: We are prepared to stay as long as you want us to.

MR. TEDESCO: We are available, Dr. Plesset. There might be a consideration to writing the letter in two parts -- one part to deal with permitting the plant to start operation with the certain condition that we resolve the hydrogen question by a certain time or under a certain condition. That is a possibility, too.

MR. PLESSET: What is the committee's view on the question of getting to a letter at this meeting?

MR. EBERSOLE: I guess if I have a concern about the hydrogen problem it is probably mostly located in the units that are running right now. I do not see this as any significant contribution to the problem.

MR. PLESSET: Okay.

Dave, did you want to make a comment? I'm going to go around the table.

MR. OKRENT: I want to hear more about some of the things they flashed on the board about filter vented containment and other containment concepts and so forth. I could myself go along with the kind of letter that said we had not completed a review of this part of the thing, and we did not see a problem with them going up to power, but that we would expect to review this within a certain time, whatever that was, four months or something.

But as of now I couldn't myself feel I have heard enough tc just say a full power license is okay, and it can be handled in the future in some vague way.

MR. PLESSET: Jerry.

MR. RAY: I feel if we are willing to let the operating plants continue to operate without requiring changes in this respect at this time, we should let this plant come on line.

MR. PLESSET: Okay. Thank you.

Carson.

MR. MARK: I agree with Jerry.

MR. PLESSET: Chet.

MR. SIESS: I pretty much agree with Dave, I think. I don't have any objection to going to full power, but I don't think we ought to sign off to where we don't have another say.

MR. PLESSET: Very good.

Steve.

MR. LAWROSKI: I prefer the cautionary approach.

MR. PLESSET: Mike.

MR. BENDER: I will go with Jesse's evaluation.

MR. PLESSET: Dade?

MR. MOELLER: I would go with Dr. Okrent's expression.

MR. PLESSET: Bill?

MR. KERR: I have no disagreement with the collective wisdom that I have heard so far.

MR. PLESSET: Thank you.

Max.

MR. CARBON: That is good enough for me.

MR. PLESSET: Charlie?

MR. MATHIS: I have no particular problem. We have not written a letter yet that did not have a caveat in it.

(Laughter.)

MR. PLESSET: On that jolly note then let's suggest that you gentlemen come back at 5:00. Is that all right? Maybe they don't need to come back. It looks as though we can write a letter. There may be some cautionary and limiting remarks in it, so really, I agree there is no point in your staying. You do not need to come back.

Carson?

MR. MARK: We are a little crowded for time. The staff may have had some remarks that we did not get.

MR. PLESSET: That might be helpful for the letter.

MR. MARK: Might be helpful on the study of the filtered vented containment question and the hydrogen question.

MR. PLESSET: In that case we should come back. Don't do the presentation now because we are going to recess.

Do you feel you have something to contribute that would help the concerns that a few of the members have expressed?

MR. TEDESCO: Just a minute.

MR. BUTLER: The staff's statements made at the subcommittee meeting are essentially unchanged. Concisely stated, they are that the staff feels the Sequoyah station can be authorized for full power operation without any additional requirements as licensing criteria. However, the staff recognizes that there are potential -- there is potential for including the safety margins by this proposed ignition system, and we would encourage TVA to work in that direction.

The staff is engaging in a major program in three different phases to essentially cooperate with TVA, with the objective of having an early completion of the review of the ignition system, as well as preparing information for the upcoming rulemaking proceeding.

MR. PLESSET: Okay. I deduce from that, Carson, that they do not feel they would add much by coming back.

MR. OKRENT: Mr. Chairman, if you think you may try to write a letter, I would suggest that we schedule an hour late this afternoon, an hour or an hour and a half to talk further with both the utility and the staff about some of the things that have been touched on too briefly here in my opinion.

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This is not with the intent of trying to resolve these issues completely, but at least to understand some of the things that have been presented here.

MR. PLESSET: I will arbitrarily rule that we do that to make Dr. Okrent happy. We will expect you back at 5:00. We will recess now until 1:30.

(Whereupon at 12:40 p.m., the meeting was recessed for lunch, to be reconvened at 1:30 p.m., the same day.)

end

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NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

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in the matter of: ACRS - 243rd Meeting

Date of Proceeding: July 11, 1980

Docket Number: ____________________

Place of Proceeding: Washington, D. C.

were held as herein appears, and that this is the original transcript thereof for the file of the Commission.

David S. Parker

Official Reporter (Typed)

[signature]

Official Reporter (Signature)