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NUCLEAR REGULATORY COMMISSION

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MEETING

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

SUBCOMMITTEE ON THERMAL-HYDRAULIC PHENOMENA

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WEDNESDAY,

JANUARY 14, 2004

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, at 8:30 a.m., Dr. Graham Wallis, Chairman, presiding.

COMMITTEE MEMBERS:

GRAHAM B. WALLIS, Chairman

F. PETER FORD, Member

THOMAS S. KRESS, Member

GRAHAM M. LEITCH, Member

VICTOR R. RANSOM, Member

STEPHEN L. ROSEN, Member

JOHN D. SIEBER, Member

ACRS STAFF PRESENT:

RALPH CARUSO

AMY CUBBAGE

JIM HAN

WILLIAM KROTIUK

RALPH LANDRY

SHANLAI LU

MARCOS ORTIZ

DAN PRELEWICZ

MUHAMMAD RAZZAQUE

UPENDRA "KUMAR" ROHATGI

JOE STAUDENMAIER

ED THROM

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I-N-D-E-X

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

8:30 p.m.

CHAIRMAN WALLIS: The meeting will now come to order. This is a meeting of the Advisory Committee on Reactor Safeguards Subcommittee on Thermal-Hydraulic Phenomena. I am Graham Wallis, the Chairman of the Subcommittee.

Subcommittee members in attendance are Tom Kress, Victor Ransom, Jack Sieber, Graham Leitch, Steve Rosen and Peter Ford.

We also expect consultant Sanjoy Banerjee.

The purpose of this meeting is to discuss the application of the TRACG code to the economic and simplified boiling water reactor, ESBWR, and the scaling analysis.

The Subcommittee will hear presentation by and hold discussions with representatives of the NRC staff, General Electric Nuclear Energy and other interested persons regarding this matter.

The Subcommittee will gather information, analyze relevant issues and facts and formulate proposed positions and actions as appropriate for deliberation by the full committee.

Ralph Caruso is the designated Federal

official for this meeting.

The rules for participation in today's meeting have been announced as part of the notice of this meeting previously published in the *Federal Register* on December 22, 2003.

Portions of this meeting will be closed for the discussion of proprietary information.

A transcript is being kept, and will be made available as stated in the *Federal Register* notice.

It is requested that speakers first identify themselves and speak with sufficient clarity and volume so that they can be readily heard.

We have not received any requests from members of the public to make oral statements or written comments.

Now, I would invite Dr. Ford to make a preliminary statement.

DR. FORD: I have a conflict of interest since I am a GE retiree.

CHAIRMAN WALLIS: Thank you very much.

We will now proceed with the meeting, and I'd ask Ms. Amy Cubbage of the Office of Nuclear Reactor Regulation to begin, please.

MS. CUBBAGE: Thank you.

As you said, my name is Amy Cubbage. I am the project manager for the ESBWR preapplication review in the Office of Nuclear Reactor Regulation.

I am going to briefly go over the agenda here. I am going to provide a brief introduction and then Ralph Landry will give an overview of the TRACG SER and discuss our review process.

Ralph will also provide a discussion on the TRACG for ECCS/LOCA.

Ed Throm will discuss TRACG for containment LOCA analyses.

Jim Han from the Office of Research will discuss the PIRT.

Dan Prelewicz from ISL will discuss the test program.

Marcos Ortiz from ISL will discuss scaling.

And at the end of day one Ralph Landry will make some conclusion remarks.

Day two we will discuss our confirmatory calculations. Shanlai Lu will present that information tomorrow and Bill Krotiuk from Office of Research. And then Ralph Landry will provide as well conclusions.

We briefed you back in July on our review plan, and I just wanted to refresh your memory on the scope of the preapplication review.

The scope includes the TRACG application for ESBWR LOCA and containment analyses, qualification of TRACG for ESBWR, the test and analysis program description including the PIRT, SBWR and ESBWR test reports and the ESBWR scanning report.

This is a list of the primary submittals that were made for the ESBWR preapplication review. They include an ESBWR design description that was submitted for reference and the TRACG application, TRACG qualification reports and so on.

I'd also like to point out that in addition to those topical reports that were submitted, the staff has considered the responses to 413 RAIs in preparing our draft safety evaluation report.

At the time that we met with you in July, we were in the process of issuing those RAIs and ultimately did issue 413 RAIs. GE responded to all of those RAIs with at least one response.

The plans going forward is that we provided a draft SER to you in December. We're here

today to brief you on the conclusions of that SER. We are scheduled to brief the full Committee on February 5th.

And then additional preapplication review topics will be reviewed by the staff in the next year, and those include TRACG for ESBWR transients, which a submittal will be made in February of this year; TRACG for ESBWR ATWS and stability. We're expecting a submittal on that in July of this year. And then the design certification application is currently expected in mid-calendar year '05.

It looks like I skipped one line here, and that's the final SER on TRACG for LOCA and containment. Our current target is to issue that in March pending the comments of this Committee.

With that, I'd like to introduce Ralph Landry to talk about the safety evaluation report.

CHAIRMAN WALLIS: Well, welcome, Ralph. Your draft SER appeared to me to be a well written document, and I'm sure your presentation will keep up to that quality.

MR. LANDRY: Thank you, Mr. Chairman.

I hope the presentation will be up to your expectations.

My name is Ralph Landry from the Office of Nuclear Reactor Regulation. And I'd like to present first an overview of the SER. After I get through with the overview of the SER, we will then go into the details of the code as applied to LOCA/ECCS and to containment, the PIRT, scaling etcetera. That portion of the presentations will all be closed. We will be going through proprietary material and we'll ask for closed session after I get through this overview presentation.

A brief history, Amy went through this already so I won't waste a lot of time on it. Just again point out that the staff asked 413 RAIs, General Electric responded to all those RAIs in some cases with multiple responses because we, as usual, have to go back and forth and back forth until we get an answer that we find acceptable.

I would like to point out that throughout this entire review process the past year and a half General Electric has been extremely cooperative. The cooperation which we have received has been exemplary. The company provided not only the TRACG code which we asked for initially, but they provided an update to the code, provided input models for the ESBWR, input models for some of the

test cases, input models for Ontario Hydro, which they had analyzed. They provided access to data from their test program.

We did not always agree with the applicant. Of course, there are times when we butt heads and we disagree with each other. But I would like to point out and give them credit initially that our cooperation level was very good. We were very pleased with the cooperation we received from the applicant.

CHAIRMAN WALLIS: Can I just ask for clarification, Ralph? When you say they provided the code and input models, you mean they provided a running version that you could run?

MR. LANDRY: That is right.

CHAIRMAN WALLIS: Or they just provided documentation?

MR. LANDRY: No, they provided input of running models. They provided the code in source form and in executable form. And they provided the input models in electronic form so that all we had to do was link with the code and run. This is the procedure that we have in pushing to enforce on each review. I simply would like to point out that in this case, General Electric was very willing to

provide any input models, anything we asked for.

The review of the code, since it is a realistic code, it is not a deterministic code, followed the CSAU outline. And we'll go through some of those steps. We won't go through all 14 steps in this presentation as we did in the SER, but we would like to go over and highlight a few of the steps along the way.

