UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	:	
DUKE POWER COMPANY	:	Docket Nos. 50-369
(William B. McGuire Nuclear Station, Units 1 and 2)	:	50-370
Operating License Hearing	:	

Wagoner Convention Center,
Room A,
3815 North Tryon Street,
Charlotte, North Carolina,

Wednesday, 18 March 1981.

The operating license hearing was convened, pursuant to notice, at 9:45 a.m.

BEFORE:

Board Members:

ROBERT M. LAZO, ESQ., Chairman
Administrative Law Judge
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

EMMETH A. LUEBKE, Ph.D.
Administrative Judge
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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Board Members (continued):

RICHARD F. COLE, Ph.D.
Administrative Judge
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

For the NRC Staff:

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P R O C E E D I N G S

(9:45 a.m.)

CHAIRMAN LAZO: Okay. Will the hearing come to order, please?

Counsel for Applicant has requested that we have a bench conference. Would counsel approach the bench, please.

(A bench-side conference was had.)

CHAIRMAN LAZO: Well, let the record show that at a brief conference at the bench counsel for the parties and the Board discussed scheduling for the receipt of evidence today and tomorrow and the possibility of the board and parties making a site visit out to McGuire, which, depending on how far we get today, might occur this afternoon. The Board also notes that when we arrived this morning we were greeted with an application from Carolina Environmental Study Group for additional subpoenas. Rather than take a lot of time to argue this matter now, I'd like to suggest that we ask counsel for Intervenors to just briefly summarize what is in this application and the reason for it, and then we shall study it at the first possible opportunity.

MR. BLUM: Certainly, Doctor Lazo. What Intervenor is moving for are subpoenas to bring to this hearing persons responsible for three pieces of evidence or potential evidence. The first is CESG Number 59, the

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Brookhaven National Laboratory memorandum, which is signed by W. T. Pratt of Brookhaven dated January 15, 1961. This is a document which we received in the course of the hearing which was referred to by various persons, particularly Mr. Berman of Sandia, and which was received -- which was offered into evidence but was only received for the limited purpose of identification and is not to be made the basis of findings of fact.

We would like to subpoena Mr. Pratt. His identity was not known to us in connection with the -- this document, which the document is clearly relevant I think. I don't think anybody would question that. But his presence would be necessary to eliminate the hearsay question I guess in connection with the document to give other parties a chance to cross-examine him, and what I would do would be to authenticate the document thru him and then see if there were any cross-examination.

The second piece which was also admitted for the same limited purpose is Staff Exhibit M, which is the report signed by three persons -- H. W. Hubbard, R. P. Hammond, and S. M. Zivi -- and is the document dated February of 1961 and was part of a -- sponsored by Lawrence Livermore Labs, and that was distributed March 11th.

We would also like to ground that sufficiently so that it could be made the basis for findings of fact in

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this hearing.

There has been no prior opportunity to know that we would need persons who prepared that -- that report or 59 here prior to Friday of last week when that ruling came from the bench.

There are three parties involved in that. It is not clear to us. We only need one. I put three on the subpoena. We would attempt to call one of those persons, whoever turned out to be available and to have been involved in the writing of the document.

The final piece of evidence that we would like to introduce is a document that has been referred to as Chapter 8, which was produced in discovery in the January 16th answers to interrogatories and is referred to as a draft version of Chapter 8, entitled "Accident Process Analysis, Updating WASH-1400 for the Sequoyah Plant," and it is to be reported in NUREG/CR-1659, Volume 1.

Now, a page from Chapter 9 of that document has been introduced through the testimony of Dr. James Meyer. That was the table that Dr. Meyer referred to. Chapter 8, although it was delivered to the document room, its significance as a reactor analysis risk study did not become clear until Dr. Meyer testified last week.

Therefore, we would like to introduce Chapter 8 to supplement the meaning of 61, but since it is a NUREG/CR which has something to do with consultant's report, I assume that it will fall victim to the same treatment as 59 and Staff Exhibit M. That is, that it be allowed perhaps for identification purposes, but for no other purpose.

Therefore, we are seeking a subpoena to have

present here John Doe, whoever it was who wrote that, since it is an unsigned document, but presumably, since the Staff knows about it being a future NUREG/CR document, the Staff would be able to easily identify the author, and we could get the author here to verify that this is, in fact, true and accurate to the best of his knowledge and establish the author's professional qualifications and so on sufficiently to make this now unnumbered document an exhibit upon which findings could be based.

I don't think the relevancy is questioned on any of these documents. What would be questioned would be who did the work, and what their qualifications are, and how much strength or weight they should be given in this hearing, and it would be for that purpose that we would require the witnesses to be present.

I have directed to the parties copies of Chapter 8 attached to the application for subpoena. I have also attached three sorts of subpoenas in blank without completing the date or place, since that obviously will -- those are real great variables, I suppose, depending on the decisions here, and when we could get back together.

I would like, I suppose, to -- it seems to me that this document ought to be numbered as CESG-62, I suppose, and I can supply three copies to the reporter so that not only will everyone have a copy, but it will be

numbered, and it will appear in the record as to what we are talking about.

That is all I have to say on this subject.

CHAIRMAN LAZO: Just as a matter of clarification, Mr. Blum, I seem to recall that when Dr. Meyer produced the table, or the figure that became identified as CESG Exhibit 61, that he referred to -- I thought he said it came from a workshop which was conducted at Sandia in the latter part of January in 1981.

You are now apparently identifying it as part of an accident process analysis that the Staff has done, and it relates to Chapter 8. I'm not certain about the Exhibit 61.

MR. BLUM: The statements about Chapter 8 come from Staff's answer to CESG Interrogatory 6, in which they identify Chapter 8 as this Accident Process Analysis for Sequoyah.

CHAIRMAN LAZO: Did Exhibit 61 come from Chapter 8, or from some other --

MR. BLUM: No, it didn't. I think the record will show that he identified it as coming from Chapter 9, the next chapter, and there was some back and forth about whether it also appeared in Chapter 8. It does not appear in Chapter 8, but it is based on Chapter 8.

CHAIRMAN LAZO: Okay.

MR. LEWIS: Dr. Lazo, the application for subpoena states that -- we were checking on whether or not CESG Exhibit 61 had been admitted into evidence. We have verified that it was.

CHAIRMAN LAZO: That is correct.

MR. LEWIS: Dr. Lazo, as to your question, I believe that Mr. Blum is correct, that the record will reflect that Dr. Meyer identified both the table from Chapter 9 and the Chapter 8 which was discussed as being part of a Sequoyah analysis prepared by the Staff.

It was not part of the Sandia symposium on hydrogen control mitigation to which I believe you are referring.

CHAIRMAN LAZO: Then Chapter 8 and Chapter 9 come from that document that has been identified as CR-1659. I think Dr. Meyer said it was about a five-inch document.

MR. LEWIS: I think that is correct. Mr. Ketchen points out to me that the confusion may have arisen from the fact that at Transcript 4523, Witness Meyer identified the fact that the Sequoyah report about which we are speaking was performed at Sandia under contract to the NRC's Office of Research, and that may have been the source of some confusion as to the nature of the document in your mind.

In any event, it is a Staff document.

CHAIRMAN LAZO: Well, I --

MR. BLUM: I would like to give three copies of

this Chapter 8 Accident Process Analysis to the court reporter and have it marked as CESG-62 for identification purposes.

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(The document referred to was marked Intervenor's Exhibit Number 62 for identification.)

MR. KETCHEN: Mr. Chairman, I heard you to say that you just wanted a brief summary of Mr. Blum's application for subpoenas this morning.

CHAIRMAN LAZO: Well, I think we have all just received the document, and Mr. Blum knows what's in it. We don't -- or didn't. Therefore, I thought it would be worthwhile to have a summary.

MR. KETCHEN: I was just wondering if we will have an opportunity to speak to that -- that document at some time this morning. We prefer to do it after this panel -- at an appropriate time after the two panels -- at an appropriate time.

CHAIRMAN LAZO: I'm sure we will.

MR. KETCHEN: All right, sir.

MR. LEWIS: May we proceed then, Judge Lazo, with the panel that I've called to the stand?

CHAIRMAN LAZO: Mr. Lewis, please proceed.

MR. LEWIS: I've called to the stand Mr. Harold R. Polk of the NRC Staff and Lowell F. Greimann, G-r-e-i-m-a-n-n, of Ames Laboratory at Iowa State University who is a consultant to the NRC Staff to sponsor the NRC Staff's testimony in this proceeding on containment structural

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integrity. May they be sworn, Judge Lazo?

CHAIRMAN LAZO: Gentlemen, would you please stand and raise your right hand.

(Harold E. Polk and Lowell F. Greimann were sworn.)

CHAIRMAN LAZO: Thank you. Please be seated.

MR. LEWIS: Judge Lazo, members of the board, Mr. Polk is the gentleman nearer to you and Doctor Greimann is the gentleman further from the Board.

Whereupon,

HAROLD E. POLK

and

LOWELL F. GREIMANN

were called as witnesses on behalf of the Staff, and being first duly sworn, were examined and testified as follows:

DIRECT EXAMINATION

BY MR. LEWIS:

Q Would you please state your name and your job, present job, for the record.

A (Witness Polk) My name is Harold Eugene Polk. I am a senior structural engineer in the structural engineering branch, Division of Engineering, Office of Nuclear Reactor Regulation, Nuclear Regulatory Commission.

Q Have you prepared a statement of professional qualifications for this proceeding?

A Yes, I have.

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Q Do you have any corrections or additions to that statement?

A No.

Q Do you adopt that statement as your correct statement of professional qualifications?

A Yes.

Q Let me turn to Doctor Greimann and ask him to identify himself and his job affiliation for the record.

A (Witness Greimann) My name is Lowell Greimann, and I am a project engineer with Ames Laboratory in Ames, Iowa.

Q Doctor Greimann, are you also on the faculty of any university?

A Yes. I am an associate professor of civil engineering at Iowa State University.

Q Doctor Greimann, has a statement of your professional qualifications been prepared for this proceeding?

A Yes.

Q And do you have any corrections or additions to it?

A No, I don't.

Q And do you adopt it as your statement of professional qualifications?

A Yes, I do.

MR. LEWIS: Judge Lazo, I have provided the

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necessary copies to the court reporter and distributed to the Board and parties previously and today copies of the professional qualifications of statements of Doctor Greimann and Mr. Polk, and I would ask that they be inserted in the record as if read and would make the panel available for voir dire at this point.

CHAIRMAN LAZO: Are there any objections?

MR. BLUM: None.

CHAIRMAN LAZO: Very well. The reporter is instructed to incorporate the professional qualifications of Doctor Greimann and Mr. Polk directly into the transcript as if read.

(The documents containing the professional qualifications of Doctor Lowell F. Greimann and Mr. Harold E. Polk follow:)

Dr. Lowell F. Greimann

Professional Qualifications

I am an Associate Professor of Civil Engineering at Iowa State University in Ames, Iowa. I hold a Bachelor of Science degree in Civil Engineering (1964) from Iowa State University and a Masters of Science and Ph.D. in Structural Engineering from the University of Colorado, (1966 and 1968).

My 13 years of experience includes structural research on dynamics of offshore oil platforms and guard rail impact for Southwest Reasearch Institute (1968 1973), and at Iowa State University (1973 to present) I teach undergraduate and graduate courses in structural analysis, structural dynamics and finite element analysis. I am involved in research work in structural vibrations and concrete beam to column connections. I also perform consulting service in the areas of best estimate and uncertainty analysis of the ultimate strength of nuclear power plants. I also consult in the areas of structural failure analysis for ordinary civil structures.

I have published 11 articles in the areas of structural dynamics, structural failure mechanisms and analytical procedures. I have completed 32 research reports on the same subjects.

I am a registered Professional Engineer in the States of Iowa and Colorado and a member of American Society of Civil Engineers, American Railway Engineers Association and the Earthquake Engineering Research Institute. I have been awarded membership in the following honorary societies, Sigma XI, Tau Beta Pi, Chi Epsilon and Phi Kappa Phi.

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for Boeing at Cape Canaveral for a period of about eight years. Part of it was in aircraft or airborne structures, and part of it was in ground support structures.

Q Did you also work on the Sequoyah licensing process, Sequoyah containment analysis?

A Yes.

MR. BLUM: I have no further questions.

MR. McGARRY: No questions.

CHAIRMAN LAZO: No questions.

MR. LEWIS: Let me proceed with a very short line of oral direct.

DIRECT EXAMINATION (Further)

BY MR. LEWIS:

Q Gentlemen, have you prepared testimony in this proceeding on containment structural capacity of McGuire units?

A (Witness Greimann) Yes, we have.

Q Is that testimony set forth at Pages 27 through 33 of the Staff's -- NRC Staff analysis of hydrogen control measures for the McGuire Nuclear Station which is now in the record of this proceeding?

A Yes, it is.

CHAIRMAN LAZO: Just for clarity, we will note that that analysis has been designated Staff Exhibit K.

MR. LEWIS: Yeah, Judge Lazo. It was originally

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identified as Staff Exhibit K for identificaiton and then without changing that designation it was admitted and inserted in the record of the proceeding as if read.

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CHAIRMAN LAZO: Very well.

BY MR. LEWIS:

Q With that identification, let me ask either member of the panel whether or not they have any corrections that they wish to make to the testimony they are offering.

A (Witness Greimann) I have one correction. Page 32, in the answer to question No. 2, the last line should say -- there should be a "C" inserted there. It should say "service level C criteria under the Code." The letter "C" should be inserted there.

CHAIRMAN LAZO: Where should the letter "C" be inserted?

WITNESS GREIMANN: The answer to Question 2, the last line of that answer, the line starts "calculated for service level," insert a "C" and then "criteria under the Code."

CHAIRMAN LAZO: Okay.

BY MR. LEWIS:

Q Are there any further corrections that either member of the panel wishes to make to the testimony?

A (Witness Greimann) I have none.

A (Witness Polk) I have none.

MR. LEWIS: Judge Lazo, as identified either, I believe, last Thursday or Friday of last week, the witnesses being made available today did the structural

analysis of the containment and also the structural analysis of ducts in the ice condenser, but they are not expert in nor being made available for subsequent questions that have arisen regarding polyurethane foam and the properties of polyurethane foam.

The questions about polyurethane foam in a continuous burn type of environment, we said that that would be addressed in subsequent testimony. So just to refresh your recollection, that portion of -- to the extent that that is touched upon in pages 29 and 30 of this testimony, this panel are not the authors of that particular aspect.

With that note, I would make the panel available for cross-examination. Their testimony, as I noted, is already in evidence in this proceeding.

CROSS-EXAMINATION

BY MR. BLUM:

Q Gentlemen, is it true that the design pressure capability of the McGuire containment is 15 psig?

A (Witness Greimann) Yes.

Q And what does design pressure capability mean?

A That initially the structure, when it was designed, was designed to withstand among other things a 15 psi internal pressure, static internal pressure.

MR. LEWIS: Please keep your voice up, Dr. Greimann.

BY MR. BLUM:

Q Does that figure have built into it a factor of conservatism?

A (Witness Greimann) Yes.

Q Do you know what the conservatism factor is?

A Nominally around -- well, nominally, around 2 as a nominal sort of factor of safety in the code.

Q Now, what does that mean, a factor of 2?

A To me, that would mean that, again, nominally the strength is approximately twice that, based upon certain other considerations, like using a minimum specified yield strength, for example.

Q That would give you a nominal capability of 30 psig?

A Nominal.

Q All right. How do you define "nominal" in this case?

A When I'm starting out with a design, there are several unknowns. I have a factor of safety to account for those unknowns. So -- well, I don't have a good definition for "nominal." There are other factors that enter into the conservatism.

For example, the type of analysis that was initially done could in itself have also been conservatism. The material strength, or the other assumptions involved in

the analysis could have been conservative, which, in effect, produced a higher factor of safety than 2.

Q Mr. Polk, when one builds airplanes, what kind of conservatism factor does one build into an airplane fuselage?

A (Witness Polk) If I can reflect back to 1958, when we were doing this, the limit load, which would be the maximum load that the aircraft would be expected to see in service for passenger aircraft at that time, was 1.5, based on a specified yield strength of the material that was being used.

Q Is it based on yield?

A Based on a specified yield. Not the mean value of yield. And if you will look in Mil Handbook 5, they define the various stress levels, the A stress level, which you would need for an aircraft, is the mean minus about two standard deviations.

Q Is conservatism in aircraft design ever based on ultimate strength?

