Official Transcript of Proceedings ACRST-3174

NUCLEAR REGULATORY COMMISSION

ORIGINAL

Title: Advisory Committee on Reactor Safeguards
Thermal-Hydraulic Phenomena Subcommittee

PROCESS USING ADAMS
TEMPLATE: ACRS/ACNW-005

Docket Number: (not applicable)

Location: Rockville, Maryland

Date: Friday, October 26, 2001

Work Order No.: NRC-082 Pages 225-356

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

October 26, 2001

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

THERMAL-HYDRAULIC PHENOMENA SUBCOMMITTEE MEETING

(ACRS)

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FRIDAY

OCTOBER 26, 2001

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ROCKVILLE, MARYLAND

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

COMMITTEE MEMBERS PRESENT:

DR. GRAHAM WALLIS, Chairman

DR. F. PETER FORD, Member

DR. THOMAS S. KRESS, Member

DR. WILLIAM SHACK, Member

DR. VIRGIL SCHROCK, ACRS Consultant

DR. JOHN D. SIEBER, Member

ACRS STAFF PRESENT:

PAUL A. BOEHNERT, ACRS Staff Engineer

I-N-D-E-X

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

(8:30 a.m.)

CHAIRMAN WALLIS: The meeting will now please come to order. This is a continuation of the meeting of the ACRS Subcommittee on Thermal-Hydraulic Phenomena, at which we discussed the proposed extended power uprates for Dresden and Quad Cities.

And we heard yesterday from Exelon, and the licensees, and today we are going to hear from the staff. I would call on John Zalenski to get us started.

MR. ZALENSKI: Thank you so very much. I guess I am a little bit of a bump in the road, in that I wanted to take a couple of minutes to talk to the letter you sent with respect to the Duane Arnold facility, and its marriage or association to Quad Cities and Dresden.

Our staff is fully prepared to get into the details of the review on Dresden and Quad Cities, but I thought it would be worth a couple of minutes to highlight that your letter has made quite an impact on me personally and on the office.

And one of the issues that I thought I had addressed before the full committee had been my keen desire to ensure that we were going to indeed have a

first-rate product before we ever approved that license amendment.

The status of that particular safety evaluation is that it is not ready to be served, and using a phrase that I have used many times in the past, we will serve no wine before its time.

The technical basis will be robust for each of those given sections, and I would submit that it would be our intent to provide some sort of a highlighted version for your easy review for information purposes once we get to the point where that is rating the issue.

In a small way to show what I believe to be a substantive difference between an early draft and the product that actually goes out the door, and hopefully that may be a little bit closer to some of the expectations of some of the members.

So to the product itself, I don't want to forecast or say that we are going to have it done next week, or the week after, but we are putting our shoulder down to ensure that the first one out of the shoot is done correctly, and it meets management's expectations, and is indeed robust.

As we go forward the staff sometimes relies on previous work and that will be kind of an

example the staff will rely on. So it has got a high mental, and you have helped us in an interesting way to ensure that the mental is put at the right height.

There were a couple of other issues in the letter that -- oh, by the way, we will be responding to the letter formally, but, I really wanted to scratch an itch a little bit and if there was discussion, I would be more than happy to take some questions.

The staff should develop and improve guidance on the detail in the safety evaluation. I read this as a generic comment to how the staff does licensing work, and we will probably respond in that manner.

And some of this is driven by our internal processes. We do have a quality initiative that has been germinating for the past year. It is funded for this fiscal year with a senior management leaving that particular activity, John Hannon in our plant activities branch.

I think we will have a lot to say about this issue over the next year, and the criteria on independent assessments, and things of that sort, I think we will probably be talking to you considerably about a lot of the guidance that currently exists, and

a lot of the expectations that currently exist, and probably do a little bit better job in assuring how our reviews are performed.

I am struck by the young lady that rose at the full committee and said I reviewed this document, and I reviewed that, and I did a lot of these. But none of that ever made it to the safety evaluation.

In so many words, we are going to go back and ask ourselves should we be a little bit more candid to here are the actual things that were done, and so I think in short this has certainly got my attention, and as we go through Duane Arnold, the bar height will be established for what we see for other licensees, and the draft that you received from us on Quad Cities and Dresden is not at that level.

But yet I would not anticipate it having not gone through any management reviews. So if there are any questions, I would be more than happy to take those. Otherwise, I would begin turning the meeting over to Mr. Bajwa.

I will say that I have asked that a number of our senior management team responsible for oversight of the reviews attend this particular subcommittee meeting.

Mr. Hannon is here, and Dr. Barrett and

Mr. Vermeil, and a number of our senior management team out of the two principal divisions in support of this particular meeting.

So by elevating our attendance to some of our managers and section chiefs, I am trying to overtly indicate that we have heard what you have said, and we are trying to be responsive.

If there are no questions, I would be more than happy to get into the subject at hand at this time.

CHAIRMAN WALLIS: Well, no, I just wanted to thank you for what you have said. It is very helpful.

MR. ZALENSKI: Okay. Good. Mr. Bajwa was the project director for Region 3 plants. He is also our lead senior SES responsible for power uprates.

And I have asked him to provide some opening comments on the work that the staff has done, and then our project management team and our technical review team stand prepared to address a variety of review areas.

There is one topic area that we will touch on that we have not come to resolution with Quad Cities and Dresden, and that has to do with integrated testing.

And should these plants be expected to perform testing of the MSIVs, should they be expected to perform other tests, such as suggested in their generic topical report -- and one that comes to mind is the load reject test, today we are simply not in a position to say that we think that those tests are necessary to confirm all the work that has been done by the staff.

My own sense of this is that the decision on whether to test or not is independent of can we approve this license amendment. In other words, I don't believe that any of us feel that conducting the test if necessary to move forward with the technical work or not performing the tests.