The review was broken down between the Office of Nuclear Reactor Regulation and the Office of Nuclear Regulatory Research, NRR and RES, and contractors which both offices have.

NRR reviewed the code itself, the models within the code for both LOCA and containment. We performed independent calculation using the TRACG code and using the NRC's TRACE code. We'll get into that material tomorrow.

We reviewed the uncertainty methodology.

Research reviewed the test program, the scaling, the PIRT and performed independent containment calculations using NRC's contain code.

NRR had overall project management and SER preparation responsibility. We brought together all the parts of the SER and prepared the overall

document.

In performing this review there are three basis for the regulatory review. We'll touch on the loss-of-coolant analysis basis, the regulatory basis for containment and the regulatory basis for standard plant design.

The regulatory basis for loss-of-coolant accidents comes out of 10 CFR 50.46, and then this is just a few sentences taken out of the entire paragraph. And I don't want to read all of this, but I would like to point out that because this is a realistic evaluation model, the evaluation model must include sufficient supporting justification to show that the analytical technique realistically describes the behavior of the reactor system during a loss-of-coolant accident and comparisons to applicable experimental data must be made and uncertainties in the analysis method and inputs must be identified and assessed.

This has been performed, and this is what we attempt to describe in the SER with regard to the code itself.

CHAIRMAN WALLIS: The last line, though, is a matter of judgment, it seems to me. It says that "there is a high level of probability that the

criteria would not be exceeded." And I don't think the staff has yet defined what they would interpret that to mean in some number.

MR. LANDRY: That's correct. That's correct.

CHAIRMAN WALLIS: I mean, high level to some people is 99.9 percent, to others it's 95 percent, and so on.

MR. LANDRY: That's correct.

CHAIRMAN WALLIS: What is this level of probability?

MR. LANDRY: We've gotten into that a number of times, and this continues to be an ongoing debate discussion as to what constitutes high level probability.

We have on the staff, more or less, dropped back to the old 95/95 criterion. But that criterion comes out of a different era and a different purpose.

CHAIRMAN WALLIS: A different, absolutely, yes.

MR. LANDRY: But that is what we have just been falling back on. And, yes, you're right there is a debate still as to what constitutes a high probability. Is it 50 percent, 60 percent, 95,

99? Of course, it can't be a 100.

CHAIRMAN WALLIS: It must depend upon the risk involved. If the risk is very, very great, then you want to have a much higher level of probability?

MR. LANDRY: That's correct.

CHAIRMAN WALLIS: And we don't quite know, I guess, at this stage what the risk is if the criteria are exceeded. But since they're conservative criteria, I've always assumed that going a little bit above them isn't a very risky thing. But that's just, again, a qualitative idea.

MR. LANDRY: This is getting off.

CHAIRMAN WALLIS: Yes. But I'm just saying, the staff should clarify I think at some stage in the near future what they mean by this statement.

MR. LANDRY: That's correct. And I believe that part of the risk-informing effort is looking at what constitutes realistic, what constitutes high probability and so on.

The regulatory basis for the containment includes general design criteria 4, 16, 38, 50, 53. After the presentation on LOCA/ECCS models, Ed Throm will present a discussion of the LOCA containment

work with TRACG, and he will focus primarily on GDCS 16, 38 and 50 in that discussion and Standard Review Plan section 6.2.1.

This is work for a standard design. So we also have to address the regulatory basis for the standard design as followed in 10 CFR 52.47.

Without going through the entire section again, 52.47 requires that certification of a standard design which differs significantly so that it utilizes simplified or inherent or passive or other innovative means to accomplish its safety functions must do several items, one of which is the performance of each safety feature of the design has to be demonstrated through either analysis, appropriate test programs, experience or a combination thereof.

Interdependent effects have to be found acceptable by analysis, appropriate test programs, experience, etcetera.

And sufficient data have to exist on the safety features.

This is part of the review which was done with respect to the test program, and the test program in support of the application of TRACG to the ESBWR. Later today we will have a presentation

from Dan Prelewicz via cell on the test program itself and detailed results and detailed discussion of what we find acceptable and where we have problems.

CHAIRMAN WALLIS: To go back to our previous discussion, this business of sufficient data with sufficient range and so on, again, this should be tied in presumably to some measure of probability or confidence that the results are going to be within the criteria?

MR. LANDRY: Yes. And when there is data insufficiency, what is the result? Do you have to go back and do more tests, obtain more data or can you accept a greater uncertainty in results?

CHAIRMAN WALLIS: Yes. If you have a measure of uncertainty from looking at the data, which again is something which in the past hasn't always been quantified particularly well.

MR. LANDRY: We will in a couple of cases attempt to make comments. Without trying to quantify what that level of uncertainty change is, but there will be times when we will point out that because of lack of data or lack of knowledge of this correlation, and so on, there is an increased uncertainty.

The topics, Amy has covered these already. I would simply point out that the discussion of uncertainty methodology I'm going to talk about when I talk about the TRACG LOCA models. I'm going to try to tie that back, rather than jump around too much. Bring that topic back up into discussion of the LOCA models within TRACG.

When we get down to the independent calculations, that discussion is going to be tomorrow morning. We debated what material to have today and what material to have tomorrow and felt that because we've done a very, very large set of independent calculations we would like to set aside a block of time to go through all those calculations at one time and not break them up between two days. To maintain the continuity in the discussion, that will be tomorrow.

We will discuss calculations which we did with TRACG, calculations which were done with contain, and calculations which were done with the TRACE contain link codes. We have comparisons between TRACG and TRACE. So tomorrow morning we will go through an extensive discussion of the calculations which we did.

CHAIRMAN WALLIS: Are you then

validating TRACG or TRACE?

MR. LANDRY: We are not validating TRACE in this. We are not validating TRACG either.

CHAIRMAN WALLIS: And you're comparing the two?

MR. LANDRY: We are performing independent calculations so that we can compare the codes and have an understanding of the code's performance.

CHAIRMAN WALLIS: But you do have that anomaly that when they disagree, I mean which one is--

MR. LANDRY: When they disagree, we will point out some of those disagreements.

CHAIRMAN WALLIS: All right.

MR. LANDRY: In some cases we understand what causes the disagreement, in some cases we don't. We do have to keep in mind at this point that TRACE is still a work in progress. The Office of Research has presented to the Subcommittee the work on the TRACE code development a couple of months ago. And there is still a great deal of assessment work being done and to be done on TRACE. And in the next couple of slides I'll get to a comment on PUMA. Part of that assessment effort

will be done with the PUMA program in the future with regard to the ESBWR design.

In July, the ACRS Thermal Hydraulic Subcommittee made a number of comments with regard to the ESBWR presentations that they received. And what I would like to do is just to address a few of those comments, not in detail but point out where we will discuss in more at a later point.

There was a comment made that we need more code calculations. Well, as I just said, tomorrow morning we will go through about four hours of presentations of code calculations which we have done using the TRACG code, the CONTAIN and the TRACE CONTAIN code and compare those calculations.