A You don't do that type of calculation in an aircraft that I'm aware of.

Q Now, you gentlemen have worked out -- have you independently worked out a figure of ultimate strength of the McGuire containment at 84 psig, or did you do that together?

A (Witness Greimann) Principally, I did that, and

I would say Harold reviewed what I did. He would have to say how much. But I did the work.

Q Tell me what you did, Mr. Polk.

A (Witness Polk) Yes, Dr. Greimann did the work, and the structural engineering staff reviewed his work. I was part of that staff.

Q And then in your analysis you reduced that value to 48 psig by subtracting three standard deviations; is that true, Dr. Greimann?

A (Witness Greimann) Yes.

Q And why did you do that?

A 84 psi represents a mean value of what I would calculate to be a leak-tight pressure. We reduced that by conservative three standard deviations to, in effect, introduce some factor of safety.

Q How did you derive the standard deviation for that figure -- for the 84 figure, or the mean analysis?

A The 84 is the mean.

Q How do you get the standard deviation around that figure?

A Okay. The method I used is called first order, second moment. It incorporates the standard deviations of the various parameters which go into the analysis. For example, the yield strength, principall; the yield strength, and some other factors, the geometric quantities. They

all have standard deviations. Those are incorporated, then, by the second moment method, which is an analytical method for obtaining the standard deviation of, in this case, the containment.

Q Now, what is the safety factor that is introduced by reducing your mean value by three standard deviations?

A What is your definition of a safety factor?

Q Well, tell me, does this give us the assurance that the containment will only fail in one in 100 cases, one in 1,000 cases, one in somewhat more?

A Excuse me. Just let me check. I believe I remember.

Four in one hundred thousand. Four times ten to the minus fifth would be the probability of failure. That is also the answer to Question 4.

JUDGE LUEBKE: And this is for the 48 psig?

WITNESS GREIMANN: Yes.

BY MR. BLUM:

Q Four times ten to the minus five per what?

A (Witness Greimann) Per occurrence.

Q Per event? In other words, if you were to pressurize the containment to 84 psig, it would fail four -- or is it the 48?

A 48.

Q If you pressurize it to 48 psig, it would fa l

.n four times ten to the minus five?

A Four times in a hundred thousand.

Q Okay. Do you know what the point of failure to be, or is predicted to be? Where is the weakest point?

A The location I calculated it to be was somewhere between a third and a half of the way up in the cylindrical portion of the containment. That was the location of the maximum displacement. I can be more precise than that if you would like.

JUDGE LUEBKE: Mr. Blum, may I interrupt with a question before we get too far away in the transcript?

MR. BLUM: Go ahead.

JUDGE LUEBKE: Earlier, when you were talking about the 15 psig and the 30 psig, is that uniform static pressure, or a transient pressure?

WITNESS GREIMANN: Uniform internal static.

JUDGE LUEBKE: Those are the same conditions as the 84 and the 48?

WITNESS GREIMANN: Yes.

JUDGE LUEBKE: In that paragraph.

Thank you.

BY MR. BLUM:

Q What would be the effect of an eight of an inch gouge if it occurred one-third of the way up, a gouge in the steel plate?

A (Witness Greimann) Insignificant.

Q Why is that?

A An eighth of an inch deep?

Q Right.

A Of a limited extent of --

Q A few inches.

A Yes. Because this shell is very ductile steel. It is used for that purpose. The principal advantage of steel being its ductility. It can tolerate small imperfections, in which case, this would be a small imperfection.

For this grade of steel, it would be unnoticeable.

Q Is there some tolerance in the fabrication of these plates?

A Yes.

Q Some of them are thinner than others?

A Right.

Q What if this eight of an inch gough were on one of the thinner plates?

A Again, not -- well, how thin? How much too thin?

Q Do you know what the limits on the plates are?

A Yes. I can look at them.

Q If you can find them, go ahead.

A Excuse me.

That would be on page 33, half-inch plate. They can be -- the tolerances are one-hundredths of an inch

thinner than that underweight, and then there is a plus tolerance, also. But in terms of being thinner, do you see what I'm pointing out? Table 3-2, thickness, and if we read under "nominal inches," and look at the three-quarter inch plate, for example, like McGuire is, the under-tolerance is minus zero point zero one zero from three-quarters. So, a very small percentage.

That would be the mil tolerance on the plate thickness.

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Q All right. But if you were to stress such a place to the transient 48 psig, would it not yield sooner?

A Yes.

Q Do you know how -- or whether -- do you know what the factor associated with -- how much sooner is what I want to know?

A Very little. Almost imperceptibly. You couldn't -- if you tested many of these thin and thick, you would hardly notice the difference. You could reduce it arbitrarily -- one guess, if it's a hundredth of an inch thin, so theoretically it would be reduced by -- what -- a little more than one percent.

Q All right. And the gouge would further reduce that, but also by a small amount. Is that true?

A Yes, but the gouge is of limited extent you are telling me. You are saying it's a few inches long.

Q Yes.

A But that would -- the reduction there would not be proportional because its length is very small relative to -- oh, the height of this thing, for example, of a hundred feet about.

Q Is there -- is there any tendency of a weak place or a flaw to spread, to propagate itself?

A Yes.

Q Is this the kind of a flaw that's -- this gouge

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that we been discussing that might tend to propagate itself?

A Not under a static situation it won't. This material would not tend to unless it was a very cold temperature like thirty below, but not under a one-time holding -- one event.

Q You are saying under static pressures it would tend to propagate?

A It would not. Under one static pressure your loading it would not tend to.

Q What about a -- a transient pressure caused by some form of internal deflagration?

A The same applies. There is -- okay --

Q Have you examined Duke Power's work on this containment?

A Their structural analysis?

Q Yes.

A No. I have read the transcripts. Their general explanation of it. I have not in detail examined it.

Q In relation to the Sequoyah plant are you aware that -- that there were a variety of figures given for the yield and ultimate values there?

A Yes.

Q And in fact your value -- well, let me ask you if it was your value of 36 psig for the Sequoyah plant. Is that yours?

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A Yes. A couple times. What 36 are you referring to?

Q What yield value did you get for the Sequoyah plant?

A I calculated -- well, okay. I calculated 60 psi as the leak -- main leak type failure pressure. That corresponds to the 84 I calculated at McGuire. Reducing that by three standard deviations gives 36, as again a conservative lower bound.

Q That is psig?

A Yes.

Q Now, of the values calculated for the Sequoyah plant, is it not true that yours was the highest?

A True. That I'm aware of. The ones that I know of. Yes.

Q What was your yield value for -- is the 36 your yield value or what is the nature of that value? 36 psig?

A That again is similar to the 48 McGuire. 36 -- well, let me go back through that again. 60 was calculated to be the pressure at which leak tightness was maintained. We subtracted again three standard deviations from that 60 to arrive at the 36 as a conservative lower bound.

Q Are you familiar with R & DA calculations of 27 psig for yield for Sequoyah?

A Yes.

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Q And was there also a Sandia calculation of yield value for Sequoyah?

A I have heard that there was. I do not know what that one was. I have not -- I'm not familiar with that calculation.

Q The R & DA criticism of the Ames work at Sequoyah was that you treated the stiffeners as if they were smeared over the surface of the plant. Isn't that true?

A Yes.

Q Did you also do that with your work at McGuire?

A (No response)

Q Did you use that same technique?

A There's two different time stages here if that would help.

Q Go ahead and give me the full story.

A Yes. What their response was to something I did approximately a year ago. In the time since then I have done a more sophisticated analysis. Okay. So one year ago, January, I did an analysis of Sequoyah and McGuire. In both cases I smeared the stiffeners, the ring stiffeners. Since that time I have done -- I have done, completed, a more sophisticated analysis in which I did not.

Q Well, what differences did you report in your second piece of work starting with Sequoyah?

A Okay. Sequoyah in January of a year ago, January,

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'80, I gave a value of 36 psi yield. This was based on smearing. It was based on assumed minimum specified steel yield strength. Okay. Then during the year with a more sophisticated analysis, not smearing the rings and using the actual yield strength of the material, that's what I came up with a value of 60, and then a similar process with McGuire. I started -- I don't remember what I did a year ago in January. I believe it was something -- I don't remember exactly, and then throughout the year again performed this similar analysis with McGuire to arrive at the mean value of 84.

Q Now, in arriving at that, you used the actual mill value for the strength of the plates?

A The mean value.

Q Did you also do a calculation for McGuire using the normal or the book value for the plates?

A I did not. Well, I did a year ago in January. If you're -- I did not -- I have not recently.

Q As I recall, there is a figure in here somewhere of 39 psig?

A Page 31.

Q Page 31. If the code value for material strength is used with the same calculational technique a containment pressure capacity of 39 psig is obtained. Is that the result of your first work?

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A No, that is not my calculation. That was done by NRC Staff, who are not here, but it was based on the -- You're right. On the minimum specified yield strength of steel, 32 psi.

Q When you talk about an ultimate value of 84 -- or the mean value in your case -- why is it important to reduce that by three standard deviations?

A Well, really, one reason, but two explanations. To introduce a factor of safety is one way of saying it.

Another way of saying basically the same thing is to reduce the probability of failure.

In general, structures are not designed at their mean value. There is a factor of safety.

Q If you calculate using the Duke form of analysis, a value of 67.5, is there -- can you assign any degree of safety to that value?

A I would prefer not to, to their value. I have not. Except relative to mine, I could. That would be the only way I could do that.

Q Isn't the usual technique in design of structures to calculate what you want it to do as opposed to the ex-post facto calculation of what it can do?

A Structures involve both. The design aspect would be, yes. It would be starting with a given set of factors in designing the structure to fulfill those conditions.

Q That is a more usual way to approach that problem?

A Well, that is the design aspect. The analysis aspect is the other way around, is to be given something, how strong is it.

Q Returning to your first -- well, to the Sequoyah plant, you derive the value of 60, which was the equivalent of the value of 84 for the McGuire plant.

How many standard -- what is the size of the standard deviation associated with the 60 psig figure?

A 8.

Q So, subtracting three of those, you get, what, 36 again?

A Yes.

Q Was that your initial -- that is the same initial value you got for the Sequoyah plant using the smearing technique; isn't that true?

A Yes.

Q How did that come about? Is it a fluke?

A Yes. Purely. Purely a fluke.

Q You are willing to concede that the smear technique originally used was not the most accurate that you could have used?

A Yes. I would agree it is not the most accurate I could have used, yes. But it -- maybe I don't want to add the "but." I'll let you ask the questions.

Q Do you want to defend it, sir?

A If it's necessary.

Q Now, at the 84 psig figure, would you expect large deformations in the containment?

A Yes.

Q All right.

A Well, I'll ask you, what is "large" to you?

Q If you will, tell us what you would expect.

A Two to two and a half inches.

Q Per what, now?

A Well, radial outward movement. This shell is approximately 115 foot in diameter. After it reaches this pressure, it would be 1.5 feet plus four or five inches.

Q What would that do to the leak quality of the containment?

A One of the basic assumptions I made is that the leak-tightness would be destroyed at that level. That was why that was taken as failure. Gross deformations would introduce leakage at some point, those gross deformations.

Q If you could help us visualize what kind of leakage you are talking about? Would it be fissures, or cracks here and there, or would it be a gross tear? Do you know?

A I don't know. It would not be a gross tear. That would be called burst of a pressure vessel, which would be significantly higher. It would be a guess, but it would probably be a small crack around some small detail.

Q By detail, do you mean around a penetration?

A Possibly.

Q Would you expect a stress concentration at the boundary around -- boundary between the area around the

penetration and the normal region?

A Yes.

Q I notice that you refer to the 67.5 figure in your testimony at page 29. You state that this is the pressure at which full section yielding occurs at points near the stiffner rings.

Mr. Polk, did you examine Duke's work for the pressure at which full section yielding occurs at points away from the stiffner rings?

A (Witness Polk) No, I did not.

Q Why didn't you do that?

A I did not look at Duke's analysis in that detail.

Q Isn't a point away from a stiffner ring more likely to experience yielding at a lower pressure?

A As I recall the analysis, the center of the plate between the stiffners was the first point to reach yield.

Q Wouldn't that be more susceptible to -- excuse me. Do you recall at what pressure that would occur?

A No, I do not.

Q Would it be below 67.5?

A Yes.

Q If there were a penetration in that region, would it not be technically vulnerable?

A Not necessarily.

Q Why not?

A The area around the penetration would be beefed up.

Q But there would be a stress concentration at the juncture between the place where it is beefed up and the more normal value?

A There could be a stress concentration and there could not be a stress concentration depending on how the particular part was detailed and how it was put together.

Q Wouldn't a penetration in the middle of a plate, then, again, depending on how it was put together, or the boundary around the penetration, be one of the most vulnerable places?

A It could be, and it could not be, again, depending on how you make the detail.

Q Do you know how Duke did its detail work?

A No.

Q You have in the next paragraph -- you refer to some studies done by Duke to analyze the response to peak pressures of 200 psig applied locally.

Do you know where that is published?

A That is in the gray book, I believe, the shell, Volume 4, Section 2 or 3 -- Section 4 out of one of the volumes. I don't remember what the volume number is.

Q What does the next sentence mean, "The results

of the study indicate that shell membrane stresses are much less than the yield stress"?

A This 200 psig is a very localized area. It is the impingement of the projected detonation sphere, if you will, upon the containment wall. Locally, you would see relatively -- you would see larger stresses than you would from a total membrane stress, which would be -- we will call it a hoop stress. That would be a stress which would be in the horizontal direction entirely around the perimeter of the shell.

Q All right. What are you saying would happen if a detonation reached that peak pressure in an area one-third to half the way up, let's say?

A You would have a very local area that would see yield stresses, if you will, but not -- it would not mobilize the total structure. It would only mobilize a very small portion of the structure.

JUDGE COLE: Mr. Blum, could I ask a question at this time?

MR. BLUM: Go ahead.

JUDGE COLE: What do you mean by "mobilize"?

WITNESS POLK: Produce stresses around the containment shell. Spread the load out. Cause the entire shell to be loaded. If you had the detonation, and this is where we were getting to here, the structural response

would be limited to a very local area, much like the ringing of a bell, if you will, and the stress would not be seen entirely around the perimeter of the structure, just in that very local area.

JUDGE COLE: All right. Thank you.

BY MR. BLUM:

Q Isn't this the equivalent of punching a door or something like that?

A (Witness Polk) Very much, yes.

7rb1

Q You're saying that this structure can tolerate 200 psig in a one-punch situation?

A (Witness Polk) Yes. For the time that we used in the pulse.

Q What was the time associated with that?

A The one we used had a rise time of a tenth of a millisecond and was a half a millisecond long.

Q What static pressure were you assuming?

A It was not a static pressure. It was dynamic.

Q What was the ambient pressure at the time you assumed this rise in pressure?

A Zero.

Q What would happen if you were already at 15 psig?

A Very little. At 200 -- 200 psig pressure converts into a static applied pressure of about 16 pounds.

Q All right. And that -- so the pressure of a local detonation -- would it be additive to whatever the internal pressure -- already existing was?

(Witnesses conferring.)

A Yes, it would.

Q So that if you were on -- an existing overpressure and then a series of hydrogen deflagrations -- detonations, that might be -- precipitate some kind of danger --

MR. LEWIS: Objection. There is no foundation for assuming overpressure, no foundation has been made for an

7rb2

assumption.

MR. BLUM: I think -- I think that comes from -- let me --

CHAIRMAN LAZO: We will sustain the objection.

BY MR. BLUM: (Resuming)

Q Are you familiar with the MARCH code analysis done at Sandia?

A (Witness Polk) No, I'm not.

(Pause)

Q Do you know the relationship between the volume of the containment at Three Mile Island Unit 2 and McGuire Unit 1?

MR. LEWIS: Objection. I think relevance is the basis of the objection. I don't believe we are here comparing the containment volumes of those two facilities.

CHAIRMAN LAZO: Well, I'm not sure we know where he is going with this line of questioning.

MR. LEWIS: Right. Well, I don't know, but it seems to me that it doesn't appear to be relevant to the inquiry at hand.

CHAIRMAN LAZO: Well, let's find out. We will overrule the objection.

A (Witness Polk) No, I do not have those numbers in my head.

BY MR. BLUM: (Resuming)

7rb3

Q Do you know whether the McGuire containment is 59 percent the volume of Three Mile Island?

A No, I would not.