So we have more work to do and we will have that issue resolved before we issue the amendment. We just did not have enough time to take it through the various levels of management to ensure we are aligned within our organization.

So with that as kind of an opening comment, why don't you go ahead and get started, Singh.

MR. BAJWA: My name is Singh Bajwa, and moving on to Quad Cities and Dresden, I would like to say that we have conducted a thorough review of the

Dresden and Quad Cities plants in all areas potentially affected by the power uprate.

We conducted our review from existing practices, including the lessons learned from the Maine Yankee experience, although we reviewed information in many areas of the licensing basis of Dresden and Quad Cities units.

And beyond that, we have used this information, and we will focus our representation today on the areas that we believe to be most of interest for our power uprate.

We will also address areas that the ACRS has expressed an interest in. So as John mentioned, we have one open issue which we will not be able to speak to it because it is a pre-decisional at this point.

But as John indicated, we will inform ACRS at the time we issue the safety evaluation in its final form. With that, I will now turn this to Larry Rossbach, the lead project manager for the Dresden and Quad Cities power uprate reviews.

Larry is also the NRR project manager for the Dresden plant. Also at the table is Mr. Stu Bailey, the NRR project manager for the Quad Cities plant.

Larry will give an overview of the review process used for this application and agenda for the meeting. He will also introduce the other presenters at the table.

MR. ROSSBACH: Thank you, Singh. My name is Larry Rossbach, and I am a project manager for the NRR, and I am the project manager for Dresden, and also for the power uprate project for Dresden and Quad Cities.

Briefly, to go over our review process, the guidelines we use, we use the generic G.E. guidelines, and generic evaluations topicals, ELTR-1 and ELTR-2.

These licensing topical reports have previously been accepted by the NRC as an acceptable guideline for power uprate applications. And the staff uses these topicals as guidelines in our review.

In addition, we use the existing NRC standard review plan and we rely on previous power uprates. Specifically, the safety evaluation for the Monticello Nuclear Generating Station was used as a guide for the scope and the depth of the review.

In addition, Dresden and Quad Cities reviews were really done in parallel with the Duane Arnold review, and in some areas even used the same

reviewers. So it should look familiar to you being done in the same format as the G-topicals, and being reviewed in the same manner in-house.

As John Zalenski had said, we are on the Dresden-Quad Cities project of the comments on the Duane Arnold safety evaluation, and we have taken those into account to the extent that we could, although most of the reports that you have was written prior to receiving those comments, and we are continuing to work to improve that safety evaluation.

As we progress in our review, we do sometimes identify the need for additional information, and so there was substantial additional information submitted by the licensee in response to our request.

The staff also performed three audits during the conduct of this amendment review. The Reactor Systems Branch audited global nuclear fuels analysis at the G.E. facility in Wilmington, North Carolina.

the probablistic safety assessment branch staff audited the licensee's risk assessment process at Exelon's midwest offices, and the plant systems reviewer audited analysis at the Dresden site.

The principal areas of our review -- and

again, very similar, and the same as in Duane Arnold, but the staff reviewed the results of the licensee's evaluations in reactor core and fuel performance, and reactor coolant systems, and containment analyses, and emergency core cooling system performance evaluation, and instrumentation and controls.

And the suitability of existing ones and the proposed modifications. The electrical power and power conversion systems, and auxiliary systems, and radiological consequences, special events and limiting operational transients.

And probablistic risk assessment review, and we reviewed human performance aspects of the submittal, and there was an environmental assessment done. The environmental assessment will be published separately in the Federal Register.

I would like to go over briefly the order of our presentation. The reactor systems review will be gone over by Ralph Caruso just to my left, and the plant systems review will be summarized by Ralph Architzel.

Following that, we will respond to ACRS questions in other areas where we had not prepared a full presentation. As time allows, we may get into more detail in those areas.

And they include -- and this is partly in response to questions that we received from the ACRS dealing with material degradation issues, pipe support, pipe and support modifications, the need for electrical modifications, and the PRA analysis and evaluation which we did.

With that, I would like to turn it over to Ralph Caruso.

MR. ZALENSKI: If I might just jump in for a second. As our staff goes through the presentation, it would strike me that it would certainly be fair to query which code standards, which reg guides, standard review plans, acceptance criteria, specific regulatory requirements, the staff is working against.

And the staff should be able to clearly explain what we did to independently determine that something was acceptable. And so seeding your thought a little bit, that would be my expectation to find that kind of information in the final report.

MR. CARUSO: Good morning. My name is Ralph Caruso, and I am chief of the BWR nuclear performance section and reactor systems in NRR,a nd I am going to talk about the nuclear reactor and fuel systems review that was done as part of the Dresden/Quad EPU review.

I am going this with the slides being a little bit out of order, the package that you have, and so I am going to do my presentation the old fashioned way here, and I think I have a crib sheet here that tells me where you should be turning as I go along, and I will call out the slide numbers that you have got.

The first one is slide 10, and that has got my name on it. The second slide is slide 11, and this is the background. This is a power uprate of approximately 18 percent from the original rated normal power level.

It involved implementation of MELLLA and ARTS, reactor trip system. It also involved the introduction of GE14 fuel into a core that is currently supplied by Siemens.

The staff, as part of its review, in addition to the review in-house that we normally do, performed an on-site audit at GNF-Wilmington. This looked at compliance with the analytical methods that we have approved and that are being applied by GE to analyze this reactor's behavior.

And this includes something called G-STAR Amendment 22, which is the process that they used to develop and approve the GE-14 fuel design. We

performed audits of the Dresden and Quad Cities EPU system performance, and a design basis safety analysis. And we reviewed as it says here the safety analysis reports.