We have performed calculations of some 28 different cases with those codes. That does not mean 28 runs, that means we have 28 cases which in many cases involved multiple runs and a great deal of analysis to determine what we're seeing.

There is a request for more information on material design. This is not meant to simply put that comment off, but to focus this review. The review which we performed does not deal with the material aspects of the ESBWR design. It deals strictly with the TRACG code and the application of

TRACG to LOCA, and two specific cases of LOCA in fact; the main steam line break and the GDS line break in the ESBWR. It does not address any of the material properties or material design of the facility.

We do have the overview facility design descriptions documented, which gives a brief description design as the design currently stands. We, of course, have to have that because without understanding basically what the design looks like, you can't determine what phenomena have to be represented by the test program and what phenomena have to be represented by the code to put together a PIRT. So we have to look at the facility design, but not for a review of the design itself. That will come during the design certification phase of the review.

There was a comment made that more information will be helpful regarding the testing program results. The Office of Research reviewed the testing program and they and their contractors will present that information later this afternoon.

There was a comment about iodine chemistry during severe accidents. As Amy pointed out earlier, severe accident material will be

reviewed at a later stage. When we get closer into the design certification phase, we will be reviewing the severe accident and probabalistic safety assessment.

There is a comment made asking for more information on the PUMA facility. That information will be presented at a later date by the Office of Research.

PUMA is a program that is sponsored by the Office of Research as part of their confirmatory work in the design certification phase of the ESBWR. At some later date when they have more work done on PUMA and they are in a better position, we will be able to schedule a presentation on PUMA; the design, the scaling philosophy, test results and code comparisons.

And there was a question asking for staff conclusions on the design. As I've tried to say a couple of times already, we don't have any conclusions on the design. The design is a work in progress. We are focused at this stage in reviewing the TRACG code itself and the ability of TRACG to represent the phenomena that are anticipated to occur in a main steam line break and GDCS line break LOCA in the ESBWR design.

We will come to conclusions on the design, of course, when we get to the design certification review and present that information to the Committee.

I think that's it.

That concludes the material that we would like to present in open session. We would now like to, at the discretion of the Subcommittee, go into closed session because must of the material that follows is going to be proprietary.

DR. FORD: Could I just ask a follow-up question, please?

MR. LANDRY: Okay.

DR. FORD: On materials issue, which is obviously close to my heart, and I accept your limitation of scope. But just to make sure I understand it, you're saying essentially all this is looking at the calculation and confirmation of pressure temperature transients in the system associated with, for instance, the main steam line break. That's all you're doing at this preapplication stage? You're not interested in the consequence of those pressure temperature transients like failure of the chimney because of those pressure temperature and transients? Is that

correct?

MR. LANDRY: That is correct.

DR. FORD: Even though those consequences might be high?

MR. LANDRY: That is correct. The TRACG code is not used to calculate such things as loading of facts and failures due to loading or the jet impingement, things of that nature. The only material properties that are contained in part of this review, I'll get to in the next presentation, all those material properties contained within TRACG used for LOCA calculation, cladding properties, fuel properties, steel and concrete properties insofar as they effect heat transfer.

DR. FORD: Okay.

MR. LANDRY: But not as far as they effect failure.

DR. FORD: Failure. No.

MR. LANDRY: That's a topic that really depends on the details of the design, which we don't have at this point.

DR. FORD: I understand. Okay.

MR. LANDRY: When we get into the testing program, there will be comments made of things that we're seeing in some of the tests that

have to be confirmed later in the design certification stage to ensure that they will not actually occur in the plan.

DR. FORD: Okay.

MR. LANDRY: So those discussions we would like to postpone. And the discussions of failure modes, failure mechanisms will be at a later date.

DR. FORD: Okay. And just to stop me banging my head against the wall here, who takes the responsibility, the license or yourself, in initiating these questions about structural integrity associated with this different design and--

MR. LANDRY: That will be both.

DR. FORD: Who takes the --

MR. LANDRY: The onus is on the applicant to provide sufficient design detail. If during the review of that design detail we determine that there is material lacking structural integrity, etcetera, then the responsibility is for the NRC to ask those questions.

DR. FORD: So the responsibility is for the NRC --

MR. LANDRY: It is a shared

responsibility.

DR. FORD: Okay. But someone's got to take a lead. And you're saying the NRC is going to initiate this by saying, hey, Mr. GE, you'd better address this particular potential materials degradation concern? Give me the answer.

MR. LANDRY: General Electric should present that information on their own.

DR. FORD: Voluntarily?

MR. LANDRY: If they don't, knowing that this question has been raised; if they don't, then we will prod them to provide that information.

DR. FORD: Thank you.

MR. LANDRY: Maybe not gently prod them, either. We will encourage them to respond.

Maybe I should point out, maybe I shouldn't; maybe Adam should this point out tomorrow. But after all this review process, General Electric has gone through some reorganization in their staff, and Dr. Gamble has been made the manager of engineering and design for ESBWR. So you will be hearing a great deal from him. And he is probably taking notes on your comments and preparing his response at a later date.

DR. FORD: Okay. Good. Thank you.

CHAIRMAN WALLIS: Now, Ralph, this is a proprietary session?

MR. LANDRY: In fact, the rest of today before we get to the conclusions in proprietary.

CHAIRMAN WALLIS: I notice, what is so proprietary about the fact that you work for the reactor systems branch of NRR?

MR. SIEBER: Nobody else knows that.

CHAIRMAN WALLIS: Nobody else knows that.

I looked through your presentation and I noticed that there's no data here, there's no curves, no figures, nothing. It all just seems to be words. And I don't really see what's proprietary about any of it. But it's just maybe I'm just confused. I thought you were going to present some actual data or something which have some reason to be proprietary.

MR. LANDRY: Some of these model descriptions are proprietary.

CHAIRMAN WALLIS: Very, very little.

MR. LANDRY: As we get into those model descriptions if questions come up, we may have to rely on staff from GE and from our contractors to go into details of the models.

CHAIRMAN WALLIS: Okay. But you have some backup slides that might actually show us some data and things like that?

MR. LANDRY: Well, we'll have slides of test programs later today and slides of the calculations tomorrow.

(Whereupon, the proceedings went into Closed Session.)

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A-F-T-E-R-N-O-O-N S-E-S-S-I-O-N

1:30 p.m.

CHAIRMAN WALLIS: We're going back into session. We're going to hear from the staff. And this is an open session now?

MS. CUBBAGE: Yes.

This is Amy Cubbage posing as Muhammad Razzaque. Basically the purpose of this is just an introduction to the presentations that are going to follow by Dan Prelewicz and Marcos Ortiz from ISL who are going to discuss the details of the scaling review and the testing review.

Part of the purpose of this is to go over a little bit of the history. As you know, the SBWR was under staff review in the '90s and there were substantial efforts in testing and scaling for the combined SBWR and ESBWR programs. SBWR and ESBWR specific tests were originally performed to qualify TRACG for the SBW configuration. And the staff participated in observing and/or auditing those test programs back in the '90s.

And the program was terminated.