Q Doctor Greimann, do you think you recall the -- the R & D Associates calculation of the yield value for Sequoyah at 27 psig? Were you familiar with that number?

A (Witness Greimann) Yes.

Q Did you look at that calculation?

A Last July. Yes.

Q Do you know whether that is translatable to a -- a yield pressure for McGuire?

A Via their calculation technique? I wouldn't translate it. No. They could.

Q Let me ask you if the McGuire containment is 50 percent thicker than the Sequoyah containment.

MR. LEWIS: I'm going to object to this.

A (Witness Greimann) Yes. Yes.

MR. LEWIS: I think that -- that CESG is asking NRC Staff to adapt the calculations done by another organization, R & D Associates, from the Sequoyah analysis which they did to the McGuire facility. I don't -- if such an analysis exists done by R & D, let someone come forward with it, but I don't think it's proper to ask this witness to adapt someone else's analysis from one facility to another.

MR. BLUM: Well, first of all, the analysis

7rb4

exists, has been identified as CESG Exhibit 51. We did come forward with it, but it has not been accepted as an exhibit.

CHAIRMAN LAZO: Well --

MR. BLUM: He testified --

CHAIRMAN LAZO: Well, we will overrule the objection. It's in the nature of a hypothetical question, includes facts which have not -- or may not be put into this record, but it's a proper question.

BY MR. BLUM: (Resuming)

Q Can you adapt that -- the 27 psig figure to McGuire by multiplying it by 1.5 to account for the 50 percent greater thickness?

A (Witness Greimann) If I -- making the assumptions R & DA did, which I am not going to agree with -- okay -- and that's how I believe -- let me put it this way. That's how I think they would do it. I would not ratio their analysis either way because I don't agree with the basic assumptions that went into the first one; but if they were going to do it, I would guess that's what they were going to do.

Q What disagreements do you have with their analysis?

A Well, the 27 is based on -- as I understand it -- the minimum specified yield strength, and it is based on the complete neglection of effects of stiffening rings and

7rb5

stringers.

Q Let me clarify this in my mind. Do you agree with the -- the process -- assuming one made R & D assumptions, do you agree with their calculations thereafter?

MR. McGARRY: I object. I think the witness stated he does not agree with R & D.

MR. BLUM: I'm just trying -- that's true at one level. I want to know whether he objects to their arithmetic thereafter.

CHAIRMAN LAZO: Well, I think he has answered the question as you have phrased it.

MR. BLUM: Well, I guess I'm not sure that he has, but he has answered that question, which is accepting their assumptions, have they done the work correctly thereafter?

MR. McGARRY: My objection goes even further. We are about four levels down into irrelevancy. First we are talking about R & D. Not this gentleman's work. Second we are talking about Sequoyah, not McGuire. Third of all, we are talking about certain calculations that R & D performed, this gentleman disagreed with, and now we are at the fourth level, and we are being asked -- aside from all that, now look at -- at the work R & D performed, do you agree with their arithmetic? We are four levels removed from relevancy, and I would object.

CHAIRMAN LAZO: Well, it may or may not be

7rb6

relevant. Again, it's in the nature of a hypothetical question, and you wouldn't have to even identify R & D. As long as he sets forth assumed facts and asks for an opinion, if those facts become part of this record, then the hypothetical question would be the expert opinion of these witnesses.

MR. McGARRY: And if they don't, none.

CHAIRMAN LAZO: Then they don't. But that's the nature of using expert witnesses to answer hypothetical questions. The burden, of course, is on the interrogator to somewhere along the line fill in those facts so that the answer has some meaning, but the objection is overruled.

BY MR. BLUM: (Resuming)

Q Do you remember the question?

A (Witness Greimann) I think so.

Q If you made the same assumptions made by R & D in their Sequoyah calculation, would you come to -- use their arithmetic -- their later calculations correct?

A Yes. I would be a little more precise. If you would say that the stresses in the shell given by PR over T and neglect the stringers, use a minimum specified yield strength, do not use Von Mises theory, use the nominal thickness, yes. Then you could ratio it out by -- in this case -- fifty percent.

Q Is there some value for the containment strength, that if you had derived that in your calculations, you would say in your judgment that this plant is unsafe?

MR. LEWIS: Objection. This witness is not here to make a judgment about the safety of the facility. He is here to talk specifically about containment structural integrity. I think the question was impermissibly broad.

MR. BLUM: I think it tests his -- it basically tests his credibility. It is in that sense that I'm asking this question.

CHAIRMAN LAZO: Well, I'm not sure that I agree with you, Mr. Blum. It is an unduly broad question. Maybe you could approach it with a series of questions and lay your foundation for it.

BY MR. BLUM:

Q Did either of you gentlemen -- do either of you have an opinion about how much pressure stress a containment should be able to tolerate?

A (Witness Polk) I think you are looking at the question in reverse. The structure is designed for the load which would be anticipated for that structure to see. We don't work the other way.

Q But that design value is 15 psig. You are now looking for some other value when you began these calculations, were you not?

A No.

Oh, which calculations?

Q The calculations that you report on in your testimony.

A We were trying to determine what the ultimate capability of the containment was for a single load.

Q Is there some value of capability for a single load that would, in your professional opinion, lead you to warn, let's say, the NRC about this containment?

MR. LEWIS: I'll object. The way the panel has been structured in this case is that people are coming on and testifying in specific areas of expertise. The area of expertise of this panel is the capacity of the containment structures at McGuire. These are not experts in different accident scenarios, and they were not the people who designed this facility. So they cannot -- they are not the appropriate people to ask for what level of pressure should this facility be designed to, which is what I think is being asked.

Number one, it involves a question for the designer of the facility, which they are not.

Number two, it would have to take into account a very particularized knowledge of a series of accident scenarios that might or might not be credible for the facility, and that is not their area of expertise either.

So, I would object on those grounds.

CHAIRMAN LAZO: Well, we agree with you, Mr. Lewis. We will sustain the objection.

MR. BLUM: All right.

BY MR. BLUM:

Q What is the separation of the stiffners, Dr. Greimann, on the plant?

A (Witness Greimann) Are you talking about the rings?

Q Both sets, I think. The horizontal and vertical.

A The horizontal rings are about ten feet. The stringers, the vertical stiffners are, I'm not sure, three or four feet. One, Sequoyah or McGuire, is three, and the other is four. I don't remember which is which right now.

Q Can you substantially strengthen a containment by adding additional horizontal rings that would be closer than ten feet apart?

A That would strengthen the containment, yes.

Q On page 29, you have a reference to Staff conclusion with regard to local hydrogen detonations. I think we discussed this in part before.

Mr. Polk, where did you make the assumption that those local hydrogen detonations would take place?

A (Witness Polk) It really doesn't matter where they would take place. The effective static pressure as a

result of the load time history that we use, the tenth of a millisecond pulse, works out to be an effectively statically applied pressure of about, as I recall the number, 16 psi, or something like this.

The containment is designed for 15, so the point becomes moot. We have a capability much higher than that, so the point is really moot.

MR. BLUM: I think this might be a good time to take a morning recess, and that would enable me to organize and finish up.

CHAIRMAN LAZO: Yes. It is an appropriate time to take a recess.

Fifteen minutes, please.

(Recess)

9rb1

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

BY MR. BLUM: (Resuming)

Q Gentlemen, in your testimony on Page 32 you mention the service level C criteria under the code. Do you know what is that value?

A (Witness Greimann) There in the ASME code defines four service levels. They are general type descriptions, word descriptions ranging from A to D, A being the most conservative, least damaged, to D, which allows more damage. Service level C would correspond to local areas of damage.

Q Does this have anything to do with -- would A be normal conditions and B upset conditions and so on?

A Be would be normal, would be my interpretation.

Q B would be normal?

A Excuse me. A. That is my interpretation. Yes.

Q Did you calculate the burst strength of the ducts within the containment between the containment wall and the ice condenser?

A (Witness Polk) Would you define what you mean by burst.

Q At what point would -- would there be a major flaw in the ducts? A major hole? What calculations did you do with regard to the ducts?

9rb2

A We didn't do any calculations. The ducts were qualified on the basis of some tests run by Westinghouse where they loaded the ducts in a fixture, simulating their installation environment, and they ran that pressure to 19 psi and observed no failures in the ducts.

Q When was that done?

A The drawings are dated 1974. I would suspect it was done shortly thereafter for qualification of those ducts for the service.

Q Do you know whether the ducts are seamless or whether they have a folded seam?

(Pause)

A In looking at the drawings, it appears that there are no folded seams. This is not the type of duct that you would have in a home-type air system. It appears that they were all welded together.

Q When you say it appears, are you sure of that or are you just reading diagrams?

A I'm reading the construction drawings, the drawings that were used to make the ducts and the weld call-outs. As best I can determine, they were completely welded together.

Q All right. If they were not welded, would it make a substantial difference in their capability?

A If they were not welded together, they could not

9rb3

perform their intended function of refrigeration and keeping leakage from the ducts into the ice condenser at a minimum. They would have to be gas-tight, and to do that you would have to completely seal, weld them.

Q All right. And I assume that welding increases their structural strength as well?

A Definitely.

Q Did you calculate the effect of a possible penetration failure or failure around the penetration if there were a fault in a weld after penetration?

A I'm not sure I understand what you're talking about yet.

Q Did you do any calculations with regard to penetrations in the containment?

A Are you talking about penetrations through the containment shell itself?

Q Yes.

A No.

Q Would you -- what kind of penetrations are there in the shell?

A There is access hatches, there is equipment hatch, a personnel access hatch, and then there are service line penetrations through the containment shell.

Q Were some of these built rather than ordered from manufacturers?

A I'm not qualified to answer that.

Q Do you know whether -- do you know whether the steam lines -- how they come through the containment?

A Not in detail, no. The penetrations, as I understand it, are a function of the mechanical engineering branch and not the structural engineering branch, part of the process piping systems.

Q Mr. Polk, did you get any containment pressure capabilities from sources other than Ames? That is, for the McGuire plant?

A Not as a result of our efforts, no.

Q Do you know of any others other than those done

by Duke Power?

A The ones done by Richard Orr, of Offshore Power.

Q He was a consultant for Duke Power?

A He was a consultant for Duke Power, yes.

Q Do you know of any others?

A Just the R&D, and Ames Laboratory. There were a few calculations done by some other members of the Staff.

Q Well, what was the nature of the calculations done by other members of the Staff?

A They were just back of the envelope scoping-type calculations. They were not meaningful -- as meaningful as the Ames Laboratory calculations would be.

Q All right. You don't know of any work done directly by R&DA or Sandia on the McGuire plant, do you?

A No.

Q Did you evaluate the phenomenon of creep under sustained overpressure?

A No.

Q Is that true of you, also, Dr. Greimann?

A (Witness Greimann) Yes, that is true. I did not.

Q Can either of you define "creep" in this context?

A Well, generally, it would be the increase in deformations or displacement or strain with time. In steel, that would generally occur at very high temperature.

Q Do you know what contribution the outer concrete

structure would make to containing internal pressure?

A (Witness Polk) You are talking about the shield building, the reinforced concrete building outside the steel containment?

Q Yes.

A That is an environmental building, only. The only pressures that that building would see would be the pressures of environmental phenomenon, tornadoes and such.

Q Would it add to the capability of the entire structure to withstand internal pressure?

A It could, but the -- one of the design parameters of that concrete building would be a 3 psi internal pressure.

Q And that is all it's built for?

A That is all it is designed for. It's capable, probably, of more than that. But it is not -- no.

Q Now, you are familiar with the ASME Boiler and Pressure Vessel Code, Section 3, for nuclear power plants components?

A It is used, and we recognize it as a valid code, yes.

Q Under that standard -- this building was designed for a code pressure of 15 psig; isn't that true?

A Which building are you talking about now? The steel shell?

Q The containment, yes.

A Yes.

Q And that -- do you know -- are you familiar with the definitions within the code of normal conditions, upset conditions, emergency conditions, and faulted conditions?

A Those are old terms, in the older version of the code. They have been revised in the newer version of the code.

Q The building was built under that version of the code, was it not?

A Yes.

Q The 1971 version?

A Yes.

Q When you talk about 48 psig, are you now into the region of the old definition of faulted conditions?

A I'm trying to correlate the service level C current level to what the levels are as spelled out in that '71 code, and I'm not sure what the one-to-one correlation is.

MR. LEWIS: Perhaps if Mr. Blum wanted to show the witnesses the definitions, that might expedite matters.

llrbl

(Pause)

(Witnesses conferring.)

BY MR. BLUM: (Resuming)

Q Under the definitions on the 1971 code do you have -- is the level C criterion now equal to emergency conditions?

A (Witness Polk) It appears that's the case.

Q Is the building still in accordance and with the code since it now appears that you have emergency conditions that would exceed its design or normal condition strengths?

(Witnesses conferring.)

A (Witness Greimann) I'm not sure I understand. Can you ask it again?

Q As the building is presently -- well, as the building is presently sitting there, if you could predict a pressure in an accident of over 15 pounds per square inch, would it still be an acceptable design under code standards?

(Witnesses conferring.)

A (Witness Greimann) If we accept level C service limits, it would be an acceptable design under level -- the 15 I'm not quite sure I understand why you inserted the 15 psi. Did that have any relation to the design? I'm not sure why you used that.

Q The 15 was a design basis accident. We are now considering potentiality for a design basis accident that

would give higher pressures than 15.

MR. LEWIS: Objection. I don't believe we are considering potentiality design basis accident. If -- if somehow -- at some point CESG wants to argue that certain accident scenarios considered should be a design basis accident, they would be free to, but I don't believe we have anything in this proceeding that establishes that we are dealing with a new design basis accident.

CHAIRMAN LAZO: Okay.

BY MR. BLUM: (Resuming)

Q I can rephrase that. We are now considering accidents that are -- that have pressures associated with them that are greater than 15 pounds per square inch gauge. That being the case, is this building still in accordance with the code -- the ASME code for pressure and boilers?

(Witnesses conferring.)

A (Witness Greimann) Yes.

Q Why is that the case?

A It's in accordance -- well, I'm not -- because there is a load which satisfies a pressure associated with the ASME code under -- which associated with the service level C, for example, which we are taking to be 48 psi. It meets those requirements of the ASME code. Service level C. At least.

Q Is this -- is this -- speaking of it as a nuclear

11rb3

pressure vessel, is it in accordance with the code to handle an internal pressure of 84 psig?

A No.

Q Is it in accordance with the code to handle an internal pressure of 67.5 psig?

A My judgment, that would be a service level D. It would fit the code definition of service level D, which is -- allows slightly more damage than service level C, so that is the judgment.

Q You say it's in accordance with the code to handle a pressure of 48 psig?

A At service level C. Yes. Yes.

Q All right. Now -- now, Mr. Polk, at the time this pressure vessel was designed, it was meant to take a maximum of I think 12.8 psig. Are you familiar with that?

A (Witness Polk) I've seen that number. Yes.

Q And that was considered to be a conservative figure?

A It would be. Yes. Not -- you're asking me now was that pressure derived, and that's outside of my area of expertise.

Q Well, 15 let's say or 12.8 was -- the design at that point was conservative in that it could easily handle 12.8 psig or 15 psig; is that correct?

A Are you talking about the containment shell

11rb4

itself was capable of handling that?

Q Yes.

A Yes. At service level A.

Q Well, is it still conservative in the same sense, to expect the same design to cope with uncertain higher pressures that are over 15 psig?

A It is not uncommon to see a structure carry a load much larger than what it was designed to carry.

Q But is it still conservative to -- to use a building that is designed for 15 psig to cope with uncertain higher pressures?

A It can be. Yes.

Q Well, how do you define "conservatism" in that sense?

MR. LEWIS: You used the term. Why don't you define it.

BY MR. BLUM: (Resuming)

Q Is this not a term that is used by the ASME, for example? Conservative? Is it used by the NRC?

A It is a general term used in the engineering discipline, yes.

Q How do you define it?

A It would be the ratio, the degree of conservatism, or factor of conservatism. It would simply be a ratio of the capability of that structure divided by the applied load.

Q If you get higher applied loads, the factor of conservatism decreases; isn't that true?

A Yes, given a set of acceptance criteria.

Q As we get over internal pressures of 15 psig, the factor of conservatism decreases with respect to the ability of this containment to withstand --

MR. LEWIS: Objection. The testimony of these witnesses has been that there are different service level categories, and I think that the questioner is ignoring that testimony of the witnesses by asking them is the level of conservatism less when you are getting into a higher internal pressure situation, and --

CHAIRMAN LAZO: And he said it was.