DR. SCHROCK: Ralph, before you leave that, I have a question on the first item. One of the problems that I mentioned yesterday in connection with the review of this large quantity of paper that was received is the fact that we essentially had two sets of things that were verbatim to a major extent.

And it was very difficult to sort out the things that were different for the different plants, and I pointed out in the beginning that as I tried to do that, I found that in the SARs that the MELLLA graphs are not the same for the two plants.

And the response to that was initially that, yes, they thought that they were the same and they should not be different. But subsequently I got the two reports side-by-side, and indeed they are different.

So what is then confusing is why are they different? What is the explanation for why the MELLLA is different for the different plants, and why is the response from the plant owners that, yes, they should be the same, when in fact they are not the same?

MR. CARUSO: It is not clear to me. What do you mean by they are different, and in what sense?

DR. SCHROCK: They are different in the sense that different points have different valves. The slope of the main MELLLA line is different on the different graphs.

The full power, full flow point, is the same. Everywhere else on the graph, the lines are not the same.

CHAIRMAN WALLIS: And on the left-hand side the boundaries are very different I think.

MR. CARUSO: Well, I can't speak to the specifics of exactly where the points are. I am not surprised that they are different, because the plants are different, because the fuel designs are different, and because the fuel management schemes will be different, because they are implementing different fuels at different points in life, and there is a lot of core design that gets done, which will change those curves.

So I am not surprised, and so are you looking for an explanation of exactly why the points are slightly different?

DR. SCHROCK: Well, there are two parts to the point that I am trying to make, and the question

that I am trying to raise; and the first one is the detail of what is correct about the SARs. Should those things be different, and should they be the same.

I am confident that I heard pretty clearly yesterday from representatives of the industry that they ought to be the same. Now, you are saying that they ought to be different, and I am not surprised that they are different.

MR. CARUSO: I am not surprised that they are different.

DR. SCHROCK: So there is a point to be resolved there. But the overall point that I am trying to get across is that it makes for a very inefficient process to be put in the position of having to sort out differences between two plants that are being resolved simultaneously when these differences are not highlighted in the documentation that is presented.

And where you get two stacks of paper which you ought to expect to have to digest in some detail, and what you find is that they are essentially verbatim, like 95 percent plus.

And then you have to discover what is the reason for numbers to be different in the two plants

when there is no explanation in the documentation, either in the SARs or in the SERs. That is the problem that I am trying to get across to you.

DR. KRESS: Your MELLLA line is not a fixed thing. It ought to vary throughout the whole life of the core actually.

MR. CARUSO: I would expect it to vary from reload to reload.

DR. KRESS: Yes, and from reload to reload, and so I guess it depends on what they choose to analyze when they put the thing together.

MR. CARUSO: Right. That's why I am saying that I am not surprised that they are different, and I can't speak to the particular details of each curve. Let me ask my staff if they have any insights as to why they might be different?

MR. KENDRICK: This is Edward Kendrick, reactor systems branch. First of all, the Quad and Dresden plants, the pre-EPU are different power levels. The post-EPU is the same thermal power.

So the post-EPU MELLLA lines I believe should be virtually identical. And since they started from a different one and they used in many cases a bounding Unit 5, there could be some differences.

The staff, in preparation for the audit,

looked first at Dresden, and then specifically at Dresden-2, which is the lead unit. And we identified the differences, first of all, between Dresden and Quad, and then the differences between Dresden-2 and Dresden-3.

Now, we did not include a table in the SER. We could do that because for our information we had to go through and look at Dresden, and then go through and look at Quad. So I think in the SER we can tabulate the differences, and why there are differences.

MR. CARUSO: And a great deal of our review did not necessarily look at and verify each individual point on those curves, because the way we do the reviews is to do a sampling to ensure that the methodologies that are being applied are being applied correctly.

So we don't necessarily review every individual number and verify each and every individual number.

CHAIRMAN WALLIS: Well, I was going to ask the question that my colleague asked in a different way. I was going to ask did the staff realize that these figures, which are key, the power versus flow maps, are different for the two plants?

And did they then ask why.

MR. CARUSO: I don't believe that question was explicitly asked, because as I said, I am not surprised at all that they are different.

CHAIRMAN WALLIS: I know, and you can say that, but the thing is were you aware until my colleague mentioned that they were different that they were different, and that is the thing that --

MR. CARUSO: I don't think that I explicitly had -- that it crossed -- well, I don't know. Ed, did that cross your mind? He is nodding yes. He did notice that.

CHAIRMAN WALLIS: I think the natural circulation line is significantly different, for instance, and I don't know why it is different. Anyway, we should probably get off of this point. We have now started asking questions.

MR. CARUSO: Okay. Review Scope, and this is Slide 12. As part of the review, as I said, we have looked at fuel design and operation, and this was Amendment 22, and something that we audited at the GE-Wilmington facility.

Thermal limits, and reactor coolant system, and connected systems, ECCS performance, the capability of the standby liquid control system, and

design basis and safety analysis, and ATWS and ATWS instability. This is the scope.

And Slide 14 will be next. As Larry Rossbach said, we followed the scope of the ELTR-1 and ELTR-2, and the Supplement-1 to ELTR-2, to guide us in our review. And once again in the reactor systems area -- and that's what I am here to focus on -- all of these analyses were done in accordance with NRC approved methodologies, analytical codes, and they are all met NRC approved analytical limits.

And those limits would range from the numbers in the regulations, such as 2200 degrees and 17 percent oxidation in 50-46, to the general design criteria requirements that 99.9 percent of fuel rods not experience boiling transition during a transient event.

CHAIRMAN WALLIS: I'm sorry, but I am going to go back to the previous question. You said that specific points weren't calculated or checked on the power versus flow map. I'm sorry, but my mind is following a train of thought here.

MR. CARUSO: Okay.