The NRC's review also terminated abruptly and without conclusion, and a safety evaluation report was not issued. There was some

letters prepared that did provide some insights and feedback to GE on those programs, but there was no safety evaluation conclusion, unlike AP-600 where, of course, the design was certified and the AP-1000 is building on that experience. We pretty much based this review on all of the information for SBWR and ESBWR.

So GE is now using the SBWR data to support the ESBWR and relied on scaling analysis to justify applicability of the data to ESBWR configuration. And Marcos will elaborate later this afternoon on some of the weaknesses that were identified during the review and the scaling analysis, and then those weaknesses were addressed by GE in multiple responses to RAIs and GE was very responsive to those concerns.

So I'd like to --

CHAIRMAN WALLIS: I'll note that the scaling presentation you have is the longest on the schedule. I wonder if that's really appropriate. Is it going to be the major presentation?

MS. CUBBAGE: In the scaling area, there were a lot of issues that were raised and a lot of revision and response by GE. So we felt that it was important that you understand where the state of the

review at this point.

CHAIRMAN WALLIS: Okay. Okay.

MS. CUBBAGE: Muhammad, you're done.

So, Jim Han, don't leave.

CHAIRMAN WALLIS: Is he here?

MS. CUBBAGE: I forgot to mention that before we get into the testing and scaling, Jim Han will be discussing his review of the PIRT. And so he's up.

(Whereupon, the proceedings went into Closed Session.)

MR. LANDRY: Okay. Conclusions

CHAIRMAN WALLIS: I don't think we can ever get the staff to have quite the -- you haven't done the studies they have. When we look for authoritative questions or answers, we always seem turn to you. And that's what you have done. I mean, you can't do the work they've done. You ask questions and then if you give authoritative answers, you believe them. Again, that is the way it has to be. I can't ask you the kind of questions -- well, I can, but you won't be able to give me the answers that --

MR. LANDRY: When it comes to the details of what's in the test or what's in the code, I would rather turn to the code expert and ask them to explain rather than make a mistake and say something wrong, and then have to have it corrected.

CHAIRMAN WALLIS: Of course, this experience that you have of questioning them and getting good answers is really what helps to support in great measure your conclusion. And we don't see that interaction in a presentation except in -- and I think we just have. We don't usually see it in a presentation.

MR. LANDRY: Well, we've gone back and

forth a great deal during this review, and especially the last few months of the review we were having weekly phone calls.

CHAIRMAN WALLIS: I know that. But the contact of --

MR. LANDRY: Because we were going back and forth to try to understand.

CHAIRMAN WALLIS: You staged a drama with GE, but unless we see through it, the way you did the last few minutes, we have no idea of how good a play it was. So it's very helpful. I find it very helpful. What we've done the last half hour I think to me was very, very useful.

MR. LANDRY: It's not Shakespeare, but it is a good play.

CHAIRMAN WALLIS: Well, it's getting there. If it's a comedy or a tragedy or something else.

MR. LANDRY: It's a comedy or tragedy depending on which week we're talking about

CHAIRMAN WALLIS: I think it's all's well that ends well, is what it really is. It's not love's labors lost.

MR. LANDRY: Either that or it's a mid summer night's dream.

CHAIRMAN WALLIS: That's what we think about some of the codes, yes.

MR. LANDRY: And I'd like to pull together some conclusions about what we talked about today, the first day.

A few of the confirmatory items that we've discussed. We've gone through each of these today. We've mentioned what must be included in the PIRT regarding long-term cooling phase for LOCA.

General Electric has committed to incorporate missing terms that were found in the documentation. The terms exist in the code. One of the advantages of having the source code and as well as executable was we were able to look at the code itself and determine that an energy term that was missing in the documentation was indeed in the code itself. It was coded, but it just wasn't documented properly.

So General Electric has committed to upgrade the documentation to include those errors that were found.

CHAIRMAN WALLIS: Are these new equations for transition criteria, are they based on comparisons with data or something. Where do they come from?

MR. LANDRY: No. These were equations that hadn't been reviewed prior.

CHAIRMAN WALLIS: It's just that they were expressed poorly?

MR. LANDRY: Yes.

CHAIRMAN WALLIS: There was no change in the real content?

MR. LANDRY: Right.

Documentation is going to be updated to include all current models and correlations providing a level of detail consistent with a stand alone document. We've already discussed this off and on today and General Electric agrees that the documents which we received at the design certification stage will be stand alone capability.

And we discussed during the test program some of the problems with the PANTHERS test.

CHAIRMAN WALLIS: This is the strange one, this sound heard will be investigated. How do you go back --

MR. LANDRY: During one of -- there was a sound heard. And we want to make sure that that was an animality unique to the test and was not indicative of water handler that's going to occur in the plant. So General Electric is going to look

into that further.

CHAIRMAN WALLIS: How would they look into a sound unless there's a recorder that recorded some evidence about it.

MR. HAN: Jim Han.

MR. HAN: When GE actually got the condenser IC test they heard very loud bang, I mean during the test. And that appeared to be a water handler. And then later on they find the header of the IC condenser leak. Okay. So is a water handler combined with leak. That is something they need to look into it during the --

CHAIRMAN WALLIS: But there was no instrumentation which would record the pressure spike and all that sort of thing, is there?

MR. HAN: I did not read that part in their report.

MR. LANDRY: General Electric is going to look into that further, whether they have to look at old data or whatever, but --

CHAIRMAN WALLIS: At what stage does this indicate there might be a water handler in some stage in the ESBWR transient?

MR. LANDRY: Well, that's what we want to--

CHAIRMAN WALLIS: What stage would that be?

MR. LANDRY: That's what we want to know.

CHAIRMAN WALLIS: What stage is that? There's all kinds of bangs with condensation in the suppression pool, but it's not there that you're talking about?

MR. LANDRY: That what we want to make sure; that this is not a water handler problem.

MR. HAN: Dr. Wallis, the mechanism that cause this potential water handler in the IC condenser is because of the way they start the IC condenser. Near the top header, near the top header there may be some steam was trapped there. And when you have condensation going on, you can maybe block somehow or create a condensation induced water handler.

CHAIRMAN WALLIS: Right. You collapse the steam bubble.

DR. RANSOM: Kind of like in my radiator when I used to live --

CHAIRMAN WALLIS: Right. So this is only up there in the IC --

MR. HAN: IC.

CHAIRMAN WALLIS: Which we're not talking about today anyway, are we?

MR. LANDRY: Correct. Correct.

MR. SIEBER: It's likely a form of the steam line --

MS. CUBBAGE: And that's why these are characterized as issues for design certification and we're just trying to make sure that we capture all of these things and make sure that they're looked at.

MR. LANDRY: Some of the conclusions. General Electric has committed to assess, track, GE for containment against some of the more traditional tests. Ed Throm brought this out and mentioned a couple of possibilities. Tests like Marviken, the CDTR test, Battelle-Frankfurt. This is something that General Electric is going to look into and determine what tests that they would like to use for further assessment.

DR. KRESS: Will you compare contained with TRACG calculations for contained?

MR. LANDRY: We will discuss some of the contain calculations tomorrow.