MR. LEWIS: He said it was, and he said it depends upon the criteria against which you were comparing it. I think the questioner is ignoring the fact that the testimony has been, you cannot divorce the question of conservatism -- I don't mean to be testifying here, but

I believe the testimony has been given that you cannot divorce the question of conservatism of a particular -- of the facility for a particular pressure without relating it to a service level as stated in the ASME Code, A, B, C, D. And I object to the question in its present form.

I would object to it unless it takes account of the criteria against which he is asking for an opinion of conservatism.

CHAIRMAN LAZO: Well, we will overrule the objection. I think the witness has been answering in that vein and now he at least understands that is the way you want him to answer.

MR. LEWIS: Good.

BY MR. BLUM:

Q The question is, isn't this approach less conservative than the original design basis approach?

A (Witness Greimann) C allows more damage than level A.

Q In that sense, it is less conservative?

A In that sense, there would be slightly more damage, yes. There was a --

Q When did the change in the code language come into being, if you know?

A (Witness Polk) I'm not sure of the exact date, but the copy I have is dated 1980, and it seems like

these changes would have occurred about 1979, 1978, somewhere in that time frame. I'm not exactly sure.

Q Do you know whether the Nuclear Regulatory Commission participated in arriving at the new code definition?

A The Nuclear Regulatory Commission has many members in various working groups in the ASME Code. We do review the code, we have representatives in all the working groups, and we do endorse the code, and in cases take exceptions to this code. And those are documented in the regulatory guides.

Q Looking at your table on page 33, under "Property" right at the top of the table, you have two values that are labeled "normal" and the others are labeled "log normal."

What is the difference for that?

A (Witness Greimann) Normal refers to the probability distribution function. It is the typical bell-shaped curve. Log normal is a different shape of that curve. It says that the natural log is normally distributed.

Q What is the reason for using that value as opposed to a normal value?

A The normal distribution says that there is a finite probability that, for example, the yield strength could be negative. It covers the entire range from minus infinity -- it can take on negative numbers, also. This is

also a better approximation to actual tests of the yield strength of steel, to assume that it is log normal.

Q On page 28, you have a statement that the vertical stringers are discontinuous across the horizontal stiffner rings.

What is the significance of the statement?

A The vertical stiffners -- okay. They are discontinuous. They do not meet the ring, nor are they welded to it. So they cannot transmit force, therefore, across the ring, because they are discontinuous.

So, physically, there is a gap between the two so that there cannot be any force transmitted through the stringer when it comes up to a ring.

Q What is the enginerring significance of that?

A That it can't carry any force at that location, so your model that you use to analyze the structure has to account for that in one way or another; that it cannot carry any force at that gap.

Q Does that mean that it is weaker in the vertical, the axial direction?

A Than?

Q Than in the horizontal direction?

A The internal pressure causes stresses in both directions. No, it does not mean that. The stress in the vertical direction is of the order of one-half the stress

in the hoop direction.

Q Do you know the thickness of the plates used in the dome? It appears in your table on page 33 as -- I think it is the eleven-sixteenths figure. Is that applicable to the dome?

A Yes, I think so. I would have to look at my drawings to be for sure, but it is less than the three-quarter. I remember it as eleven-sixteenths.

13rb1

Q How does that compare in strength to the three-quarter-inch cylindrical section?

A (Witness Greimann) It's stronger.

Q Why is that, sir?

A It's a different -- it's a hemisphere. It's a portion of a sphere as opposed to a cylinder. It's curved in two directions if you wish, so there are two curvatures helping it, whereas the cylinder is curved only in one direction.

(Witnesses conferring.)

Q Are there any stiffeners in the dome region?

A I don't believe so. There are in Sequoyah. I don't believe there are -- again, I'd have to check the drawings. I believe the last one is at the top of the cylinder. Near the top of the cylinder.

Q Wouldn't that affect the strength of the dome region if there were no stiffeners?

A Yes. Well, having stiffeners would increase its strength.

Q Did you do calculations for the dome region, if you recall, without stiffeners?

A I can look if you would like.

Q Please.

(Pause)

A I did calculations for the hemispherical top

13rb2

without stiffeners.

Q And, Mr. Polk, have you found anything that shows that there are no stiffeners in the dome?

A (Witness Polk) No. I haven't found anything that would contradict that.

Q Well, let me show you -- This is Figure 4.2.1-1.

MR. LEWIS: From which volume is that?

MR. BLUM: Volume 2 I think, 5B.

MR. LEWIS: Right. Which figure are we looking at?

MR. BLUM: I was looking at 4.2.1-1 in Volume 2.

BY MR. BLUM: (Resuming)

Q Have you -- okay. Have you satisfied yourself that there are no stiffeners in the dome?

A (Witness Greimann) Yes. There is no significant structural -- there are other pieces up there but not significant.

Q All right. Then did you do calculations that show that the dome -- the thinner metal in the dome without stiffeners is stronger than the cylindrical portion with stiffeners?

A Yes. Well, yes. Stronger. At least as strong and stronger. The failure -- when I analyzed the entire shell including the top, failure occurred between a third and a half of the way up on the cylinder. The largest displacement

13rb3

occurred at that point.

(Witnesses conferring.)

Q Looking at Page 31, your responses to the board questions, in answer to Question 1, Factor 2, what is a limit state calculational technique?

A (Witness Gamann) It would take account -- excuse me. Limit state would take account of two things normally not -- in a usual elastic and That would be typically at least yielding of the material, localized yielding of the material. That would follow the actual stress curve of the material, and at least in what I did included large displacement effects. In other words, a cable kind of effect. If it displaces far enough, it tends to get stronger.

Q Wait a minute. Does that -- does that have anything to do with strain hardening?

A I neglected strain hardening. The typical stress strain for this would show it. I neglected that.

Q Did you do any calculations with regard to the ability of the containment to withstand missiles that might be propelled by local detonations?

A I did not.

A (Witness Polk) No.

MR. BLUM: We have no further questions.

CHAIRMAN LAZO: Mr. McGarry?

l3rb4

MR. McGARRY: Thank you.

BY MR. McGARRY:

Q Doctor Greimann, as I understand, you performed the calculations that resulted in the 84 psig value; is that correct?

A (Witness Greimann) Yes.

Q And that calculation or that analysis you utilized average mean values; is that correct?

A Yes.

Q And as I understand it, after you arrived at this number, you then determined that a 12 -- a value of 12 -- a standard deviation of 12 should be associated with that 84 psig; is that correct?

A Yes.

Q In your report did you apply or suggest the utilization of three standard deviations?

A In my written report to the NRC, no. I reported 84 for the mean and 12 for the standard deviation.

Q And so I'm clear in my mind, how did you arrive at the number 12?

A As a standard deviation?

Q As a standard deviation.

A Okay. I can tell you what went into it. I included standard -- that standard deviation. It's composed of standard deviation -- takes account of standard

13rb5

deviations in material strength, in geometric properties, radius, thicknesses, and correlation of theory with experiment.

Q And then as I understand it, you provided this information to the Nuclear Regulatory Commission; is that correct?

A Yes.

Q And then the Nuclear Regulatory Commission applied its judgment and determined that three standard deviations should be applied to your 84 psig figure; is that correct?

A I will let Harold answer this too, but they called me and we discussed it over the phone.

A (Witness Polk) That's correct. Yes.

Q Now, when did you arrive at the 48 psig number? Do you know when that was finally determined? Either one of you gentlemen.

A (Witness Griemann) To me, it was this year. Is that right?

A (Witness Polk) Seems to me like late January. I can't be precise on the date. It was a lot going on at that time.

Q And as I understand your testimony, the purpose of utilizing the three standard deviations was to arrive at a number that would be extremely conservative; is that correct?

13rb6

A We wanted to arrive at a number that we felt confident with, that would give us a very low probability of leakage.

14-fj-1

Q Now, I note in your testimony, written testimony, and I believe you refer to it orally today, that you have determined a probability of failure to be four point one times ten to the minus five; is that correct?

A (Witness Greimann) Yes.

Q When was that number calculated?

A After we -- after the decision was made on the 48.

Q And the fact that we have this probability number of four point one times ten to the minus five, would that lead you to conclude that the 48 psig figure could be characterized as conservative?

A Relative to normal structures, yes.

Q All right.

A Building, say.

Q Would you say that this figure of four point one times ten to the minus five indicates that the probability of failure is remote?

A What is your definition of remote?

Q In your professional judgment, do you think it is going to happen?

A For a one-time loading, the odds are with me that it will not.

Q Now, so that I understand probabilities as it relates to your testimony, in ascertaining the probability

of the failure of the vessel, one must look to the probability of an event occurring times the probability of the vessel actually failing at the pressures associated with that accident; is that correct?

A Yes.

Q Now, if I were to ask you to assume that the probability of an event occurring were ten to the minus five, or ten to the minus six, and you have already determined that the probability of a vessel actually failing at certain pressures is ten to the minus five, then would I be correct in saying that the probability of the failure of the vessel would be ten to the minus ten, or ten to the minus eleven?

A Yes.

Q You are familiar with the Applicant's number of 67.5 psig, are you not?

A Yes, I'm familiar with the number. Not the details of how they arrived at it.

Q Given the probability that we have just discussed relative to your 48 psig number, if one were to assume 67.5 instead of 48 psig, would not you have a probability of a failure of the vessel somewhere in the range of ten to the minus ten, ten to the minus nine, ten to the minus eleven?

A I don't believe so, if I understand the question

correctly.

I'm not sure I remember all -- you are saying the probability of the event is ten to the minus fifth? You are making that assumption?

Q Yes.

A And the event in this case being 67.5 psig?

Q Yes.

A Okay. My judgment would be that it would not be as low a probability as you said, ten to the minus ten. It would be something higher than that.

Q Do you have a judgment on what it would be?

A Yes. If the probability of the event is ten to the minus five, I would say it was ten to the minus six, or ten to the minus seven, more in that range than in the range you were talking about.

Q And if the probability of the event occurring were ten to the minus six, then your testimony with respect to the 67 psig would be ten to the minus seven, or ten to the minus eight; is that correct?

A Yes. Between a factor of 10 and 100, or one-hundredth and one-tenth. So, yes.

MR. McGARRY: No further questions.

CHAIRMAN LAZO: Does Staff have any redirect?

MR. LEWIS: I believe not. But I'm looking very quickly at my notes to verify that.

(Pause)

I have no questions.

EXAMINATION BY THE BOARD

BY JUDGE LUEBKE:

Q I have some questions of the panel about nomenclature. I have learned that people dislike using the words "old" and "new" to characterize the containment pressure capacity. So, maybe I can use the words low values and high values. In other words, low values being at 12 to 15 psi, and high values being at 48 to 67 to 84 psi. And what I learned from you panel this morning was that in your derivation of numbers like 48 and 84 psig, you were considering the same circumstances, continuous static loading. I had the impression several days ago in the testimony that low values were related to continuous static loading and that the higher values were related to transient loading as might be caused by hydrogen, combustion, or deflagration effects. But if it remains that both the high numbers and the low numbers relate to a static continuous pressure loading, is it fair for me to say or think that the original design of 12 or 15 psi, or whatever, was extremely over-designed by standard deviation, which ranges between 5 and 6, instead of the 3 that you have chosen?

A (Witness Greimann) Knowing what they knew then, or

given the information they had at the time, no. It was not extremely over-designed.

Q Now, we get back to the matter of information, I guess.

What do you mean by "old" and "new" information?

A The exact yield strength of the material.

When you are designing something, you base it on what the mill guarantees they are going to give you. After it is built, you know what it is.

Q You mean you got much better material than you ordered?

A Yes, in this case, right. Like 50 percent better material, almost.

Q Oh, that is an interesting observation.

A Well, it is not totally uncommon. But just because the mill sets a minimum, they have to have all the steel coming out of their mill has to be above that, so in general, everything has to be above that. That is a specified minimum, not a specified average.

Q But if they had known it at the time they might have made the thickness of the plate three-eighths of an inch instead of three-quarters?

That is a what-if question.

A Right. They could have probably, right.

Q Yes.

A They also at that design were adding other effects in. I don't know what they were doing.

Q Well, then, my other question probably has to do with history, too. I spent some time reading the SER, and I got into words like, on page 3-5, the expected value, it was called, was 84 psig, and realistic value was 48 psig.

People keep changing the names they call these things.

But then, in the next chapter, I guess it would be on page 6.4, they worked out a calculation which my notes say was a postulated LOCA, and the peak pressure was 14.8 psig, and it was then remarked that it was less than 15 psig, and sort of left the impression, hooray, it's less than 15.

If I listen to you correctly this morning, the modern version of that sentence would be that 14.8 is less than 48, and very safe.

15rb1

A (Witness Greimann) Yes. Maybe -- I don't know whether I should ask you to repeat that. The way I understand what you said, yes.

Q I mean --

A Yes. Now, yes. Today I would say that the 14.8 -- and I'm not familiar with that number.

Q Yes.

A Is a lot lower than 48.

Q And that -- do you have a difference with that, Mr. Polk?

A (Witness Polk) Not -- I suspect what you were reading was the result of someone in a systems who was writing that their scenario gave a pressure that was less than the design value and at that point that would be as far as they would go. They probably would not be very interested in what the ultimate capacity was.

Q Isn't the design value really now 48?

A No.

Q I get confused by this, sir.

A The design value is still 15. Its capability is 48.

Q But after you recognize that you have better steel than you ordered, why don't you change the design value?

(Pause)

A (Witness Greimann) Well --

15rb2

(Witnesss conferring.)

A (Witness Greimann) The design value to me means the value you use to design it with, and 15 -- that is the value they used to design it with. It now has been designed and built. Now maybe it's even academic to talk about the design value. Now we want to talk about what it actually is.

Q That's what I'm trying to straighten out.

A I would talk about what it actually -- what confused me less, if I talked about what it actually is. The 15 is something they used when they designed it based on things that they didn't know. Like the steel strengths.

Q I would agree with you there. This matter of confusing less. Otherwise one might have the impression that when one does a calculation that comes out with a number like 14 or 13, then you use 15 as a guidance. If you do a calculation that comes out with a number like 35, then you use 48 or 67 and a half, and you kind of have the feeling there is some game-playing going on, so I think it's important to clarify what people mean when they say it.

I think that's all I have.

BY JUDGE COLE:

Q Doctor Greimann, did you conduct a review of the structural analysis prepared by Duke?

A (Witness Greimann) No.

15rb3

Q Is it fair to say that your analysis was an independent, de novo analysis?

A An independent -

Q De novo analysis, independent of what anybody else has done?

A Yes. I think mine was done first I would guess. Completed first. I'm not sure -- it was completed like last August.

Q All right, sir. With respect to the value of 84 psig and standard deviation, is the distribution about the mean value of 84 psig -- what kind of a distribution is that, sir? Is that a normal distribution?

A I assumed it to be log normal, l-o-g normal.

Q Log normal. What differences might we then see with respect to the areas under the curve as compared to a -- the standard -- normal distribution and areas under the curve at various standard deviations departures? What I'm trying to get at, sir, is how you arrived at your value of 4.1 times 10 to the minus 5 as I assumed that to be the area of the tail at the lower end.

A Of the log normal. Yes. Right. That would be on -- that area would be greater for a normal. In other words -- okay. The number I put there was 4 times 10 to the minus 5. That number would be larger if I assumed normal distribution.

15rb4

Q All right, sir. For a normal distribution the area that we would normally think of or that I would normally think of for three standard deviations would be a half a percent or one in 200?

A For three standard deviations?

Q Three standard deviations. Is that correct, sir?

A Yes. Right. Well, I would say 13 in 10,000. Yeah. Right.

Q Three standard deviations -- plus or minus would be about 99 percent of all the values?

A It's more than that. And we are just looking to the left, just at the lower tail. Not the upper tail.

Q So it would be half of that then?

A Yes.

Q Then the value that you -- that you presented for probability of failure is the tail area of the log normal curve and that value is 4.1 times 10 to the minus 5. Did you get that in tables of log normal distribution, sir, or was it calculated some other way?

A It was calculated by converting it to a log normal situation and then going to the normal tables. It corresponds -- it would correspond with 3.92 standard deviations of a normal curve, so if you'll look -- the number you are talking about for three standard deviations, you would look up in the normal table. I would look up for what

15rb5

I did. The corresponding number would be 3.92.

Q All right, sir. Thank you.