CHAIRMAN WALLIS: How did you satisfy yourselves that the MELLLA upper boundary was in fact in the right place?

MR. CARUSO: Well, as part of the audits that were done, the staff reviewed the calculations that were done for linear heat generation rate for the LOCA analyses, and for the transients.

And the MELLLA line will be developed as part of that process. So we reviewed particular points in the process to ensure that the process was being followed, and the MELLLA line was therefore appropriate.

DR. KRESS: You reviewed the process instead of the product.

CHAIRMAN WALLIS: Did you make any independent calculational checks or anything?

MR. CARUSO: No, we did not.

CHAIRMAN WALLIS: So you checked off that they went through the right process?

MR. CARUSO: No, we didn't check it off. What we did was that we sent people to the GE-Wilmington facility to look at detailed calculations, to look at the inputs and to look at the outputs.

And to determine whether the assumptions that were made were appropriate and within the stated limits and the approved methodologies. And that the outputs were in accordance with the acceptance criteria.

CHAIRMAN WALLIS: Well, the reason for asking the question is because this is a very key point, because you are saying that they are arguing that it is now possible to go up to this limit, this boundary.

It is now possible to operate in a region where we have not operated in before, and this is the boundary of the new region. So you have to be really sure that you are on good ground if you approve that boundary or the methods that led to that boundary.

MR. CARUSO: In the reactor systems area, we are -- I don't want to say we are unique, but I think we are probably ahead of other organizations, other parts of NRR, other disciplines, in that we have a well-founded base of analytical methods that have been reviewed and approved, and that we have a lot of experience with.

These methodologies have been reviewed and we have -- we do have our own analytical tools that have been used to verify these methodologies, and we feel that as long as licensees and vendors use those methodologies within the acceptance criteria, and within the limits of application,we do not feel a need to do additional independent assessment unless we have specific credible information which would cause us to

doubt those codes are being applied inappropriately.

And in the case of these power uprates, because the peak bundles are not changing, and because the flow rates are all within current methodological limits, we didn't feel that there was any need to do any independent assessment.

DR. KRESS: If you did want to do an independent assessment would you use RELAP and NAMONA, or is --

MR. CARUSO: It would depend entirely upon the area. If it were a LOCA case, we could use TRAC-B, and we could use RELAP. In the area of stability, we could use ROMANA. Well, ROMANA is the one that comes to mind. I think there may be some other codes.

But we have contractors available to us, and Jose Marsh Luba, the expert on instability, and we would call on him if we felt that there was something about the operation of this plant that placed it outside the appropriate methodology.

But because of the way that they did this power uprate, everything stayed within the appropriate limits, and therefore there was no credible reason for us to doubt that the methodologies were not being applied correctly.

We do occasionally -- I mean, the reason

that we do these audits is because these power uprates called into question whether the methods were being applied correctly.

That was a prima facie case for doing an audit, and that's why we started doing the audits at Duane Arnold, and that's why we continued doing them for Dresden and Quad Cities.

And that's why we continued for Clinton, and that was done, I believe, in September, and I believe that we are planning going out and doing a Brunswick audit sometime later on this winter.

So we are looking at these things to check to make sure that the methodologies are being applied appropriately, but without some credible specific issue. We don't believe that we have the resources to go do an independent assessment.

CHAIRMAN WALLIS: Well, an issue might arise -- and I haven't done this yet, as my colleagues have been looking at these curves in more detail, but if we started to compare them and we found that there were really big differences between this MELLLA boundary in one reference than another, then I think we might ask at the full committee meeting again why this is so -- and it might indicate that someone perhaps needed to check into it.

And you are saying that you didn't have a good reason to want to make an independent assessment of the question, and that may well be true.

We began to question it because we noticed that there were these differences, that's all.

MR. CARUSO: I understand that, but as I said, realize that these changes occur from cycle to cycle, and the staff normally doesn't even do reload reviews. They can make changes to these parameters without our knowledge when they change fuel designs, and when they change core designs.

And we would not even see them except as a report after they start off. That could cause --

DR. KRESS: They basically develop a new MELLLA line for every reload don't they?

MR. CARUSO: That's correct. That has to be reevaluated every reload. All of these analyses have to be done every reload. And they are done in accordance with these approved methods, and we feel comfortable enough with those methods that we didn't think that we needed to do independent assessments.

DR. KRESS: Did your audit go to the extent of checking the input to the codes to these methods?

MR. CARUSO: Yes.

DR. KRESS: So you really did look at the inputs?

MR. CARUSO: As I described I think to this committee, or maybe it was to the full committee, we had four people that went to the plant, and they asked for what are called the design record files, and these are the detailed calculations that support operation.

And they sat down in a room and they read them. They went through them page by page looking at the inputs, and looking at the outputs, and looking at the assumptions.

And then they asked questions, and they sat down with people like Jason Post, who is standing up and he wants to say something.

MR. POST: Yes. This is Jason Post. I have a couple of things. One is that the differences that you see in the power flow maps between the two units are mostly in the natural circulation line, and the minimum pump speed line.

And those were not -- those are historical differences between the two sites, and we did not try to reconcile those differences for this, because that really was not pertinent to the change that was being made.

CHAIRMAN WALLIS: I don't understand the term historical. I mean are they meaningfully different, or is it some mysterious history?

MR. POST: It has to do with the instrumentation and the analysis that was done at the time that those plants were first built. And the difference is not as great as it is shown.

CHAIRMAN WALLIS: Well, if they are similar plants, you would expect natural circulation characteristics to be pretty well the same wouldn't you?

MR. POST: Yes, you would.

CHAIRMAN WALLIS: So why are they so different on a map?

MR. POST: As a result of the improved methodology over the years, some of the plants have gone back and redefined their natural circulation lines. My guess is that one of the units has done that a little more accurately than the other unit.