DR. KRESS: Okay. You have some.

MR. LANDRY: TRAC contain, and we'll go

into a lot of depth of that tomorrow.

DR. KRESS: Okay. Thank you.

MR. LANDRY: GDCS air space in wetwell vet have to be modeled correctly during the design certification stage.

This is not a criticism now. This is a statement of conclusion of things that we feel are important.

We have concluded that the PANTHERS/PCC program covers the range of operational conditions expected in the design-basis LOCAs in the ESBWR. The data are adequate for assessment of TRACG for PCC as performance.

CHAIRMAN WALLIS: That's again where it'll be useful to have a figure which says, you know, here's the flow rates this, this and this, that they tested and here is the range of interests that's covered.

MR. LANDRY: Yes.

CHAIRMAN WALLIS: Some sort of a show that supports the statement. I'm sure most of this does exist, yes. It's just a question of presenting it.

MR. ROHATGI: I've seen those charts with figure and flow where there's air

concentration.

CHAIRMAN WALLIS: All right.

MR. LANDRY: The GIST, GIRAFFE, PANDA-M test programs, there's a whole cover the range of late blowdown phase, GDCS.

CHAIRMAN WALLIS: See the thing, Ralph, and I'm going to say it again, the task you have is not to tell us what your conclusions are. It's to convince us in some way that they are justifiable.

MR. LANDRY: Okay. We'll try to improve that.

CHAIRMAN WALLIS: And we may be at fault. But we have a very short time to appreciate the rational, so you have to somehow condense it and put it across. And it's going to be a one act play not a long time, because we don't have the time.

MR. LANDRY: That's one thing that makes this a draft SER at this time. We'll look into these comments and see what we can do to improve the document before it goes final.

The combined data from the test programs are generally expected to cover the LOCA phenomena and processes defined in the PIRTs.

The PANDA-P series tests were not discussed today because those tests, we have decided

and discussed with GE and so that the PANDA-P series test are not applicable and useable for code assessment purposes. They can be used for code confirmation purposes, though. And this is not any criticism of the test, but as a simple statement that the QA program was not applied to the PANDA-P series tests. These are tests that were done specifically in the ESBWR configuration after the closure of the SBWR work. These tests were performed in Switzerland. And we're not criticizing the Swiss' ability to perform tests, but they did not follow the prescribed GE QA program as we would accept it.

Now, these may very well be very quality tests, but they haven't provided the pedigree that we demand under QA. So therefore, we have said these tests can be used only for confirmatory purposes, not for assessment purposes.

MS. CUBBAGE: I'd just like to interrupt for a moment. At the beginning of this presentation we were supposed to reopen, and I apologize for not alerting you to that. So, I don't know if we can remedy that.

CHAIRMAN WALLIS: You mean if anybody is wrong, not GE.

MS. CUBBAGE: Well, the record.

CHAIRMAN WALLIS: So this is now an open presentation?

MR. LANDRY: The entire conclusion.

CHAIRMAN WALLIS: All your conclusions are open?

MS. CUBBAGE: This part. Not the figures he was showing earlier. This handout we're looking at now.

MR. LANDRY: On the first slide that said "ESBWR 1st Day Conclusions."

CHAIRMAN WALLIS: This is now a completely open presentation.

Well, I guess whoever keeps the paperwork is going to make that distinction.

DR. ROSEN: Well, this is a matter of curiosity. The PANDA-P tests were paid for by GE? They were GE driven?

MR. LANDRY: The European community.

DR. ROSEN: They just happened to be applicable to the -- in other words, they weren't specified by GE and carried out?

MR. LANDRY: They were not specified by General Electric. They were performed by the European community that was considering the ESBWR

design. This is our understanding of it.

CHAIRMAN WALLIS: In those days it was called the European SBWR.

MR. LANDRY: Right. So that the facility was mocked up into a ESBWR configuration, tests were performed. And now General Electric would like to use those tests. However, we've said since they were not under their auspices, then the QA program was not the GE approved program, so we will not permit the tests to be used for assessment purposes.

DR. ROSEN: Well, I was thinking a little bit that was does this indicate a general breakdown in GE's quality assurance for procurement of testing. And the answer, I think I just got, was no. Because this is just GE trying to use something that happened to have been done --

MR. LANDRY: Right.

MS. CUBBAGE: That's right.

MR. LANDRY: Yes, it was performed by the--

DR. ROSEN: If GE had specified these tests and hired a vendor to do them, they would have been done under GE's quality assurance program and there wouldn't have been a issue.

MS. CUBBAGE: Correct. As were --

MR. LANDRY: That is correct. These were performed by the European community, but then General Electric says hey these tests are ESBWR configuration, let's see if we can use them. And right away after a lot of discussion back and forth, we had to say you can use them for confirmatory purposes but not for assessment purposes because they were not done under your QA program.

CHAIRMAN WALLIS: It may well be that the European's QA program was just as good as GEs would have been.

MR. LANDRY: But it wasn't done under that program.

CHAIRMAN WALLIS: All right.

MR. LANDRY: This is a regulatory issue.

CHAIRMAN WALLIS: You guys are being bureaucratic then, I suppose.

MR. LANDRY: No, it's a regulatory issue.

MR. SIEBER: Well, you could have shown equivalents or somebody could have done it if there was equivalence.

MS. CUBBAGE: Well, GE opted not to make that demonstration. They wanted to make the argument that these were confirmatory in nature.

MR. LANDRY: They insisted that they did not have to have these tests. We looked at the programs for the code --

CHAIRMAN WALLIS: But the staff could have used them?

MR. LANDRY: And we agreed, okay, they do not have to have these tests. So, it was left at that stage.

CHAIRMAN WALLIS: But they're there. I mean, you have the results so the staff can look at the PANDA tests and see if it can draw conclusions, presumably. It's not prevented from using it.

MS. CUBBAGE: If it was determined that these were necessary, then it becomes an issue for design certification because Part 52 requires Appendix B criterion to met. And it's just we don't have the evidence at this point because we didn't --

DR. ROSEN: You can use them because in a regulatory decision making --

CHAIRMAN WALLIS: Can't use them for any purpose whatsoever?

DR. ROSEN: No, you can use them --

MS. CUBBAGE: You can use them.

DR. ROSEN: -- but safety related tests shall either be done in accordance with Appendix B

of 10 CFR 52. That's the law.

MS. CUBBAGE: That's right. That's right.

CHAIRMAN WALLIS: The law is sometimes peculiar. It says I know something but I've got to behave as if I didn't know it.

MS. CUBBAGE: No. We're not behaving as if we don't know it.

DR. ROSEN: If you don't know it whether or not -- sure it's test control, design and all the rest is done --

CHAIRMAN WALLIS: Well, okay. We can move on.

MR. LANDRY: You can use it for this purpose but not for that purpose.

CHAIRMAN WALLIS: Yes. We can move on.

MR. LANDRY: Right.

We have concluded that there are relevant and sufficient data to qualify TRACG for stimulation of the phase for which the scaling analysis was completed, that is, the GDCS injection phase. Conservative bounding analyses have been employed for the remainder of the analysis.