A The reason I chose that basically is the normal curve would say that there is also a finite probability that the strength of this thing is less than zero, which is unrealistic.

Q I understand, sir.

A Okay.

Q On Page 33 you refer to the mill tolerance. What's the significance of mill tolerance there, sir? And my point is does that -- is that what the mill will tolerate and departure from that acceptable tolerance of the mill would assure us that it would be rejected at the mill and not get out of the mill?

A I don't see the word "mill" but --

Q Well, it's the tolerances.

A The tolerances. Well, that would depend on how good their quality control is I suspect, but that is the premise. If it is outside of those tolerances, it wouldn't get out.

Q Is it reasonable to assume that, sir? What is your experience?

A It's that there will be some that get out that don't fall in those tolerances, and to a certain extent I've incorporated that by saying that with a nonzero standard

15rb6

deviation there will be a percentage that get out, outside of those limits.

Q And that's reflected in the standard deviation?

A Yes.

Q All right, sir. Thank you.

In response to questions by Mr. McGarry when he posed to you a question concerning the calculation of the probability of containment structural failure, he indicated that would be the product -- the probability of reaching a certain pressure, for example, 48 psig times the probability that the structure would fail at that pressure. He then followed that up with a question of what would be the probability at 67.5 psig? If the probability of the event that he hypothesized there that might be 10 to the minus 5 or 10 to the minus 6, as a probability of reaching that pressure, and you then indicated that the probability of failure at 67.5 psi would then be of the order of 10 to the minus 1 or 10 to the minus 2, did you not, sir?

A That order. Yes. I have not calculated that.

Q Well, based upon your calculation of the mean value for containment structure strength and the standard deviation, can you refine that calculation and give us a more precise estimate of the probability of that based upon your calculations?

A I could. Let me say -- okay. Would you like

15rb7

me to do that? I have to get my calculator out. It would take some time. I have done it for 72 psi, which is one standard deviation, which is in the vicinity of what they have. That is a -- 86 percent reliability. That is .04 probability of failure at 72 psi.

Q Excuse me, sir. You said 86. How did you get .4 from that?

A Okay. I didn't mean to say 86. Did I say 86?

JUDGE LUEBKE: 72.

A (Witness Greimann) 72. 84 -- a pressure of 84 would represent about a fifty percent failure probability. A pressure of 72 would represent a fourteen percent -- .14 failure probability.

BY JUDGE COLE: (Resuming)

Q All right, sir.

A A 60 psi, which is two standard deviations now -- that is why I'm picking these numbers -- would be 99.1 or .009, so that was the basis for my answer is that it's somewhere between .1 and .01. Okay?

Q All right, sir. I think that sufficiently bounds your answer.

A Okay.

Q All right, sir. I have only one other question, sir, Doctor Greimann. And it has to do with how one would apply a dynamic load to a structure, and the question is

15rb8

two parts. First of all, is it reasonable to consider a -- a pressure spike -- better back up here. With respect to the loads that might be imposed upon this structure, are you familiar with the range of pressures that might be generated inside the containment structure when different sorts of things happen like a hydrogen deflagration or local detonations? Are you familiar with any of the pressure spike patterns that might emerge from those kinds of incidents?

A I have seen a hypothetical couple.

I'll ask you if this is it. Are you talking about 180 to 200 psi spikes for very short times? Is that what you are talking about?

Q Or 20 psi spike, or 30 psi spike, similar to what happened at TMI.

A Yes. I have seen a couple of those curves, yes.

Q All right, sir. Now, with respect to applying any loads that might be the result of those pressure spikes, is it fair and reasonable to apply those as static loads or dynamic loads?

A The ones I have seen, the 28 value -- okay, I've seen two. The 28. From what I can tell on that curve, that lasted for periods of minutes, or longer. That is a static load in terms of this structure.

The ones I've seen -- well, Harold mentioned them earlier. The .5 millisecond-type load, very short, that is not reasonably applied as a static load. In fact, he mentioned that an equivalent static load is in the range of in the teens someplace. There is something called a dynamic load factor which you can convert dynamic loads to static loads, and that conversion involves the magnitude of the load and how long the load, in terms of time, how much time it is on, relative to, say, the structural period, which is sort of its natural

frequency to vibrate.

Q All right, sir. Are you finished your answer, sir?

A Yes.

Q Is it then more conservative to apply it as a static load?

A The dynamic load?

Q Yes.

A It would be ultra, very, very conservative, to apply this short a load as a static load. If it only lasts -- in this structure, if the load lasts a half a millisecond, it would be not reasonable to apply it as a static load.

Q Well, is there any difference if the load goes from, for example, zero to 28 psig, if that is applied very quickly and then stays there, is there any problem, then, with the way in which you might calculate it as a static load?

A Yes.

Q What would be those problems, sir?

A It could have a larger effect than applied statically, if it rises very rapidly and holds constant, depending upon how fast it rises.

Q You indicated that you looked at the 28 psig pressure spike that was demonstrated at TMI.

Is this, in your opinion, one of those kinds of incidents that might result in a higher loading on the structure than the 28 psi static pressure?

A Not in my opinion. From what I have seen, the scale is not very well-defined. I mean, it looks like a very sharp spike for a very short time, but the scale on the bottom is -- I can't remember, and I don't have a copy of that.

A (Witness Polk) The scale on that particular curve that you are referring to, Dr. Cole, is very misleading. It is in terms of hours. And one division, as I recall, from that curve, is in the order of six minutes.

It may be three. I'm just remembering the curve. And it appears, as I can recall, it takes about two divisions on that graph to reach the peak, which would be in the order of six to nine minutes, something like that, as I recall that curve.

And it isn't very well-defined, as Dr. Greimann pointed out. And it would be a static load, in my opinion.

Q Some of that might be caused by slow instrument response.

A That is part of my concern, yes.

Q My question is, sir, how quick a response should we be worried about if that was a consideration?

A If the response is in the order of magnitude

of the period of the structure, if that rise time was in the order of the period of the structure, I would be very concerned about it, yes.

Q All right, sir. And they are different orders of magnitude; is that correct?

A It appears that they are many orders of magnitude difference.

JUDGE COLE: Thank you. I have no further questions.

JUDGE LUEBKE: I have another question for the panel.

BY JUDGE LUEBKE:

Q On page 29, middle paragraph, we begin dealing with the transient situation. In other words, which I think the Board is really involved with. In other words, we have hydrogen, combustion, deflagration, maybe detonation, and what happens.

I get the impression from reading the paragraph that some work has started. It is not complete. Probably more work is being done. Yet in the last sentence, you draw a conclusion.

Are there reports, back-up reports? What weight should we put on that conclusion?

A (Witness Polk) I think what we were trying to do there was to get some idea as to what the structural

response would be to a detonation. And the information, as I understand it, for this type of loading is not readily available. We took that pressure in that time period, and we did an analysis on it, and we found that the effective pressure for that particular spike, or that particular load time history, if you will, was very slight on the structure.

Q Now, is the discussion of how you did it and what you did in some of these documents that the Staff has introduced in the testimony? Is it in the record?

A As far as the computations of the response --

Q That relate to the transient picture, yes.

A I don't know if that curve is in the -- yes, there is one very similar to it in Mr. Priory's --

Q It would be good if you would identify it, because I think that is really what the Board has to contend with in its deliberations.

A I might ask him if he knows exactly where it is. It is in Section 7, I believe.

MR. McGARRY: We think it is Chapter 7 of Volume 4.

WITNESS POLK: If you look at Figure 7.3.

BY JUDGE LUEBKE:

Q So the matter is documented?

A (Witness Polk) Yes. And we used a pressure

pulse that was very similar to that.

If you look at the next page, Figure 7.4, there is some additional information there, also.

Q I don't mean to ask any questions about it. I just want to be sure we have the matter in the record.

JUDGE LUEBKE: That is all.

CHAIRMAN LAZO: One more question, Dr. Cole?

JUDGE COLE: Yes.

BY JUDGE COLE:

Q On page 29, gentlemen, the end of the paragraph there, comparing your results with the licensee's results, you say, "This result correlates reasonably well with the Ames Laboratory results."

Do you mean by that that your calculation of AD 4 psig with a standard deviation of 12 compares reasonably well with 67.5 psig gauge figure proposed by the Applicant? Is that what you mean? You are satisfied that the results are not sufficiently apart from each other that they compare reasonably well, and they compare reasonably well; is that what you mean by that, sir?

A (Witness Greimann) When I understand what they did, yes. For example, if they used a lower yield strength.

JUDGE COLE: Thank you.

MR. LEWIS: Judge Lazo, I have one clarifying

question.

CHAIRMAN LAZO: Please proceed.

REDIRECT EXAMINATION

BY MR. LEWIS:

Q Mr. Polk, you earlier testified, and I think this led the Board to ask you certain questions, or I understood you to testify that you used the static loading method for various types of spike pressures.

Is that what you did for the kinds of very short-lived spike pressures that have been described in questioning here just now?

A (Witness Polk) Yes. What I did, if you do a time history analysis using the pressure spike, it gets to be rather laborious, time-consuming, and really not that productive. I computed the dynamic load factor, as Dr. Greimann pointed out, and simply multiplied the peak of that curve by the dynamic load factor, and applied that load to the structure as a static load, which is a normal way of doing business.

It makes computations much simpler. The answer is very good.

MR. LEWIS: Thank you.

CHAIRMAN LAZO: Mr. Blum.

RECROSS-EXAMINATION

BY MR. BLUM:

Q What is the period of a structure?

A (Witness Polk) Which period do you want? Which mode of vibration?

Q You compared 28 psig at TMI to the period of the structure. What were you comparing it to?

A If you look at the breathing mode of the structure, I think that is in the range of 47 cycles per second, which would be about .02 second period.

If you look at a panel, it is a little different. 27 or something like that.

Q Pardon? What is the panel?

A It's 27 cycles per second was the vibration period of one panel.

Q And that is the breathing mode at McGuire, in panels at McGuire that you have just given me?

A Those are actually Sequoyah numbers, but they are not very different from the McGuire frequencies.

Q Is the period of the panels independent of the thickness of the panels?

A No.

Q I'm not sure how you can compare Sequoyah with McGuire, then.

A We are looking at a ratio of structure period to

applied load time, in a range of 100 to one, or more. We are way outside of any dynamic amplification, so small errors in the computation of the natural frequency are meaningless.

Q All right. Can you define "panel" in this context?

A It is the portion of the containment shell which is bounded by the horizontal stiffners and the vertical stiffners.

MR. BLUM: Thank you.

CHAIRMAN LAZO: Any other questions?

Well, then, hearing no response, we thank you, gentlemen, and this panel is excused..

Now, it is approximately a quarter to 1:00.

The Staff has one other witness today. I suppose we should take a luncheon break. I guess -- can we estimate how long it will take, Mr. Lewis to --

MR. LEWIS: I couldn't hazard a guess. I have a relatively short line of oral direct, since this witness was requested during the course of the proceeding, and at that point, it would be a function of the amount of Board questioning and cross-examination.

CHAIRMAN LAZO: Well, we don't want to rush. I think there was a possibility of some of us making a site visit this afternoon, but I think we should continue with

the taking of testimony and make that a first priority.

MR. LEWIS: I would prefer that we did in order not to end up taking an undue amount of time on Thursday.

CHAIRMAN LAZO: What is your pleasure? Shall we take our usual luncheon break?

MR. McGARRY: I guess so.

CHAIRMAN LAZO: All right.

MR. BLUM: We could make it an hour, as far as we are concerned, and come back at quarter of 2:00.

CHAIRMAN LAZO: Why don't we say 2:00 o'clock? Then we will have a chance to get some things done.

We will be in recess until 2:00 p.m.

(Luncheon recess at 12:45 p.m.)

17rb1

AFTERNOON SESSION

CHAIRMAN LAZO: Well, are we ready? Will the hearing come to order, please?

MR. LEWIS: Judge Lazo, let me call Mr. Al Herdt, H-e-r-d-t, from the Office of Inspection and Enforcement, Region II, Atlanta, to the stand. I have provided to the Board and parties just before the luncheon break copies of his statement of professional qualifications.

CHAIRMAN LAZO: Mr. Herdt, would you stand and raise your right hand, please.

(Mr. Herdt was affirmed.)

CHAIRMAN LAZO: Thank you.

Whereupon,

ALAN R. HERDT

was called as a witness on behalf of the Staff, and having first affirmed, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. LEWIS:

Q Mr. Herdt, would you state your name and your present job for the record.

A My name is Alan R. Herdt, and I am Chief of the Materials in Process Section, Nuclear Regulatory Commission, Office of Inspection and Enforcement, Atlanta, Georgia.

Q Did you prepare a statement of professional qualifications for this proceeding?

17rb2

A Yes, sir.

Q Do you have any corrections or additions to that statement?

A No, sir.

MR. LEWIS: Judge Lazo, I would ask that the professional qualifications statement of Alan R. Herdt which I have provided to the reporter be admitted in evidence and inserted in the record as if read.

MR. BLUM: No objection.

MR. McGARRY: No objection.

CHAIRMAN LAZO: Very well. The reporter is so instructed.

(The document entitled Statement of Qualifications of Alan R. Herdt, Office of Inspection and Enforcement, Region II, follows:)

STATEMENT OF QUALIFICATIONS OF ALAN R. HERDT

OFFICE OF INSPECTION AND ENFORCEMENT, REGION II

My name is Alan R. Herdt. My business address is 101 Marietta Street, N. W., Suite 3100, Atlanta, Georgia 30303. I am employed by the United States Nuclear Regulatory Commission, Office of Inspection and Enforcement as Chief, Materials and Processes Section in the Engineering Inspection Branch, Division of Engineering and Technical Inspection.

I graduated from Rensselaer Polytechnic Institute in Troy, New York in 1957 with the degree of Bachelor of Metallurgical Engineering. I am a registered professional metallurgical engineer in California. I am a member of the American Society for Metals; American Soci of Nondestructive Testing (ASNT); the Welding Research Council's Subcomm on stainless steel welding; and the ASNT's Personnel Qualifications Commi e. In 1972, I was presented with a Metallographic award from the Internationa Metallographic Society.

From 1958 to 1961, I was employed as a Meta gical Engineer at Pratt and Whitney Aircraft (CANEL) in Middletown, Connecticut. My primary functions in the Fuel Element Fabrication Development Section included the supervision of the development of the refractory metal cladding of fuel and its assembly for the nuclear reactor.

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MR. LEWIS: Before proceeding to oral direct of the witness, I would ask whether or not there is any voir dire.

MR. BLUM: I would like to.

VOIR DIRE EXAMINATION

BY MR. BLUM:

Q In 1972 you began work with the I & E division?

A At that time it was Reactor Operations, and with the Atomic Energy Commission which is now the NRC. That's correct.

Q Did you in that capacity involve yourself with the McGuire plant?

A Yes, sir.

Q What was the nature?

A I did some of the welding and metallurgical inspections at McGuire from about -- starting from about 1972 to about 1975, actually at the site.

MR. BLUM: I have no further questions.

CHAIRMAN LAZO: Mr. Lewis?

DIRECT EXAMINATION (Further)

BY MR. LEWIS:

Q Mr. Herdt, are you familiar with the history of the construction inspections for the McGuire Nuclear Station, particularly as they relate to the quality of the containment construction?

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A Well, I'm familiar with the construction at McGuire. I've reviewed the reports from 1971 till about 1978 in preparation for this particular hearing, and I have gone through them. As I said before, I have personally been at the site from 1972 to 1975.

Q Would you outline for us the nature of construction inspection activities conducted by the Office of Inspection and Enforcement.

A Well, the Office of Inspection and Enforcement has inspectors in each regional office, and McGuire is one of the sites in Region II that we send inspectors to on a periodic basis, based on the status of construction to do inspections in the areas that are being done at that time, and we will -- the inspection program is just really a selective program. It's not a 100 percent detailed review of all the records or watching all phases, but it's just a verification of the licensee's program.

We do this by reviewing it, their procedures, to insure that they are in accordance with the code that they have committed to and the safety -- safety analysis report. We observe the work, and we look at the quality records that are obtained based on this work.

Q Now, focusing in a little more closely on the nature of the inspections with respect to containment welding, what would be the nature and the type of inspections that I&E undertakes with regard to those?

A Well, we would first take a look at the procedures that are being done in the welding area, in the weld rod control, the nondestructive examination area, receipt inspection material, qualification of personnel; and we would look at it to make sure that it meets the requirements of the code that it is being built to.