But again that wasn't something that was pertinent to this design change to MELLLA and EPU. So that was not addressed in this license amendment that historical difference was maintained.

CHAIRMAN WALLIS: Well, maybe if we asked the question again at the next meeting, you will have

an explanation other than history?

MR. POST: Certainly.

CHAIRMAN WALLIS: Can you have an explanation other than that?

MR. POST: Certainly. The other statement that I wanted to make was that while the actual power flow relationship can change from a cycle to cycle basis, the MELLLA line itself is a licensed limit, and that as a licensed boundary does not change.

And that licensed boundary is drawn to be bounding over the actual power flow relationship that can change slightly from cycle to cycle. And Israel is just coaching me here. It is also common to both plants, and so the MELLLA boundary itself is identical between the two sites.

It's just extended to a lower core flow in one to match the natural circulation line, which is lower.

CHAIRMAN WALLIS: Thank you.

DR. KRESS: So Virgil's observation that the slope is different is not true? The slope is actually the same?

MR. POST: That is correct.

MR. CARUSO: It is not the same on the graphs.

MR. POST: Excuse me. I believe the slope is the same on the two SARs. It's just that the lower point, the lower left-hand point, is different. So it might appear that the slope is different.

CHAIRMAN WALLIS: This is something that we can easily verify since we have two different points of view, and we can do a test at the break and see who is right.

MR. CARUSO: My next slide is actually Slide 21 in your package. And it is the reactor core and fuel performance slide. And one of the questions that often comes up is a question about margin, and who owns the margin.

And as I stated earlier, we have a number of different cycles specific, and licensing thermal limits. And the licensing limits, like the 2200 degrees, and the 86 gallons per minute for the standpoint liquid control system, and the 99.9 percent limit for the transient, those are the fixed limits.

And licensees are free to work within that boundary as much as they want. They own that margin.

CHAIRMAN WALLIS: And they did in this case.

MR. CARUSO: And they do.

CHAIRMAN WALLIS: And 1600 became 1600

exactly, for instance.

MR. CARUSO: That's acceptable.

CHAIRMAN WALLIS: And 1500 psi became 1499.

MR. CARUSO: And I will be honest, as the first question that I asked when I saw the number was how many times did you have to run it to get results.

CHAIRMAN WALLIS: We asked the same thing. We asked about do loops and things.

MR. CARUSO: And I got a very indignant response. He said that the first time that we ran it, it was 1499 and that is what it was.

DR. SHACK: I wouldn't run it again either.

DR. KRESS: Your statement that the margins are available to the licensee, does that have qualifications to it? Like it is available if they are using the same approved codes that they used before?

MR. CARUSO: Absolutely. They have to use the methodologies within the limits that are defined in the SER, and they have to meet the appropriate acceptance criteria.

DR. KRESS: So if I go in and change my code, and improve the code, do I still --

MR. CARUSO: We could spend all day talking about changes to the codes.

DR. KRESS: Yes, I understand.

MR. CARUSO: There are rules about this, some of which are better defined than others, about when changes have to be re-reviewed, and it depends on whether it is a LOCA code, or a transient code, or a stability code.

And we have disagreements about that now and again. But generally as long as they stay within the acceptance limits, then they can wander within the box. And occasionally we see people do very creative things, and we try to convince them of the error of their ways when they do that.

Once again, as I said here, this is an unusual power uprate because it was based not on any one particular plant. Most of the analyses were done for what was called Unit 5, and it was a bounding analysis of some plant that doesn't actually exist and that had parameters that bounded all of the four Dresden and Quad Cities units.

But our determination was that this equilibrium bounding unit -- the analysis of this equilibrium bounding unit demonstrated that the thermal limits are acceptable, and that the cores that

will be designed eventually in the future to be used in these plants can be appropriately designed, and can be appropriately operated.

CHAIRMAN WALLIS: Could you say what the thermal limits are again, and what you mean by it?

MR. CARUSO: Up here on top, we have a safety limit minimum, minimum critical power ratio, MCPR.

CHAIRMAN WALLIS: Those are things like the 2200 degrees and things like that?

MR. CARUSO: Some of these are 2200, like the LOCA limit to the right is there, and the safety limit, MCPR, and its derivative, the operating limit MCPR, are there to show that you meet the 99.9 percent boiling transition.

CHAIRMAN WALLIS: Were these evaluated for -- I don't quite understand, but for some typical cores, which is a bounding -- some typical bounding unit?

MR. CARUSO: Yes.

CHAIRMAN WALLIS: Well, then you are sure that this is somehow outside all the possibilities of the various limitations of cause or whatever?

MR. CARUSO: For the purposes of doing the power uprate, they did a bounding calculation, but

then for each individual plant, for each actual core design, they will verify that that core design meets those limits.

CHAIRMAN WALLIS: The numbers that we were presented with, the 1600 degrees, and things like that, are the actual specific calculations for specific plants aren't they?

MR. CARUSO: I think it depends on the analysis. In some cases, they were plant specific, but in some cases they were bounding. I seem to remember some were plant specific, but some were also bounding.

CHAIRMAN WALLIS: It would seem that eventually they all have to be plant specific.

MR. CARUSO: That's correct.

CHAIRMAN WALLIS: And one would expect the number to go down when it becomes plant specific if the previous one were bounding.

MR. CARUSO: Yes, that's correct.

CHAIRMAN WALLIS: Is that always the case?

MR. CARUSO: I believe so.

CHAIRMAN WALLIS: Does it go down by much? Is it exactly 1600 in the bounding case, and 1599 for the plant, or something like that?

MR. CARUSO: I don't think that they are

going to go down to something like 700.

CHAIRMAN WALLIS: I guess if we saw 1600 for the plant, then the bounding unit must have been somewhere above the limit.