Now, in saying that, we've also said that rigor of the analyses is not at issue, but the

completeness of the analysis is all that we are issue with.

The staff has determined that it is acceptable for General Electric to perform a rigorous scaling analysis limited to the most important phase of the LOCA event, demonstrating that the scaling tools are correct.

General Electric is not consistent with the CSAU approach in performance of the uncertainty analysis. We went into a great deal of discussion of this this morning.

Should it become evident that the core is going to uncover or the transition boiling and boiling will occur, the core will heat up then the staff will revisit the uncertainty methodology. But at this stage because the core does not uncover, the core does not heat up we have said okay, we'll accept the approach that has been proposed.

I believe that completes presentations for day one.

CHAIRMAN WALLIS: Right on time.

MR. SIEBER: Tomorrow will be more exciting than today.

MR. LANDRY: Tomorrow we will go into a great many calculations.

CHAIRMAN WALLIS: I think we've learned a lot today and it's been very useful. And the thing that's making me asking myself at the moment is these conclusions I feel a little bit insecure in endorsing these conclusions because I don't really quite understand the justification for all of them or some of them. And I'm not sure I'm in a position to say I approve all these conclusions.

I mean this conclusion about airspace and wetwell vent must be modeled correctly during DC. Well, that's a very general statement and, yes, I suppose it's true. But why is it pointed out in a conclusion? Everything has got to be modeled correctly, presumably, during DC.

It should presumably mean because there are uncertainties or errors or something and justification for this conclusion.

MR. LANDRY: No, we're trying to be complete. In drawing our conclusions we're trying to point out those items that are important.

CHAIRMAN WALLIS: Right.

MR. LANDRY: And must be addressed properly at the design certification stage.

The conclusions don't necessarily mean, Mr. Chairman, that there's a problem.

CHAIRMAN WALLIS: No.

MR. LANDRY: But there's simply some conclusions in there for the purpose of completeness and to make sure that these items don't get forgotten in the future.

DR. FORD: But, Graham, your reticence would be resolved if for each of those conclusions there was just a simple graph of data versus observation, as they have done very well in the last half hour.

CHAIRMAN WALLIS: Why these conclusions, why not some others and so? I'm a little uncertain about endorsing the conclusions just as they stand.

Some of them seem to be vague. I mean, just GIRAFFE and PANDA test programs as a whole cover a range of the late blowdown phase. Well, yes, they do. But I mean does that it's adequate or good enough. "As a whole they cover a range," well yes we know that but are they adequate for what purpose and why.

MR. LANDRY: Well, we were trying to take into consideration some of those points that were being made in the presentation on the test programs. That there are data out of each of these programs that are in other data. There is some data

that are all the way from limited use to non-useable and others that are very good and very prototypical. So we did not want to go through in the conclusions and state data by data set, test by test facility which are really good and which are not and simply say that when we look at the program overall, we're trying to get an overall reaction to the test program that has been proposed, scaling that's been performed to suppose the use of the code. And we're saying overall these tests programs are adequate for the purpose of assessment of this code.

CHAIRMAN WALLIS: You had one conclusion which said TRACG is good enough for us to go forward and proceed to design certification and that at design certification we're going to examine whole other things. I think that would accept that. I think we have seen enough that we should go forward and not back with the TRACG. But I'm bothered about a lot of these specific conclusions, some of which seem to be vague, some of which seem to be perhaps unsupported.

MS. CUBBAGE: If could, to jump ahead tomorrow, but that actually is our bottom line in conclusion in our slides for tomorrow.

CHAIRMAN WALLIS: Yes.

MS. CUBBAGE: So this was kind of a summary of what you heard today and then tomorrow morning you're going to hear about the confirmatory analyses and then Ralph's going to come back with our bottom line conclusions.

CHAIRMAN WALLIS: Sort of soft conclusion, but let's move ahead and we're going to reexamine all of the stuff and GE isn't going to get it over write-off saying this is okay, this is okay, this is okay, this is okay at this stage.

MR. LANDRY: That's correct. Right. So we're just sort of an intermediate step in the process. Let's move forward.

MR. LANDRY: Right.

MS. CUBBAGE: It's more than that. It's approval of the application of TRACG to ESBWR. And then at the design certification stage we need to ensure that they do the analyses using the actual plant design.

CHAIRMAN WALLIS: But that's a kind of a absurd thing. What else do they have to use? Obviously they're going to use TRACG for the ESBWR. So, acknowledgement that they're going to use it is not at question.

MR. LANDRY: Well, what Amy is saying is

two things. We wanted to come to the end of today and not just let the day hang. We wanted to try to draw some conclusions from the material today, and that's what these conclusions, while they might in a way sound trite, we're trying to draw together what we've discussed today because tomorrow we're going to move into a full morning session of calculations. And then we're going to try to draw the overall conclusion, which is going to be what you're talking about, about Amy's talking about: The bottom line is the code is adequate to move forward now to design certification.

And while it might sound trite, yes it's still the fact that at design certification the exact parameters, the exact design, all the operator actions should they ever be brought in, whatever, is going to be brought together and performed -- used to perform the actual plant calculations.

We're just trying to draw a conclusion today.

CHAIRMAN WALLIS: That's fine. I understand. Now, this is a first day conclusion. This is what we learn after the first day.

MR. LANDRY: Right.

CHAIRMAN WALLIS: And that the second

day it's going to come together much more definitely and we're going to have some definite conclusions, which we're going to be asked to address.

MR. LANDRY: Right.

CHAIRMAN WALLIS: Probably not asked specifically to address these conclusions --

MR. LANDRY: But what we will be trying to get agreement on tomorrow is the last slide that will be presented.

CHAIRMAN WALLIS: Maybe you should show that at the beginning of the day and so we can see where we're going.

MR. SIEBER: What really counts is what the final SER says as opposed to what conclusions you've come to at this point in time.

MR. LANDRY: Well, the final SER is the final -- the final version of this SER is going to take into consideration comments which we have received from the Subcommittee.

MR. SIEBER: Right.

MR. LANDRY: And any comments that we get from the full committee the first week in February. We will take that material into account and then prepare the final SER on TRACG application to ESBWR LOCA.

MR. SIEBER: With whatever limitations you choose to impose at that time.

MR. LANDRY: Right.

CHAIRMAN WALLIS: But we won't get another look at it? I see the schedule, and our last chance to have a crack at this is February. Then you take into account what we say and go off and write whatever you want to write?

MR. LANDRY: That's our proposal. That's our game plan.

CHAIRMAN WALLIS: And then we may not even see it again.

MR. LANDRY: You'll get a copy.

MR. SIEBER: Yes, it's on the website. You can always get it.

CHAIRMAN WALLIS: Thank you very much.

DR. ROSEN: Doesn't the full Committee have to write a letter?

CHAIRMAN WALLIS: We're going to write on something which is not yet complete?

DR. ROSEN: But isn't there another letter we had to write?

CHAIRMAN WALLIS: I don't think so.

DR. FORD: No.

DR. KRESS: That would be a letter at

SCR, the design certification phase.