Then, in turn, after looking at that, we would go and observe specific welds being fabricated, different stages of fabrication, from fit-up all the way to being welded out. We would also observe the nondestructive examination. read the radiographs in this particular case, watch MT or PT's, if that is being done, visual examinations.

Q Could you please use the full terms for those abbreviations?

A I apologize. I guess I use some of the slang or shortness. MT would be magnetic particle inspection; PT would be liquid penetrant inspection. There also would be visual inspection that would be done on these welds. In turn, as I say, we would look at the radiographs. We would look at the other quality records that are generated

from this particular activity that is being done.

Q Did the Office of Inspection and Enforcement have any knowledge of the defects in welds which have been alleged by Mr. Lanford in this proceeding?

A No, sir.

Q In your opinion, if there were a one-eighth inch gouge, as testified by Mr. Lanford, would that type of gouge have been detected and remedied in the course of the licensee's inspection program?

A It should have been detected, and I would think if it was one-eighth inch thick, as so stated previously, I think they would go back and repair it.

JUDGE COLE: You mean one-eighth inch deep?

WITNESS HERDT: Yes.

BY MR. LEWIS:

Q Have there been any noncompliances with NRC requirements on the part of Duke with respect to its containment welding program?

A There was an item -- and I don't know if we called it back in that time an item in noncompliance, but that is what it is in today's vernacular. There was an item back in 1973 that talked about Duke not following their own procedures that related to containment welding, and that had to do with sequencing of the particular weld.

Q How was that resolved?

A That was resolved -- Duke eventually changed the procedure. It was not really a code requirement to sequencing, and they decided at that time to change the procedure to be more in accordance with what they were doing.

Q Has the Office of Inspection and Enforcement discovered any defects, or is it aware of any defects in the steel containment liner at McGuire Nuclear Station Units 1 or 2?

A Not that I'm aware of.

MR. LEWIS: Thank you. With that direct testimony, I would now make Mr. Herdt available for cross-examination.

CROSS-EXAMINATION

BY MR. BLUM:

Q Did you, in your review of the files, find Mr. Lanford's report, or any report about his finding an alleged defect?

A You mean on the containment welding?

Q Yes, sir.

A No. We have not found it.

Q Now, if a company engineer did a trip report that was critical of welding, or a weld, or welding in general, would you expect that to be passed on to you by the company?

A Not necessarily. If the company feels, and they

have done an evaluation, and it may not meet the reporting requirements that are laid out in the Code of Federal Regulations.

Q What are the reporting requirements in connection with discovery of defects?

A It would have to meet two requirements in the Code of Federal Regulations, in Parts 5055-E, which have to do with safety significance.

Q Who decides if it is a significant safety defect?

A The licensee has the obligation to do this. We obviously come in and review that evaluation, and we do at times.

Q So, basically, you don't know anything about this particular defect that Mr. Lanford reported, or testified about, do you?

A That is correct, except for what I have read in the testimony.

Q If a defect of this nature is corrected by the Applicant, by the company, is any report to be filed, or in their records for your review?

A There may be a report, or it would be maybe a weld traveler, or something along these lines that would document, let us say, a weld repair. It would be in the records that they weld-repaired it, who did it, the

weld rod control, and so on. Normally, that would be the case.

Q Did you look for such a record?

A As I say, we don't do a 100 percent review. We look at particular welds that are documented in our inspection reports, and unless I would know what particular weld we would be talking about, I can't say that we have looked at that or others.

There has been repairs made on different welds within the containment, and it was so documented.

Q What percentage of welds on the McGuire containment did your office inspect?

A I don't know if I can come up with that figure exactly.

Q Well, you did some kind of a spot selection?

A We do a spot selection, and I would say -- I imagine we looked at at least a dozen, or maybe even a little bit more of the actual welds that were being done. I couldn't say how much in the record, or in the radiographic area. I would have to go through every one of the reports and document all that.

Q Now, when you went back to look through these records, did you look for a record on the correction as per the testimony in 1973, or what exactly were you looking for?

MR. McGARRY: I want to object to the general line of questioning. The questioning is premised upon there was a defect. I think the testimony has shown that Mr. Lanford allegedly saw some what he characterized to be a defect.

He wasn't qualified in this particular area. Further questions should be framed with respect to the alleged defect. We have strayed from the alleged defect, to there was a defect, and did you see any reports of this defect in your reports?

I have no objection to the question as long as it is clearly understood that it is an alleged defect.

CHAIRMAN LAZO: Well, we will just have to be careful. The witness has testified that there were some repairs that were made, and they were so documented. But when you are referring to defect, Mr. Blum, I assume you are referring to --

MR. BLUM: An eighth-inch gouge as described by Mr. Lanford.

CHAIRMAN LAZO: What Mr. Lanford testified about.

MR. BLUM: Mr. McGarry may think that is an alleged defect. I may think it is a defect. It is up to the Board to make some judgment about what it was later on.

CHAIRMAN LAZO: Well, just so that it is clear.

BY MR. BLUM:

Q Did you look for a gouge similar to that described by Mr. Lanford as being corrected?

A I saw nothing in our reports that spoke to any gouge or anything along those lines.

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Q And is it your testimony that if it were corrected, there should be a report on that?

A I would feel there would be.

MR. BLUM: No further questions.

CHAIRMAN LAZO: Mr. McGarry?

MR. McGARRY: If I may have one moment.

(Pause)

MR. McGARRY: Thank you, Judge Lazo.

BY MR. McGARRY:

Q Mr. Herdt, if there was indeed no defect reported, there would be no inspection report on such a situation, would there?

A That's correct.

Q If there was a defect and it was repaired in conjunction with the original weld, there would be no documentation except that for the original weld; is that correct?

A That's correct.

MR. McGARRY: No further questions.

EXAMINATION BY THE BOARD

BY JUDGE COLE:

Q Mr. Herdt, either the last question or one of the last questions posed to you by NRC counsel referred to the steel containment liner. It's not actually a liner, is it? You are using that synonymously with the steel

containment construction?

A That's correct.

JUDGE COLE: Thank you. I have no further questions.

BY JUDGE LUEBKE:

Q Mr. Herdt, in the line of your work have you had occasion to do similar inspections at other plants?

A Yes, sir.

Q And you mentioned in all these years at McGuire one noncompliance item which had been resolved. Can you characterize this good performance or good rating for McGuire compared to the other plants you have occasion to be associated with inspection of?

A Well, it's very difficult to try to compare one site to another. All I can say is that through all the inspections that were done at this site from the containment welding aspects, there was only the one area of noncompliance that I mentioned. There were some in the piping -- some storage later on that we -- that the office performed. I would rate them -- this is just a personal opinion -- as a good site.

JUDGE LUEBKE: Um-hum. Thank you, sir.

CHAIRMAN LAZO: Mr. Lewis, any --

MR. LEWIS: I'm sorry. Are you through, Doctor Luebke?

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JUDGE LUEBKE: Yes, sir.

MR. LEWIS: No, I have no further questions.

CROSS-EXAMINATION (Further)

BY MR. BLUM:

Q Did you say that if the defect were repaired -- well, let me ask you this. If there were a gouge put into the base plate by a grinder and someone reported that and it were then repaired, is that in the nature of being repaired with the original weld or being corrected and should there be a report on it?

A I guess maybe I should explain. If it is made -- if the repair is made in conjunction with the weld as the weld is being made or just as it's being finished up so to speak, let us say that they did grind on the weld and a little gouge occurred and they repaired it, a record may not appear. I assumed by your question though that the weld had already been made, been inspected one time, and now a gouge had appeared later on or was there and had to be separately repaired. Then the completed part of the weld, then a record should be there.

Q I think that the testimony was that -- by Mr. Lanford that he looked over and saw that there was a gouge in an area that a man was grinding and he went over to inquire about it and called it to the attention of a supervisor and the grinder. In those circumstances under

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what -- under what circumstances, given those facts, would a report be required?

A I couldn't say one hundred percent either way because the grinder could be working in conjunction with the weld being made, and listening to what you have just said and reading what the testimony was, what I've gotten out of it, is that there was nothing established to say the weld was completed or not completed.

Q Are you familiar with the accuracy of the radiographs used to verify the welds?

MR. McGARRY: I'll object. It's beyond the scope of any further examination that was conducted even by the Board or myself.

(Board conferring.)

CHAIRMAN LAZO: Well, it may be relevant testimony, Mr. McGarry.

You may respond.

THE WITNESS: Could you repeat the question?

BY MR. BLUM: (Resuming)

Q Are you familiar with the radiography process used to test welds?

A I'm familiar with radiography. Yes.

Q Are you familiar with it in the context of the examination of the welds?

A Yes.

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Q If you have a -- a gouge that is smoothed out by undercutting the base metal, will that appear on a radiograph?

A It would depend on the depth of the gouge.

Q What is the accuracy of the radiograph?

A For this particular thickness of material or --

Q Yes, sir. For three-quarter-inch plate.

A Three-quarter-inch plate. If you are asking me would you see an eighth of an inch if it was in the area of interest in the weld, I would say yes.

Q Would you see it if it were ground out?

A Well, you could still see some reduction in plate thickness.

Q Can you get an absolute thickness measure of a radiograph -- from a radiograph?

A When you use the word "absolute" I don't believe you can. You can get an estimation but not an absolute.

(Pause.)

Q Are there -- Are there instruments that can give you the absolute thickness?

A Not -- I don't believe in the absolute sense. They can give you estimates, and the densitometer can do that.

MR. BLUM: Thank you. No further questions.

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CHAIRMAN LAZO: Very well. The witness may be excused.

Thank you, sir.

MR. LEWIS: Judge Lazo, if the next order of business was to be the question of the subpoenas, I would ask for a very brief recess so I can go and locate Mr. Ketchen, who is prepared more so than I to represent us on that point, and who undoubtedly expected the testimony of Mr. Herdt to take somewhat longer than it did.

CHAIRMAN LAZO: All right. Let's not scatter too far.

MR. LEWIS: I'll just go find him. Thank you.

CHAIRMAN LAZO: Take five minutes, ten minutes.

(Recess)

CHAIRMAN LAZO: Are we back on the record?

It appears that basically there are three documents that CESG would like to get into this record. They were rejected -- at least two of them were rejected earlier on the basis that they could not come in for the various reasons given. Basically, the evidence, or proposed testimony of Mr. Riley, was found to be inadmissible, and therefore, the exhibits upon which Mr. Riley would base his decision were not relevant.

We now have an application for subpoenas in an effort to get these exhibits -- I assume the basic reason

is to simply get these exhibits into this record so that they may be relied upon.

They are Staff exhibits, so I think we will ask the Staff to lead off and tell us whether they have any objection to the issuance of the subpoenas or the admission of these exhibits.

MR. KETCHEN: The answer to the question, Mr. Chairman, is yes, to both; that we object to the admission of the exhibits based on the reasons that were given last week, and we will resist the issuance of subpoenas.

If I may just describe the basis for our position, I would like to do so in a few minutes.

CHAIRMAN LAZO: Do you want to do it later?

MR. KETCHEN: I'm prepared to give the argument now.

CHAIRMAN LAZO: Oh. I thought you said you would give it in a few minutes.

MR. KETCHEN: No. It will take a few minutes. Maybe more.

I have a detailed presentation based on the regulations, but I would like the Board to focus -- the Board and the parties to focus just for a moment on two points, and I would refer the Board and the parties to page 2 of the basis and the motion or the request for the subpoenas.

The next to the last paragraph -- I guess it's the last line of paragraph 3 -- where the words state, just before Item No. 4, "And the author of the document may well have other information to offer that will aid this proceeding." That is number one.

Number two, our objections -- also, I would like the Board and the parties to focus on -- our objections to the documents last Friday which continue are not necessarily based on the idea that the author of the document was not present. It may be that an expert can vouch for the document. So we are not saying that you have to have the author present.

Having said that, I would like to give you the basis for the main argument. Our basis obviously lies in 10 CFR Section 2.720(h) 1 and 2, which indicates that prior to issuance of a subpoena for Staff witnesses, exceptional circumstances must be shown.

For purpose of our argument and resisting the subpoenas, consultants under 10 CFR Section 2.4(p) indicates that consultants are Staff personnel for purposes of the subpoena power of Section 2.720 and also for discovery purposes under Section 2.740. As I read the documents and the request for subpoenas, it is our position at this time that Mr. Blum has shown no exceptional circumstances for obtaining these gentlemen that he requests to come down

and testify at this proceeding. And I will come to that a little bit later, but I point the Board and the parties back to my comment that the author -- that Mr. Blum says the author of the document may well have other information to offer that will aid in this proceeding.

If I may digress one moment here: That may be true, that the author of such documents may have other information to offer that will aid in this proceeding. There are probably a lot of NRC Staff witnesses that would have information that might aid in this proceeding, and I think therein lies the purpose of the rule under 2.720 that protects Staff personnel from broad fishing expeditions to try to obtain general information on the hope that a case can be propped up by bringing in more and more Staff people.

Back to the main argument: Mr. Blum indicates that these documents are important for his purpose.

Once again, to reiterate, I haven't seen other than a general indication that these documents are relevant, or rather, not an indication, but an argument, and I'm not sure that all parts of all of these documents are relevant and material to the issues before this Board in this proceeding which, at least the Applicant and the Staff have been arguing all along, is somewhat limited in its scope.

For the moment I would harken back to the CLIA-16 decision and the motion for reconsideration which the Commission issued and indicate based on that decision at least my view of the record at this point is that the Applicant has made a prima facie case -- with its Part 1 and Part 2 panels, that, because of its training and because of the procedures it has instituted at its facility or that will be applied at its facility following TMI 2, there is a very low probability of hydrogen generation at all in this proceeding.

I mean not in this proceeding but as an answer to the issue in this proceeding. Having said that, I then go to the Staff's review of the hydrogen mitigation system that is installed by Duke. What we say is that although not yet required and although Duke in our view of the record has indicated a low probability and therefore an unlikelihood that there is a scenario leading to violation or -- I should say exceeding the Part 100 requirements, the fact that Duke has put in a hydrogen mitigation system is in our view of the case, gives additional reasonable assurance that this plant can be operated safely.

Now, I also want to add in here to the comment both with respect to the documents and the subpoena of the witnesses -- and I recognize that the lever for obtaining -- for getting the documents admitted into the record is the

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request for subpoenas -- but I think the main objective is to get the documents into the record.

I would also go back to 10 CFR 2.743(c) that indicates only relevant material evidence may come into the record which is not unduly repetitious and some attempt should be made to segregate material that is not pertinent or relevant or material to the record out of such documents.

Now, that's just a review of the regulations. How does that apply to this case? There are two precedents in this case that I have been able to find since this morning. I think one is a recent one. It was in the Midland proceeding, ALAB 634, February 19, 1981, which the Atomic Safety and Licensing Appeal Board construed 2.720(h) 1 and 2. That case had to do with a request for depositions of the Staff witnesses. The holding in that case was that unless there is a special circumstance shown, a person -- in this case the Applicant who wished to take the deposition of a particular Staff witness had no right to do so under 2.720 if the particular -- another Staff witness could provide the answers, and that Staff -- and that Staff witness was identified by the executive director of operations.

I think the case is fairly close to the one that we have here. The factual circumstances of that case with the Staff -- I'm sorry. The Applicant wanted to depose a

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particular named Staff witness that attended a meeting, the purpose being to determine why the Staff changed its position from what it was before the meeting to what it was after the meeting, which was different. The ruling of the Appeal Board and the Licensing Board was that the Applicant had to depose another Staff witness which the Staff had offered at the beginning first to determine whether the answers given were adequate to respond to the Applicant's discovery request. If it could be argued that the response was inadequate, then the Appeal Board indicated that that would be a sufficient special circumstance to produce the other staff witness.

This case is cited to indicate that there is some discretion under the rules that protects Staff witnesses from subpoenas.

The other case involves Diablo Canyon. It was a 1979 case, ALAB 519.

That case involved the seismic proceeding going on in -- at the Diablo Canyon reactors in California. In that case the intervenors sought to obtain the testimony of two ACRS witnesses who in this case were treated as staff personnel for purposes of applying 2.720 subpoena power.