MR. CARUSO: Let's see if I can get someone from the licensee to answer that.

MR. FREEMAN: This is John Freeman with Exelon. The 1600 degree was for the upper bound calculation on the LOCA analysis.

MR. CARUSO: Oh, you are talking about the LOCA number. Okay.

MR. FREEMAN: I think that is what you were driving at, and that was a bounding number based on the Unit 5 approach, which covered all of the fuel types which were going to be in the reactor.

As far as whether some of them are cycle specific, or bounding, LOCA -- well, actually, all the thermal limits get reevaluated on a cycle specific basis. However, most of them don't change. The ones that we expect to change are the safety limit MCPR, the operating limit MCPR. To a lesser extent, the LHGR, depending on how the center line melt and plastic strain limits are met.

So that is all done on a cycle specific basis. However, I think the big issue was the LOCA

analysis, and that is bounding. The ATWS analysis was bounding.

So we don't expect to see any changes in those results without changes to the reactor system design.

CHAIRMAN WALLIS: So this 1600 degree example that we have here is specific to each cycle. So it is a variable. It changes all the time?

MR. CARUSO: Well, in this case, I think as the GE -- I think Dan Pappone did that presentation yesterday. And he explained that they have a 1600 degree limit in the GE methodology. So they may --

CHAIRMAN WALLIS: But the 1600 is the actual as well.

MR. CARUSO: And they calculate 1600 as the actual number, but they may vary the MAPLHGR limit, the linear regeneration rate, to stay below that number.

So they will use 1600 as the limit, and they will vary the heat generation rate to make sure that they stay within it. The number may stay the same, and --

CHAIRMAN WALLIS: And part of your licensing procedure is not just to say they have calculated a number which you approved of, but to say

that you trust them to keep calculating it and to keep it below your limit?

MR. CARUSO: Yes, that's very important.

CHAIRMAN WALLIS: And you trust them to keep calculating it all the time because it is cycle specific?

MR. CARUSO: That's a very important point.

CHAIRMAN WALLIS: And not to let it go over the limit.

MR. CARUSO: That is a very important point, yes. We trust them to do these calculations appropriately. But we also verify from time to time that they are.

CHAIRMAN WALLIS: So when they show us a number which is exactly on the border, 1600 calculated equals 1600 allowable, then this is for a particular calculation at a particular time that is implied with sort of our approval of that if we approve it, and they are going to keep doing this, and they are not going to allow themselves to go over that?

MR. CARUSO: That's correct.

CHAIRMAN WALLIS: And that they didn't understand at the time?

MR. CARUSO: That's correct.

CHAIRMAN WALLIS: And presumably they found that they were going over it? What would they do, shut down the plant until they corrected something or what?

MR. CARUSO: No, they have to revise some aspect of either plant operation or core design to make sure they stay below it.

CHAIRMAN WALLIS: So they might then operate at a reduced power?

MR. CARUSO: Exactly.

DR. KRESS: They can only go over it on a hypothetical basis.

CHAIRMAN WALLIS: Of course, it is a calculation.

DR. KRESS: It is a calculation.

CHAIRMAN WALLIS: Okay. Thank you.

MR. CARUSO: Let's see. My next slide is Slide 28. Let's see. I have a general discussion here about system performance. We looked at the systems.

For example, the RCI system, the high pressure injection systems, and the low pressure injection systems, to see whether they would perform their design functions at the higher power, higher rated power.

And because this was a constant pressure uprate, those reviews were not very difficult to determine that those components would operate appropriately, because they see the same steam pressure, and they see the same reactor pressure. Most of the bounding parameters remain the same for these systems.

DR. KRESS: How did you decide that the isolation valves would perform their function just as well at the new uprate?

MR. CARUSO: The isolation valves. Actually, they have to be able to close on critical flow. If you have a pipe break outside the MSIV --

DR. KRESS: I understand, and the heat didn't change?

MR. CARUSO: The pressure didn't change.

DR. KRESS: Yes, but T did.

MR. CARUSO: T? Temperature?

DR. KRESS: Critical flow is squared over KGRT. It is steam. It is close enough.

MR. CARUSO: I don't think it matters. Why did the heat change?

DR. KRESS: Well, I thought you changed the outlet temperature.

MR. CARUSO: No.

DR. KRESS: Just the amount of steam flow?

MR. CARUSO: The steam flow rate changed, but the steam pressure stays the same.

DR. KRESS: So your blow down rates are about the same.

MR. CARUSO: They would be about the same.

DR. KRESS: And your pressure is about the same.

MR. CARUSO: Right.

DR. KRESS: So the loads on the valves, if they could close before, they can close now is what you are saying?

MR. CARUSO: Exactly.

DR. KRESS: Okay.

MR. CARUSO: Let's see. My next slide is Slide 29. As I said, they performed the LOCA analyses for the bounding unit using an equilibrium GE-core.

This is the core that they eventually expect to get to once they replace all the Siemens' fuel in about 2, 3, or 4 cycles with GE-14 fuel. And we looked at the -- as part of our audit, we looked at the pre-EPU and the EPU analyses for LOCA.

These were done with the SAFER/GESTR methodology that was described yesterday, and as we have discussed in the past, the peak limiting bundle

for these analyses doesn't really change.

So there was not much to look at in terms of changes to the methodology, and changes to the inputs to reflect the fact that it was a mixed core, Siemens fuel and GE-14 fuel, and it changes because it is GE-14 fuel which is going in for the first time.

But other than that, the methodology was applied appropriately, and the LOCA analyses demonstrated compliance with 50.46.

DR. KRESS: This particular ECCS, to deal with LOCA, is it a head spray, or where does that come in at?

MR. CARUSO: I need assistance. This says -- well, Dresden has high pressure coolant injection. How many high coolant injection pumps? One high pressure coolant injection pump.