DR. ROSEN: Yes, that's what I'm talking about.

DR. KRESS: We're obligated as one of our --

CHAIRMAN WALLIS: The schedule here, I was looking at it, it says they got to prepare this SER after the February meeting sometime.

MS. CUBBAGE: Well, we have prepared the draft SER. It's a very extensive document --

CHAIRMAN WALLIS: You're going to take our comments --

MS. CUBBAGE: -- that was given to you in December. And the purpose of this meeting is to get your comments.

CHAIRMAN WALLIS: To get our comments. And then you revise it. There's no time when we sign off on the revised version?

MS. CUBBAGE: I didn't think that that was the way that you normally --

DR. ROSEN: But wait a minute now. You mean, the full Committee is not going to write a letter to the Chairman?

DR. KRESS: Absolutely we are.

MS. CUBBAGE: Yes.

CHAIRMAN WALLIS: We can't say that this SER should be approved because we're not going to see the final version. We can comment on the draft version, that's all we're going to be commenting on.

We have this often with the staff, or too often. Maybe not too often. But it's a little concern to this Committee generically that we comment on stuff and then what -- and we write stuff, and we may bless something or appear to endorse it and then the final document looks different from the draft thing that we wrote our letter on, and we don't get a --

DR. KRESS: Yes. But we've never done that with the certifications.

CHAIRMAN WALLIS: No, we won't do it with certifications, but that's down the road. That's down the road.

DR. KRESS: Yes. I mean, we will do down the road. We'll look at the final SER.

CHAIRMAN WALLIS: This is still a draft SER after you've written --

MS. CUBBAGE: I'm not sure what you mean. I mean, the reason it's draft because we can't send it final until we come here --

CHAIRMAN WALLIS: When is it final?

MS. CUBBAGE: -- and hear what you have to say. And so we're going to come back to the --

CHAIRMAN WALLIS: No, you don't necessarily have to. It's just that we have had a problem sometimes writing a letter to the Commission saying the draft version we've seen is wonderful and then -- or is terrible, whatever, and then find out that what actually comes out is quite different from what we reviewed.

MS. CUBBAGE: Well, our intention is that the only changes we'd be making would be to address your comments. We were very far along in the review and basically were done with the review at the time that we drafted the SER. So --

CHAIRMAN WALLIS: So whatever your presentation is. So we don't get another look at it after February?

DR. KRESS: Yes.

CHAIRMAN WALLIS: Only when you come back for design certification do we get another look at it.

MR. SIEBER: Well, it's too late then I think. Because now you've already got an approved code that's been applied by asunder, and at the design certification stage to come back and say I

don't think the code should have been approved, then I think that creates a big problem.

MR. CARUSO: But the purpose of doing these preapplication reviews was to give the vendors some sort of confidence that they could proceed with the rest of the detailed design without having an enormous amount of uncertainty. They're trying to reduce the uncertainty associated with these LOCA codes.

MR. SIEBER: Right.

MR. CARUSO: So what you're giving them is not a final -- and I want someone to correct me if I'm wrong to use that phrase, you're not giving them a final certification or approval to use this to analyze ESBWR. What you're saying is at this point in the review cycle it looks okay except for these issues which are open issues to my mind. They are open unresolved issues that have to be checked, further issues that have to be checked again when they finally go to use to do the analyses. But up to this point we think that it's acceptable to this extent.

DR. ROSEN: So then they go ahead and do the calculations and do the final design, then they bring that whole thing back through the staff and

the staff comes to us and --

MR. CARUSO: They did it or they didn't do it.

DR. ROSEN: This design looks like it worked and we think you ought to write a letter --

MR. CARUSO: Right.

DR. ROSEN: -- to the Commission saying they ought to certify this design.

MR. CARUSO: That's correct.

DR. ROSEN: That's when we get a chance to --

MR. CARUSO: That's when you get a chance again.

DR. ROSEN: -- write the letter. And if everybody on the Committee agrees, then you get a letter without any additional comments. If you don't, you get a letter with additional comments.

MR. CARUSO: And that lets them go off and sell a reactor.

DR. ROSEN: Well, not yet. Not until the Commission agrees.

DR. FORD: Yes, but what Jack's pointing out is what happens in a year's time when we start to say "holy smoke, that little bit was wrong in the TRACG code."

MR. CARUSO: That is a risk that everyone runs when they get a methodology approved that at some point in the future someone will come look at it and say, opps we made a mistake. And the staff has the right and the responsibility -- the Commission has the right and responsibility to change their mind at any point, they just have to justify it and explain it.

MR. SIEBER: That happens all the time.

MR. CARUSO: That happens all the time.

MR. SIEBER: There's a requirement that you review and update those; what is it, once a year, every year or every two years? And there's always changes, code corrections that come out to do that. And then everybody has to either justify through some analyses --

MR. CARUSO: Right.

MR. SIEBER: -- that says it really changes the CT by a certain amount or you have to rerun Appendix K.

MR. CARUSO: Right.

MR. SIEBER: Which is not a cheap deal.

CHAIRMAN WALLIS: Well, I think what you're going to tell them is that TRACG is useable for ESBWR, but it might need some improvements and

some details.

MR. SIEBER: Well, there is one other--

CHAIRMAN WALLIS: But at least the basic code is useable. You're going to say they don't need to do new testing, is that what you're going to say? That seem to be a useful conclusion out of this SER.

I'd be a little worried about saying that all that's been done about scaling is adequate. It seems to be a somewhat fluid situation and Mark is asking for something better, and it comes back. And then you've only got three things joined together, and maybe there are more than three things. I mean, I don't know whether that scaling is going to turn out to be complete.

MS. CUBBAGE: Well, I think we've learned enough about the scaling at this point to support our conclusion that we could accept the use of TRACG for ESBWR.

CHAIRMAN WALLIS: Right. And the way they're going about scaling, you would say that's good. But you couldn't, I think, say that how far they've progressed with scaling now is a final word of scaling of ESBWR. You can't certainly say that. You could say that the scaling work they've done so

far indicates that they're on the right track with scaling and now it's a method they can use.

MS. CUBBAGE: But what has been done is sufficient to support our conclusions on TRACG.

CHAIRMAN WALLIS: But when they make this submittal on the ESBWR transients they're going to be much more specific about these transients and it may be that something will come up about a sensitivity to something that will have to be looked at.

MS. CUBBAGE: Right. Because we're not approving --

CHAIRMAN WALLIS: You're not approving it.

MS. CUBBAGE: -- for transients at this time.

CHAIRMAN WALLIS: Right. So I think it's got to be clear, and maybe it's very clear in your mind just what it is this SER is concluding and what it's not concluding.

MS. CUBBAGE: Right. For me to back up on what I said earlier, approval to use TRACG for ESBWR LOCA/PCCS and containment only, that's what this SER is for.