In that case on those specific facts where an earthquake -- a fault zone had been discovered over the coast of California within three miles of the plant and the

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plant had been designed for another earthquake of lower magnitude located some distance away. On those facts and in the discretion of the Appeal Board in that case, the Appeal Board indicated that extraordinary circumstances had been shown within the meaning of 2.720. They -- the point of that case, as I understand it, is that - and as I read 2.720, this Board has considerable discretion on an appropriate finding of special circumstances or exceptional circumstances to issue such subpoenas for Staff witnesses, but until that finding -- showing is made and the finding on that showing, it's our position that such should not be done, and the specific language of 2.720 that I'm referring to is that -- 2.720 -- I'm sorry. 8(h)(2)(i) where it states -- I'm quoting -- the attendance and testimony of the commissioners and named NRC personnel at a hearing or a deposition may not be required by the presiding officer by subpoena or otherwise provided that the presiding officer may, upon showing of exceptional circumstances such as the case in which a particular named NRC employee has direct personal knowledge of a material fact not known to the witnesses made available by the executive director for operations required the attendance and the testimony of named NRC personnel.

Now -- Now, in this case I'm not told in the document by Mr. Blum what particular witness -- I'm going

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to have to segregate the document in a moment, but generally at this point with respect to all three documents I'm not told what direct personal knowledge of a material fact not known to the witnesses that we have heretofore presented to this Board and what exceptional circumstances these other witnesses should -- I'm sorry -- are that should require the Board to exercise its discretion in this proceeding. All that I'm told -- and I point specifically to the sentence I started out with -- is the phrase that "and the author of the document may well have other information to offer that will aid this proceeding".

Given the protection offered by 2.720, the protection of Staff witnesses to just unwarranted fishing expeditions, I think this motion for request for subpoenas does not rise to the level of the criteria specified in 2.720(h) 2 (i).

Having said all that, depending on how the Board may wish to rule, I would point as an example specifically to the document, Chapter 8, the Accident Process Analysis that the CESG has attached to its application for subpoenas, and just indicate, and I'm sure the Board has read this as well, that this document covers a lot of area, a broad area, and basically, as I understand the document, it has to do with core melts, and we have been saying all along in this case that that is not what we are here to talk about, computer analysis of postulated core melts going all the way to core melt-down. We have said otherwise many times through our panels, particularly through Dr. Meyer.

So, I think there is a threshold burden to show the particular material fact that Mr. Blum may want to prove with each of these documents, and then some exceptional circumstances for requiring a Staff witness to come down and explain the ins and outs of these documents.

I may make one further point with respect to CESG No. 59: We had a Staff witness here to talk about that document. The Staff witness was Dr. Meyer and that

panel. The 2.720 and 2.4(p) regulations would again protect, we believe, the underlying authors from mandatory appearance at this proceeding unless there is some exceptional reason or material fact that was not limited to Dr. Meyer that would aid -- I'm sorry -- would allow this proceeding to go forward.

With respect to the R&D Associates study, February, 1981, that we handed out last week, there is a lot of information that is relevant to the proceeding. It talks about the proceeding. But there again, we haven't -- not there again, but with respect to this particular document, although Mr. Tinkler was here, we did not hold Mr. Tinkler out because, and I may be corrected on this, he had not had time to review the document since we had only just received it recently. But as far as we are concerned, that doesn't make any difference.

Still, it is in our view the burden of the Intervenors to show some extraordinary circumstances and the material fact that it wishes to prove by a particular witness that has not been already covered in this proceeding by witnesses presented by the Staff.

One final point with respect to this document, and it is a small one, with respect to paragraph 6 on page 3: As this document stands, the statement is made that 2.720(2) requires the NRC Staff to provide witnesses in

relevant matters and gives them a shield if they do so. I don't understand that sentence.

The next sentence, that it also allows the subpoena of NRC personnel if they are named individuals who are in possession of direct material facts, is erroneous. That statement has to have tacked onto it, as I have quoted from the regulations, a statement to the effect that that is true only upon a showing of extraordinary circumstances and a demonstration that a particular named NRC employee has direct personal knowledge of a material fact not known to the witnesses made available by the executive director of operations and so on.

I said that was my final point, but in checking my notes, I have one other point. I go back to the original, second of my two points that I wanted the Board and the parties to focus on. With respect to these documents, we had experts here who were witnesses that could have introduced these documents if we thoughg that that would be required for the Staff's case, and once again, I just wanted to point out it is not necessarily the authors of documents that are necessary under the Federal Rules or our rules for admissibility of evidence, but because we deal with experts, it requires an expert who can say that he, in his expertise and in his opinion, would rely on such documents and thereby allow these documents into the record for

consideration by the Board in its decision-making.

That completes my argument, Judge Lazo.

CHAIRMAN LAZO: Just one question, a point of clarification, Mr. Ketchen: Is it your position that Mr. Pratt at Brookhaven and Mr. Hubbard and Mr. Hammond, of R&D Associates, are for the purpose of 2.720 Staff personnel?

MR. KETCHEN: Yes, sir. Under NRC personnel, personnel under 2.4(p).

CHAIRMAN LAZO: And your basis for that belief?

MR. KETCHEN: The basis for that belief is simply our reading of 2.4(p), which says "NRC personnel means, one, NRC employees; two, for the purpose of 2.720 and 2.740, only persons acting in the capacity of consultants to the Commission, regardless of the form of the contractual arrangements under which such persons act as consultants to the Commission," and it goes on to, in number three, point out, "Members of advisory boards, committees, and panels of the NRC," and so on.

CHAIRMAN LAZO: Thank you. I recall taking a position like that one time and getting overruled by the Appeal Board. But I had forgotten that the Commission then changed the regulations.

Well, Mr. McGarry?

MR. McGARRY: Yes, sir. I believe the Staff has

very adequately described not only its position, but the position of the Applicant. But let me try to present some different perspectives, if I may.

We discussed subpoenas some weeks ago, and I believe I made a fairly extensive presentation at that particular point in time. I think what is relevant to this proceeding, or to this particular issue, is that this matter is a matter for the Board's discretion. This Board looks to the relevancy of these documents, but also should look to the circumstances surrounding the requests for the subpoena. Are they timely?

I have asked myself, when the subpoena issue arose yesterday, what is happening here? And the best I can piece it together, and I think the Board has already made indications to this effect, is that the Intervenor has determined that certain documents are necessary to its case, and the Board has ruled those documents can't come in, at least with respect to two of the documents. The third document was never raised. It is a new issue, if you will. That is the Sequoyah, Chapter 8. And now subpoenas are being sought so as to enable live testimony to be presented, and presumably, this live testimony would embrace these documents and the documents come in.

Well, let's just stop for a second and examine that thesis. The Intervenor has a burden, as every one

of these parties has a burden, and we have alluded to this burder more than once in this proceeding. Their burden is to come forward and demonstrate the credible accident scenario that will give rise to hydrogen that will ultimately detonate and breach the containment. The Intervenor attempted to do this. They presented the testimony of Mr. Riley.

Now, that testimony wasn't accepted by the Board. Now, Intervenor could have come forward with appropriate expertise. These experts could have embraced the documents that we are now discussing. They don't have to be the authors of these documents.

If these experts were to come forward and these were the type of documents that experts in that particular field of endeavor would normally review, and these experts, if they had reviewed that document and felt competent to testify on that document, they could have. The Intervenors didn't present those individuals.

So, now, I think the Intervenor, having realized they can't get it that way, at this late date, are coming through the side door and approaching it from the subpoena. This just isn't appropriate, and it isn't proper. You decide upon a course of action, and you stick with that course of action.

If an Intervenor tried to present this matter to

a court, it has been my experience the court rules, does the document come in, or doesn't it come in, and that is it, one way or the other. And like a court, this Board should not just say, well, we are going to change the ground rules, and we have ruled the document can't come in, but now we are going to let these subpoenas issue, because again, let's carry it to its logical conclusion.

We could be faced with 30 documents and 30 subpoenas, which is clearly a potential here in this proceeding, since there has been no direct case made, and the only case that can be made now is either one through cross-examination, which is clearly appropriate, or one through the documentation.

I have looked at these three doc ments. The first one is this Sequoyah Chapter 8 document, which is part of the acronym, RSSMAP.

Intervenors never sought to make this document a part of their case. Mr. Riley, when he took the stand on March 5th, made reference to numerous documents. This was not one of them. Last Friday, when we were in the process of attempting to wrap up this case, the Intervenors tried to get in numerous documents. This was not one of them. This document was sent to the Intervenors on January 16th. They have had this document for some time. They thought it was so important. They should have either

provided the appropriate expert or sought the subpoena at a much earlier date.

We have heard the Intervenors say, well, we got it at the end of January, or what not. Let's put that to rest once and for all.

They could have sought that information, as I said, in June, 1980, July or August, 1980, and if they had sought it, then they would have had it earlier. They didn't even know about this document until Dr. Meyer made reference to it. Then all of a sudden the light came on. That is not the way we conduct this business here.

As Mr. Ketchen pointed out, this isn't a fishing expedition. That is the function, at best, of discovery.

When we come to this hearing, we have our ducks in a row, and we present it to the Board.

Now, let's look at the document itself. Again, as Mr. Ketchen has pointed out, this document is talking about various accident scenarios. I think there is one thing that hopefully -- we have made this point, but I want to emphasize it again -- we have utilized -- we have said that TMI is credible. However, it is difficult to take and place TMI at McGuire due to the difference in plant design. Therefore, it was necessary to look at various models of accidents to determine the steam and water release rates as well as the hydrogen generating rates which

occurred at TMI and attempt to get that analytical model which best represented those release rates.

23rb1

We determined that the S2D sequence was the most representative of various release rates. We have never said that S2D was credible. TMI is credible. S2D is not credible. In fact, in one of the exhibits on the table it points out that S2D is 6 times 10 to the minus 6. That is not credible, and it's a very important point. We -- again, we looked at S2D simply as a vehicle to properly analyze containment response. Now, with that preamble, we turn to this Sequoyah document that talks about S2D and various other accidents which we maintain are all incredible, beyond the scope of this hearing.

Intervenor has to come forward with a credible accident scenario. They never have. Let's turn to the R & D document. The R & D document is a subcontract to the Livermore study. Livermore was referenced in the Sandia report. That's evidence. It was referenced by Doctor Berman. Livermore is referenced in the Staff testimony. At least that part of Livermore that refers to the two anomalous tests. Just so we are clear, those tests are discussed in Part 1 of this R & D document. Parts 2 and 3 of the R & D document are not the subject of -- well, I guess --

CHAIRMAN LAZO: I think it's Section 2.

MR. McGARRY: Yes. Section 3 is -- has not been a topic of this hearing. Section 1 is merely an

23rb2

introduction. Section 2 is a commentary on the Lawrence Livermore.

My point is that Lawrence Livermore indeed has been referenced in various other documents. Again, as Mr. Ketchen pointed out, the Staff provided appropriate individuals to discuss this document. The record clearly reflects the Livermore/R & D position. It's not necessary to bring a witness here. This Board knows what the position is. The Board asked question. Intervenor asked questions, and we have asked questions about the anomalous tests about how they were conducted and whether or not the vessel was heated or unheated.

With respect to Brookhaven, let me just stop there. There is an interesting point here on R & D, and it's a similar point with Brookhaven. The R & D discussion of anomalous tests at Livermore was in essence before the Commission when they discussed Sequoyah. The Sandia report made reference to these for more tests. The Commission was well aware of these tests, yet decided it was appropriate to -- to issue the Sequoyah license; and pointing out to Doctor Luebke, I don't have the decision in my hand, but we will have it; but to the best of my recollection, the Commission issued that decision, that it was a Commission decision in Sequoyah. Brookhaven, as Doctor Ross indicated, was before the Commission when they discussed Sequoyah.

23rb3

That didn't stop the Commission. The point is the Commission isn't glossing over these documents. They considered them. Didn't find that it was significant enough to warrant the denial of the license.

We are going to get to a point at the end with respect to the Commission's clear directive that there should be ongoing review however. With respect to Brookhaven, again Brookhaven was discussed. The appropriate witnesses from the Staff were here. Questions were asked, exhaustive questions by everybody. The record reflects the Brookhaven position. It's not necessary to bring a witness here to testify as to the Brookhaven position.

We have a continuing flow of documents. That's healthy. The Commission has mandated that this matter be the subject of ongoing review, but it's not to be viewed as we can't license McGuire. We don't have the answers. The Commission had this issue before it when Sequoyah came before it, and the Commission said we have examined this particular issue and we feel that for one year it's permissible to issue the license for Sequoyah and that for Sequoyah to run.

Now, the Commission has the mandate to protect the public health and safety. They wouldn't have issued that license unless they thought that the public health and

23rb4

safety would be properly protected, so the fact that we have these continuing documents presented to us should not be introduced as a -- as an indication that the public health and safety is being jeopardized. The Commission has already determined it has not but the Commission said let us go forward and let us continue to review this.

So just because -- my point is just because there are additional documents doesn't make us stop in our tracks and say we have to have this witness rushed in here to explain this document or that we have to have this document part of the record. We have to ask ourselves is this document important? Is it providing some information, significant information, that we weren't aware of before? Or is it merely an additional bit of information that we were already aware of? And I submit with respect to Brookhaven and I submit with respect to R & D, we are all well aware of those documents. We don't need a witness from either one of those institutions, and we don't need those documents in evidence.

With respect to the Sequoyah document, that just simply is untimely raised and is irrelevant to this proceeding.

That completes my remarks.

MR. BLUM: Well, I want to start off and apologize for the syntax and especially the hint of fishing

23rb5

expedition in the document which was written late yesterday afternoon and get on closer to what we are doing here.

The Staff and Applicant keep trending off into a sort of a discussion of the merits on what I think is an evidentiary argument, but perhaps it is correct to look at the procedure that we are operating on. This is the first adversary proceeding on an ice condenser plant after Three Mile Island that I know of. The first one that is hydrogen generation and ice condenser. That didn't happen at Sequoyah. There was no Intervenor at Sequoyah. In Sequoyah as I understand it the Commission on a two-to-two vote upheld the Staff recommendation. I don't consider that a smashing indication that --

MR. McGARRY: That's erroneous, and I want to correct the record before we go on. You have to have a three-to-one vote to have affirmative action, and two to two would not enable the license to be issued, and it's simply incorrect.

CHAIRMAN LAZO: Well, please don't interrupt, Mr. McGarry.

MR. BLUM: To get down to it, I think this is an adversary proceeding. We are trying to make our case just as Applicant and Staff are trying very heavily to make their case. If we had heard the arguments that we've heard today last week in which there has evidently been plenty of

23rb6

opportunity to cross-examine experts about the substance of both of these -- of all of these documents, in particular, 59 and M, I don't think that the document would be kept out of evidence. It seems to me that the parties, Intervenor -- Intervenor on part -- are caught on the horns of a dilemma. Staff on the one hand wants those people who wrote these documents to be a part of Staff for the purpose of protecting them from subpoenas. Staff -- you know -- they may have some justification for it; but if that is in fact the case, then Federal Rules of Evidence, particularly 803G, they are public records and reports, and there is therefore a sufficient justification of them so that they can stand on their own feet and be introduced as public records or reports under the exception to the hearsay rule. They are, after all, reports of disinterested scientists to a government agency, and that makes them -- gives them some assurance of trustworthiness. The material within them has been amply discussed, so on the one hand I think we have to decide whether they are indeed Staff members and therefore shielded from subpoena or whether they are not. If they are, then these are public records and they ought to come in without any further statement. If they are not, then they can -- these folks can be subpoenaed.

The documents, if they have been discussed as fully as has been argued, which was my position Friday, and I adhere

23rb7

to it -- they -- at least two of them have been fully discussed, then they are indeed relevant to what we are doing here. However, they have only been discussed in order to dispel their conclusions. I think the documents ought to be admitted and need to be admitted so their conclusions, such as they are, can stand on their own two feet. Then it becomes a question of how much weight the Board wants to give them. I think they are relevant, and I think they are material to what we are discussing here.

There is a second dilemma. On the one hand Staff and Applicant now contend that we had sufficient witnesses present to talk about these documents fully, and therefore they don't need to be admitted to the record, but if we had sufficient witnesses here to talk about them fully, then they may be admitted to the report because there has been certain testimony dealing with them in substance, so there -- it is a dilemma. They have to decide which horn they would prefer to be impaled on. Either we did not have experts and therefore we can get some in to vouch for these documents, if that should be, but if we did have experts, then the documents can come in under any rule, vouched for by those experts, discussed by those experts, criticized in part, but upheld in part as I recall the testimony.