DR. KRESS: And that is in the head coming down on top?

CHAIRMAN WALLIS: It is a ring spray, a ring with a lot of nozzles on it.

MR. CARUSO: It is a low pressure core spray.

CHAIRMAN WALLIS: We are asking the staff if they know or if they understand the system, I guess.

MR. CARUSO: Well, you are asking me off the top of my head, and I don't have all 37 BWRs in my head.

CHAIRMAN WALLIS: I know. I understand that.

DR. KRESS: Well, part of my question is to see what you guys looked at, and the other part is if you flatten out the core profile, and you have got more steam coming up around the edges, and less in the middle.

And you are basing your validation of your code for these ECCS based on something like the old tests in Germany and Japan, which didn't have a core profile. It had a different one.

And does this put into question the validation of the codes that are used to calculate these peak clad temperatures?

MR. CARUSO: Interestingly enough, this is one thing that we did actually talk to them about, spray distribution.

DR. KRESS: Yeah, carry over and the spray distribution. Right.

MR. CARUSO: And it came up in a relationship to an issue involving license renewal of the BWR, and we were concerned about spray

distribution over extended -- of a plant at the end of 60 years, and would it still have the same spray distribution.

And in talking to G.E. about it, we learned that spray distribution is not important for the early part of the LOCA because of the assumptions that are made as part of the analysis. They don't assume a particular distribution, but for the long term cooling portion of the LOCA analysis, spray distribution does become important.

And let me see if I remember the logic here, because this gets very convoluted. Late in the LOCA sequence, the distribution is acceptable. I am trying to remember the reason why we discussed this with them.

CHAIRMAN WALLIS: Early in the sequence, you have got a pool don't you?

MR. CARUSO: Exactly, and that's why --

DR. KRESS: The pool is up on the top.

CHAIRMAN WALLIS: But then how the pool drains will depend upon the amount of steam coming out of all of these channels, which is now different because you have gotten more heat source on the outside from the decay heat.

DR. KRESS: And the question was how much

of that drained and how much got carried out.

CHAIRMAN WALLIS: Well, there is a different pattern of drainage, too, because of the flux distribution.

MR. CARUSO: This was discussed. We had a real long discussion with them about this.

CHAIRMAN WALLIS: It was discussed, and so you are really sure that you are on good technical grounds?

MR. CARUSO: Yes.

CHAIRMAN WALLIS: And you looked at the effect of the new distribution of heat source across the core on the draining of that pool during a LOCA?

MR. CARUSO: Yes. The explanations are very reasonable. I was going to suggest at some point that it might be a good idea -- well, I won't talk about that now.

CHAIRMAN WALLIS: Well, you didn't find it necessary to do any independent verification calculations or anything on those phenomena?

MR. CARUSO: No.

CHAIRMAN WALLIS: Because I guess one of the generic questions that ACRS raised before was when do you decide to do your independent verification calculations, and when do you accept what you see from

the applicant.

MR. CARUSO: And as I said earlier, if we -- when we are using these approved methods within their acceptance criteria, we would do independent calculations if we had some specific and credible reason to believe that they were not appropriately being applied.

If we had some issue that had been raised by staff members, by the Office of Research, by the ACRS, by outside interested parties, that said they didn't consider this particular aspect.

And there is no way you can tell that from their analysis, and then we might do an independent analysis in that case. But realize that the methodologies have been validated in many instances against the NRC codes already.

CHAIRMAN WALLIS: We have no way of independently checking this. We just have to ask you and sort of believe that you have done the job.

MR. CARUSO: You would have to dig through piles, and piles, and piles of topical reports.

CHAIRMAN WALLIS: That's correct.

MR. ZALENSKI: For closure on this issue did I hear a comment or a question raised regarding the validity of our codes based on new data becoming

available from Japan?

DR. KRESS: No, the comment was that the codes -- that their validation was based on old data mostly, I think, and those used actual flux distributions that were not as flat as these.

And the question is does that put into question the validity of them, because it is based on old data with the wrong flux distribution.

MR. CARUSO: Our question really had to do with the spray distribution, and to make sure that there was the spray distribution that was assumed as part of the analysis.

DR. KRESS: Yes, it is the same issue. Is the flux distribution going to maybe affect the spray distribution.

MR. BOEHNERT: And whether the tests are still applicable.

DR. KRESS: So that was the nature of the question.

DR. SCHROCK: I guess I wonder how confident a particular analysis is bounding.

MR. CARUSO: Generally, you mean?

DR. SCHROCK: Yes, in general. Do you scratch your head and say now why is this one bounding when I am going to make some changes?

MR. CARUSO: Well, that is one of the reasons that we did the audits. We sent people down to actually look at the inputs that were used, and the people that did the audits, like Ed Kendrick here, are experienced in core design and analysis methods.

And they know which parameters are sensitive, or which parameters can affect those analyses, and they looked at the bounding analyses and determined that G.E. had used the appropriate conservative values as inputs. And they ran a number of sensitivity cases to verify that.

CHAIRMAN WALLIS: Oh, G.E. ran them?

MR. CARUSO: G.E. ran them. That takes me to my next slide, which is Number 30, which is what we did as part of the audit reviews. Fuel thermal limits, which is transients; and reactivity characteristics, and stability.

And we looked at detailed calculations in each of these areas to verify that they were done appropriately.

CHAIRMAN WALLIS: This is a check of paperwork?

MR. CARUSO: It is a check of the calculations.

CHAIRMAN WALLIS: It is not an interactive

thing, where you look over someone's shoulder and say, well, how about trying this and that, and let's see if it is really bounding.

MR. CARUSO: No, but because it was done at the vendor site, and when people had questions about what was in the paperwork, they could immediately ask the people who did the work and get an answer. They are interactive in that sense.