MR. SIEBER: Well, you do have another

problem I think where you have a circular argument going related to uncertainty. And you say that General Electric did not apply the CSAU uncertainty principles correctly. But since the core doesn't uncover, we won't require them to improve their uncertainty methodology. Now, the question is how certain are you that the core doesn't uncover? If the methodology isn't what you want, then you aren't certain that it doesn't uncover. And if you're not certain it doesn't uncover, does that mean you got to change the methodology, or you know, I just see that going around in a big circle. And that gives the vendor a certain amount of uncertainty with regard to the acceptability of the code because that's a no win deal. It's either fix the uncertainty or at least provide a good estimate of how much uncertainty there is associated with whether the core uncovers or not. And I think uncertainty's an important thing. That tells you how much margin you need to have and how much confidence you should be placing in the calculations that you perform. So that's one that sort of bothers me.

DR. KRESS: But you have to keep in mind this is an Appendix K application.

MR. SIEBER: That's correct.

DR. KRESS: And there's no real requirement in Appendix K applications.

MR. SIEBER: To define that, that's right.

MR. LANDRY: This is a realistic application.

MR. SIEBER: It is. That's why uncertainty is important.

DR. KRESS: That's why you have to have something --

MR. LANDRY: That's why at the outset I presented that "out of 50.46 that specifically addresses requirements for uncertainty analysis."

DR. KRESS: I was mistaken then. This is a realistic.

MR. LANDRY: This is using a realistic approach to modeling.

CHAIRMAN WALLIS: Except when dealing with the containment when it's the bounding approach.

MR. LANDRY: Except the containment is handled as a bounding calculation.

CHAIRMAN WALLIS: But it's a wonderful step forward to replace the 22 degrees F by not a

requirement, but by a demonstration that the core never uncovers anyway. That would seem to be a wonderful step forward in terms of public safety.

MR. LANDRY: Well, in this --

CHAIRMAN WALLIS: An assurance of public safety.

MR. LANDRY: In this case, that is the basis for accepting the uncertainty analyses that has been performed. Since the core does not uncover, does not heat up, assessing uncertainty in PCT is meaningless.

CHAIRMAN WALLIS: Yes, we discussed that this morning.

MR. SIEBER: It never changes.

MR. LANDRY: Yes. If it doesn't go up, it's a meaning --

MR. SIEBER: Therefore it's a coolant temperature.

MR. LANDRY: It's a meaningful uncertainty. So General Electric has proposed to use the static head in the chimney as the metric. As long as you have sufficient static head above the core, you show you don't uncover core, you --

CHAIRMAN WALLIS: I think their assertion there are time at sometimes that no matter

what they do it never goes below whatever, a meter or something or other.

MR. SIEBER: I think that's what they're saying.

DR. KRESS: I don't think you can say the uncertainty in P-clad temperature is meaningless. It's a delta function probably.

MR. SIEBER: Yes.

DR. KRESS: And you either have this or it's going to go up pretty high. Because if you start uncovering, you're going to let off the steam reaction near the top then you're going to boil off a lot faster than you thought you would. And perhaps if you just barely uncovered the core to a certain extent, which could be an uncertainty in the core recovery, you could have set off a fairly P-clad temperature. And so it's not a meaningless comment. And it is tied to whether or not you uncover that core and what's the uncertainty in that.

MR. LANDRY: Yes, but we agree with you, Tom. That's why we're saying --

DR. KRESS: Yes, but you're saying that that thing is so high that it's very unlikely that you are uncovering the core to the extent that you're going to have to worry about P-clad.

MR. LANDRY: Well, we're saying like now for the condition as they calculated right now, it doesn't uncover it doesn't heat up. So there really isn't a meaning to PCT. But --

DR. KRESS: Yes, there's a reason for them to calculate that if you can show that that's an uncertainty in that calculation.

MR. LANDRY: Yes. Now that's where we placed the caveat on that should at some point it be shown that the core does uncover and there is a core temperature extrusion, then you must do an appropriate acceptable uncertainty analysis.

DR. KRESS: Yes. The only way we're going to show that at this stage of the game is the calculations using TRACG.

MR. LANDRY: Right.

CHAIRMAN WALLIS: And I think you should say should show that it does uncover, you should show that it could uncover within the range of some uncertainty.

DR. KRESS: Yes. I think that's the right words to use.

CHAIRMAN WALLIS: I mean, if there's really no probability at all that it'll uncover, which it seems to be here, then there's no sense in

worrying about it. You've got to show that that really is a minuscule probability.

MR. SIEBER: Just make the reactor vessel taller. Make it 50 meters.

CHAIRMAN WALLIS: And I think you might be concerned, as one of my colleagues mentioned operator actions. The events that have occurred in the past which have been traumatic for the industry have usually involved operators doing the wrong thing.

DR. KRESS: I think you'd reserve that for the PRA probably.

CHAIRMAN WALLIS: Yes.

DR. KRESS: That doesn't normally come--

CHAIRMAN WALLIS: Well, it's got to be a consideration if everything else is fine, then the weak link may well be the operators.

DR. ROSEN: Well, and even in that case, because the operators have so much time here to do anything; that the likelihood that you look at the performance shaping factors, likelihood is that they'll get it right because it could have --

MR. SIEBER: I would wait until shift change myself.

CHAIRMAN WALLIS: Yes, there's lot of

shifts. New shifts of operators. That might make it better or worse.

Are we ready to adjourn? I'm not sure we need to make conclusions yet. Going to hear some more, and it's probably premature to --

MR. SHIRALKAR: Can we make just one comment, Graham? Real short one.

CHAIRMAN WALLIS: Yes.

MR. SHIRALKAR: We wanted to say that we are really looking for closure on this issue. Approval of TRACG for these applications. And you know it's gone on for 15, 20 years. And we do need, you know, closure on this issue. And that's --

CHAIRMAN WALLIS: Yes. Are there any other comments that GE would like to make at this time? You're going to be here tomorrow.

MR. SHIRALKAR: Yes. One comment I would like to make about the -- to talk about the margins of core uncovery and uncertainties, we'd be talking about the margin of 2 meters of water above the top of the core. And things that we have done have changed that by about 10 to 20 centimeters. And so, you know, a rigorous statistical analysis could be done, it seems to me a little bit --

DR. KRESS: But you know that simplified

analysis you've shared there --

MR. SHIRALKAR: A simplified analysis has been done --

DR. KRESS: And that you could probably do a real good uncertainty analysis of. And that looks like it's as good as TRACG for that phase of the accident. I mean, that's a pot of water boiling off and condensing, and the uncertainty is all in your condensing. So, you know, you could probably do a pretty good uncertainty with a back of the envelop type thing almost.

CHAIRMAN WALLIS: That's right. What you need to show that it's two meters plus or minus 10 centimeters. Not two meters plus or minus three meters.

DR. KRESS: And I'd be perfectly happy with a simplified model --

MR. SHIRALKAR: That was done.

DR. KRESS: Oh. Well, I'd like to see that then.

CHAIRMAN WALLIS: Okay. So we ready to adjourn -- what's the right word. Recess. We're going to recess until 8:30 tomorrow. And by tomorrow everything will become clear.

Thank you all very much for your

attendance and contributions.

(Whereupon, at 5::25 p.m. the meeting was recessed, to reconvene tomorrow at 8:30 a.m.)