So, these documents, in particular, 59, the Brookhaven report, has been discussed, as the MARCH code analysis of various accident sequences. It has been used by many of the people who have testified. I will agree that Staff Exhibit M, Section 3, Alternatives to the Use of Igniters, while it is interesting, and I think the jet engine stuff is ingenious, even, nevertheless, we have not had much discussion of that, and I don't know that it would ease any problems, but that portion of it, Section 3, not appendix or the references, can be excluded. The rest of it is clearly relevant to topics we have discussed. As Applicants stated, Item 62 is an explanation of the accident table that was produced by Dr. Meyer. It doesn't make -- which is 61. It doesn't -- 62, Chapter 8, of itself doesn't lead anywhere, and doesn't make much sense of itself. But when it is put together with 61, the probability table, all of a sudden it makes a lot of sense, in that, if you look, for instance, at Table 8-5 of that document, you get a lot of accident sequences that lead to release categories in which gammas appear.

Gammas we find elsewhere in the document refer to containment rupture due to hydrogen burning. So, there is hydrogen released in any sequence in which a gamma appears.

Then, if we turn to 61, we now know the

probabilities, predicted probabilities, of some of these accident sequences, and therefore, we know whether they are more -- and many of them are more probable -- or less probable than an S_2D, which is what we have been considering.

So, the net sum of Chapter 8, when coupled with Table 61, is that we now have other accident sequences that are a great deal more likely than S_2D. It points out what I consider, at least in this adversary proceeding, to be a weakness in Applicant and Staff's cases.

I think that it is necessary to decide whether in fact consultants are Staff members, and therefore, whether the documents can come in by themselves, and the Staff members, or consultants, cannot be subpoenaed, and we would indeed be satisfied with that result. I have no need to conceal my motives.

We think we need these documents to make our case. That is why we want the people. And I would argue to you that either they are Staff members, in which case we can take these documents as they appear and put them in the record, or they are not, in which case they need to be subpoenaed here. Either there was sufficient comment on these documents so that they can be introduced, or there was not, in which case we need the people subpoenaed.

I don't at this point particularly care which we do, get the people here or let the documents in. But

either are important to our case, and we want one or the other, and I think we are entitled to one or the other.

Thank you.

CHAIRMAN LAZO: Mr. Ketchen, what about the argument that these are public records, or public documents?

MR. KETCHEN: Well, I don't see any consistency in the argument. I don't see the dilemmas at all. I think you have got two separate questions or two issues. On the one hand, you've got a request for subpoenas of Staff personnel, including consultants, and you have got a specific regulation that says how that is to be -- how the Staff witnesses other than the ones presented by the Staff are to be subpoenaed if the Staff chooses not to bring these people forward, and we stated our basis, and a long argument on that.

CHAIRMAN LAZO: If we should agree with you that the regulations are such that in the absence of a showing of extraordinary or special circumstances that these witnesses could not be subject to subpoena, then you have the argument that the documents are, in fact, public records, public reports, and they should be able to come into this record.

MR. KETCHEN: Well, the argument I make to that is the same one I made last week. Just because the Staff has a document that is produced and in its possession, I would

argue, doesn't fall under the 803(18) exception to the hearsay rule. If I wanted to get that document into the record last week, as an example, I would have asked Dr. Meyer, Dr. Meyer, is this the learned treatise, and is it an authority that you would rely on as an expert?

If he said yes, then I would say that that document could come in. But if, on the other hand, he said no, it wouldn't come in to be available for quoting as a periodical, pamphlet, treatise, subject of history, medicine, science, or art, established as a reliable authority by the testimony or admission of the witness or by an expert, and I think that solves the dilemma. There isn't any.

With respect to the record's exception, I think there would have to be more of a delineation. I'm reading a document that I have. It is the new Federal Rules of Evidence. Mine are numbered 803, and then sequentially by numbers, but I think the one, if I'm correct, that Mr. Blum is referring to is (8) Public Records and Reports. I think there is a distinction here. Those types of reports, I think, are talking about reports kept in the ordinary course of business about the activities of an agency. It talks about something like records, reports, statements, or data compilations, and any forms of public offices or agencies setting forth, and I think you are talking about

maybe a clerk in the courthouse where he keeps records of daily documents supplied to him, and if there was nothing suspect about those documents, I think those kinds of things could come in for what they are worth, and they would speak for themselves for their weight, depending on what you were trying to prove in a particular case.

But I just think that Mr. Blum, in that instance, in taking a research report which we received, which we receive a lot of them, some we like, some we don't, and some are in the middle, and taking that and comparing it with that particular rule of evidence, is an apples and oranges comparison. And I don't think it is correct. That is a long answer to your question.

JUDGE LUEBKE: Mr. Ketchen, I take it from your remarks that you are receiving reports all the time in this particular case, McGuire, and you expect in the future to receive still more reports?

MR. KETCHEN: Not necessarily with respect to McGuire, but generally, in this area of hydrogen mitigation.

JUDGE LUEBKE: Yes.

MR. KETCHEN: And Halon and inerting, and it is going to go on for some time.

JUDGE LUEBKE: So, the door is not closed on information?

MR. KETCHEN: No.

JUDGE LUEBKE: The door is open.

MR. KETCHEN: Information continues to flow. I guess our reason for digging in is at some point this Board has got to shut, at least for its purpose -- close things up.

JUDGE LUEBKE: I guess my next question is, granting those circumstances of continuing new information on the hydrogen question, and observing that -- I think as I remember, the Commission did make the decision on Sequoyah, and it was conditional; in other words, there would be a review coming up at some future date not too far away. Can it be said that the Intervenor may have an opportunity -- that there will be another comprehensive look at this new data that comes in between, say, February and the end of the year?

In other words, are they shut out completely if we deny their motion?

MR. KETCHEN: The answer is yes. In one sense, yes. But our regulations have -- as this Intervenor knows, in this case, this is a reopened proceeding. If there is new, significant information that comes to the attention of an Intervenor, or anyone else, under a different rule, but prior to the issuance of an initial decision, they can move to reopen the record. But they have a heavier burden after the record is closed than before under the Wolf Creek

standard. They have got to meet certain criteria, as this Board ruled they did in reopening the record on these issues. So, in a sense, they are cut off, yes, unless they can carry that burden and convince the Board to consider some new information.

JUDGE LUEBKE: How do you view the process in Sequoyah -- was it January 31, 1982?

MR. KETCHEN: Yes.

JUDGE LUEBKE: When it is subject to reconsideration or review.

Is the Staff going to perform the function and report to the -- make a report to the Commission and recommend something or other?

MR. KETCHEN: With respect to McGuire, yes.

JUDGE LUEBKE: No, Sequoyah, I mean.

MR. KETCHEN: With respect to Sequoyah, yes.

JUDGE LUEBKE: That is what you would do. And taking the hypothetical that this Board might issue a similar decision for McGuire that reads more or less like Sequoyah, what would be the Staff's function?

MR. KETCHEN: It would be the same. At that point in time, the conditions, assuming they are exactly the same as Sequoyah, assuming the Board has issued an initial decision and an amendment to the operating license has been issued, then at that point my understanding of

the procedure would be that the Board, its judicial capacity is out of it, and its responsibility is with the Director of Reactor Regulation, and he would see that the condition is met.

JUDGE LUEBKE: Might it then show up in the Federal Register as an opportunity for a hearing?

MR. KETCHEN: No.

JUDGE LUEBKE: It just goes on. You just keep performing the Staff function?

MR. KETCHEN: No. It would be like any other issue that might be opened that is not before the Board at that point. It would be the Staff's responsibility to resolve it.

CHAIRMAN LAZO: But I think Judge Luebke may have been referring to the fact that you said there are going to be ongoing studies on hydrogen generation and control and igniters, and that this research and review has not been completed. If somewhere down the road, next January or later, as a result of those studies, a design change should be incorporated in the view of the Staff in Sequoyah or in McGuire, then isn't it true that that would involve an amendment to a license, which would involve a notice of opportunity for a hearing on that design change?

MR. KETCHEN: Under the Shelly decision, you may be right. I haven't read that decision in some time.

JUDGE LUEBKE: I'm just trying to see what opportunities the Intervenor has.

MR. KETCHEN: I stand to be corrected. I had forgotten about the Sholly decision. Under that decision, there probably would be that opportunity.

CHAIRMAN LAZO: At a time when this hydrogen research question is more advanced?

MR. KETCHEN: I think I reacted a little too soon on that. If the hypothesis is it involves a licensing amendment, under the Sholly decision, there probably would be a notice of opportunity for intervention.

In this case, though, if you look at the condition, and I would have to pull it out, compliance with the condition of the license might not involve an amendment to the license.

CHAIRMAN LAZO: Yes.

MR. KETCHEN: That is maybe the problem. If that is the case, and it is a type of condition subsequent, where the Applicant comes in and demonstrates to the Staff that the condition is met, there is no cause in my view to amend the license.

In that case, the Sholly trigger of the notice wouldn't come into play.

JUDGE LUEBKE: Is Sholly specific, like, related to the hydrogen?

MR. KETCHEN: No.

JUDGE LUEBKE: It is general, a general ruling?

MR. KETCHEN: Yes.

JUDGE COLE: Mr. Ketchen, I'm trying to understand better the reasons why the Staff is objecting to the introduction of these documents. These documents were known by your Staff witnesses?

MR. KETCHEN: Well, yes and no. The R&D Associates report, Staff Exhibit M, was only received by us from our consultants about a week ago. The date on CESG No. 59 was known by the Staff officially, I guess, on January 23rd, when the transmittal was made to Dr. Meyer.

You have got to back back from that. The Staff witnesses are in daily contact with their consultants, and they would know that this report was coming, because they issued the contract.

I guess I'm having trouble with your use of the word "known," when we knew about it. We got the report. We knew about the research long before the reports come in.

JUDGE COLE: I'm trying to understand better the position as to why you say it shouldn't come into the record. Is it that this information was known to the Staff; they have taken it into account, and it was their expert decision that whatever important parts in these

three documents have either already been included or added during their testimony, and therefore, in their expert opinion, those parts are already introduced into the record, and we don't need it?

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MR. KETCHEN: You have summarized the Staff's position well.

MR. McGARRY: I do want to make one comment, and that has to do with the Sequoyah document. That is a draft document, and Intervenor picked up a point that we had made. That is --

MR. LEWIS: That was for you.

MR. McGARRY: That is that the S2D sequence is credible, according -- that's the thesis -- therefore, that's why their document is important. Because it talks about S2D and puts other accidents either above or below, and we are saying S2D is not credible. They have the burden to demonstrate it is credible. TMI is credible. S2D is not TMI, so the document is irrelevant. That's our point. It's draft and it's irrelevant.

(Board conferring.)

CHAIRMAN LAZO: We will have to take a short recess. I hope it won't be too long. Give us a chance to review the arguments and arrive at a decision.

MR. BLUM: Judge Luebke, if it would help, I have copies of the cases I referred to the other day if you care to look at them. Somewhere. I'm sorry. Judge Lazo.

CHAIRMAN LAZO: All right.

MR. BLUM: Well, I am sure Judge Luebke can read them too, but it may require your expertise on them.

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JUDGE COLE: Other people can read too, Mr. Blum.

MR. KETCHEN: Mr. Chairman, I would object to that. If we are still on the record, I object to that process because those cases were in another phase of the argument last week which was ruled on. This is different today. This is -- those had to do with FAA certificates and that kind of thing, and we had that argument. This is a different argument -- starts out here, the subpoena of Staff witnesses, and I think those cases just confuse things at this point, so I would object to the proffer of those cases at this point in the proceeding.

CHAIRMAN LAZO: Well, you are not helping us a lot but --

MR. KETCHEN: I'm sorry.

CHAIRMAN LAZO: But we can refer to the transcript.

MR. BLUM: Thank you.

CHAIRMAN LAZO: If we need to. Thank you.

(A recess was taken.)

CHAIRMAN LAZO: Would the hearing come to order, please?

We're all in agreement that there has not been a showing of exceptional circumstances which would warrant the issuance of subpoenas for Staff personnel. Therefore, we will not grant the motion to issue the subpoenas. As for the exhibit which has been marked for identification as CESG

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Exhibit 62 with the shorthand caption of Sequoyah, Chapter 8, we are similarly in agreement that that exhibit should not be admitted. The exhibit together with Staff Exhibit M and CESG Exhibit 59 represent documents which have not been vouched for by any expert, and under our rules of evidence, we're permitted only to accept evidence that is reliable, relevant, and material. Since these documents have not been vouched for by any expert witness, there is a question of the reliability of the documents. We are unanimous regarding the Sequoyah Chapter 8 document in denying it as an exhibit in this proceeding which may be relied upon for truth of the contents.

As to the Brookhaven National Laboratory document and the R & D Associates document, the Board is ruling in a two-to-one vote that neither may be received.

(Board conferring.)

JUDGE COLE: It was my opinion that there was sufficient discussion of CESG Exhibit 59 and at least Chapter 2 of Staff Exhibit M, and even though the Staff and licensee witnesses might very well have taken any important aspects of that in their testimony, it was my opinion that we should have admitted those for whatever they might be worth.

(Pause)

CHAIRMAN LAZO: Well, considering the hour of the

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day --

(Board conferring.)

CHAIRMAN LAZO: I think we will ask Mr. McGarry has the proposed schedule for tomorrow been altered or does it still stand?

MR. McGARRY: We plan to start tomorrow morning putting on Dr. Lewis and Mr. Karlovitz, and they will be discussing the matters we mentioned at the bench. And we will also address the polyurethane foam question tomorrow morning.

MR. BLUM: Who will be addressing that? Do you have qualifications for that person?

MR. McGARRY: There will be several people addressing it, and they have all testified in the proceeding except we have a chemist named Lynn Ettlman, I believe, E-t-t-l-m-a-n. He's a Ph.D.. E-d-e-l-m-a-n.

Just one second. I'll see if I can get some more information.

MR. BLUM: That is okay. That is sufficient, unless you have his whole credentials.

MR. McGARRY: I don't have them with me, and I don't know them precisely.

MR. BLUM: Thank you.

CHAIRMAN LAZO: So you have two subjects on which you wish to present a rebuttal case?

MR. McGARRY: That is correct.

CHAIRMAN LAZO: Do you have any idea how long the direct examination will take?

MR. McGARRY: I would think that the direct will take no longer than a half-hour, maybe an hour for all of that.

CHAIRMAN LAZO: Mr. Ketchen, does the Staff have plans to introduce any more rebuttal witnesses?

MR. KETCHEN: It depends on the rebuttal, Mr. Chairman. We are not sure at this point whether we would offer an additional witness or witnesses on rebuttal. I think it depends somewhat on what the Applicant puts on tomorrow.

There will be people here observing.

JUDGE LUEBKE: Your witnesses will be here tomorrow?

MR. KETCHEN: Yes.

CHAIRMAN LAZO: Is there a surrebuttal case planeed?

MR. BLUM: That is an interesting question.

MR. LEWIS: I hadn't thought of that before.

MR. BLUM: Not at this time. I would like to ask the Staff what areas -- are these more polyurethane foam people?

MR. KETCHEN: Yes. We are going to listen to Mr. Edelman and also to Dr. Karlovitz, et al.

MR. BLUM: We have no further case.

CHAIRMAN LAZO: I think we mentioned earlier that they have to set this room up for an evening function, so we are going to have to get out of here.

It has been proposed that we might start at 9:00 tomorrow.

Is that an inconvenience to anybody?

MR. KETCHEN: No.

MR. BLUM: Not for us.

MR. McGARRY: No, sir.

CHAIRMAN LAZO: Very well. Are there any other matters?

MR. McGARRY: Yes. Where is the Rebel Room?

CHAIRMAN LAZO: It's attached to the main building down at the other end. I think it's beyond the restaurant.

JUDGE LUEBKE: There is Rebel Room A, B, and C.

CHAIRMAN LAZO: There is an entrance to it, I believe, from the front parking lot near the entrance, and there is an entrance to it from the back near the pool.

MR. McGARRY: Thank you.

CHAIRMAN LAZO: Then, we will recess until 9:00 a.m. tomorrow morning.

(Recess at 4:40 p.m., to reconvene at 9:00 a.m., 19 March 1981.)

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

ATOMIC SAFETY AND LICENSING BOARD

in the matter of: Duke Power Company

Date of Proceeding: Wednesday, 18 March 1981

Docket Number: 50-369-OL & 50-370-OL

Place of Proceeding: Charlotte, North Carolina

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

Ronald Grahsm

Official Reporter (Typed)

Frank D. Taylor

Official Reporter (Signature)