CHAIRMAN WALLIS: And that wasn't actually sort of together running the code to see what happened under certain circumstances or that you were curious about?

MR. CARUSO: No.

CHAIRMAN WALLIS: It would be interesting if you could do that sort of thing.

MR. CARUSO: We are about to do that for one of the advanced reactor reviews. In this case, we didn't feel that it was necessary. Are there any questions about the audits? If not, my last slide is Slide Number 33, Conclusions.

CHAIRMAN WALLIS: I guess it is hard to know, and I guess what I am thinking about here is how do we satisfy you did a good audit? Well, I guess an example would be if you had a case history where you found something, and if the audit found nothing, it is

a kind of evidence-free situation.

And we don't know if it is good or bad as you didn't find anything, maybe because you didn't try hard enough or maybe there is nothing there to find. It is hard to know what to say.

But if you had a case history where you were actually curious about something, and you wondered about it, and when you probed deeper, yes, you indeed found that they really knew what they were doing, and they convinced you that everything was good.

That might be a little bit more harder to convince some independent person that the audit was a useful exercise.

MR. CARUSO: I will go back to the Duane Arnold review and something that I said last time. None of these audits should be looked at in isolation. It is a series of audits, and we started with the Duane Arnold review, looking at areas that we had the most interest in.

And I am going to admit that we had an anterior motives besides doing the power uprates. We wanted to understand how the vendors were doing their reviews.

So we were looking in places that we

really didn't think we would find anything related to power uprates, but we wanted to just check how they had done the calculations.

And during the Duane Arnold review, we found a couple of significant issues. We found one that led to a Part 21 report, and the next audit that we did, we decided that we would look at something different, because we only have a certain limited amount of time.

So we focused on things where we think we will find something, and in this case we came up with a dry hole so to speak. But that's not bad. The next time we did the Clinton audit. I don't know what to say about the Clinton audit. I think -- well, I don't want to talk about it. That is pre-decisional.

But then we will do another one for Brunswick, and we will do another one for the plant after that, and at some point we will get tired, and we will stop.

DR. KRESS: From the reactor safety evaluations, your previous slide, I sort of have a two-part question. For the site calculations, 10 CFR 100, did they redo an origin calculation to get a new inventory, or did they just scale up the previous

inventory in some way, like using the power ratio

MR. BAILEY: What the did -- this is Stewart Bailey, and I am the project manager for Quad Cities. They did run origin for the new core loadings and for the 24 cycle, and they used that to develop scaling factors on the critical isotopes.

And they combined that with some of their previous analysis to evaluate the changes in the off-site dose.

DR. KRESS: And I have a question to ask G.E. or that I asked the applicant people yesterday about the PRA, and the use of LERF. With a different core inventory, with different power and a different amount of products in the core, should the definition of what constitutes an acceptable LERF be the same or should it change?

MR. BAILEY: I am not going to touch that. Mark Rubin will.

MR. RUBIN: Good morning. I am Mark Rubin from the PRA branch. I think we have kicked this around with the committee a couple of times. It is certainly a very valid point as we have mentioned before.

Generally, we see a large variety of power levels in currently operating plants, and when we are

developing the guidance for Reg Guide 1.174, it was thought that we should try to be design independent, and site independent, and go with a LERF that would certainly be confirmatory on the Commission safety goals.

We have plants at higher power levels operating now, and clearly have higher inventory, given a LERF. We are sticking with the 1.174 criteria at this time. I believe if we were to start the licensing plants at significantly higher power levels than currently operating, we certainly would want to reconfirm the LERF definitions, but at this time we think that this is appropriate.

DR. KRESS: Because the power levels are generally within the mean of the distribution?

MR. RUBIN: Yes, sir.

DR. KRESS: I think that is a good answer.

DR. SCHROCK: How about the way in which origin is used? And one of the difficulties that I have in hearing that everything is done with previously approved codes, the codes can be used in a variety of ways, and Origin is an example, as it is designed it is a point reactor.

And so it doesn't do for you any spacial evaluation of different compositions in different

parts of the core. If you are going to use it to do that, then you have got to apply it in a particular way.

Another limitation that it has is that the composition of the core is constant during a time step, and so the limitation that you may place on the time step will have an impact on the accuracy of results that you get from the application of the code.

So what I am asking is do you look at how Origin is employed in different parts of the analyses that are necessary on these evaluations? It comes up in a number of ways; for the radiological consequence, for the activities, for a wide range of things.

In a sense, it is a more general question. It is how do you assure yourself that what you regard as an adequate previously approved code, which you then have confidence in the results for a new application, is being applied in a way that you should still have that confidence.

MR. CARUSO: Well, for the -- I can't speak to Origin, because I was not involved in reviewing the origin code. We don't have the individual here.

But I think the question is probably also applicable to the other codes that we deal with, and

I guess you could say, well, how do we know that they are not doing and creating a notalization, for example, or creative time steps control.

And the answer is that we when we do the review of the LOCA codes, for example, we approve explicit notalizations, and they are required to do time step studies to verify that the time steps that are used demonstrate convergence.

There are lots of criteria that go into approving a method to make sure that people don't use it too creatively. And if you go look at the way the vendors have set up their calculational systems, they are very rigid because they can't afford to have to defend lots of creative solutions.

And so they do things in rather rigid ways, and we found this of all the vendors. They all proceed this way. So it is our experience that with codes like the LOCA codes, they are rather set in their ways.

So they don't do things very creatively with those codes, because it is not worth it to them from an economic basis, and we try in approving the methodologies to define the box so that they can't be too creative.

I can't answer with regard to the origin

calculation, but I understand the question that you are asking.

DR. SCHROCK: And another question regarding the approved codes. According to the SAR and I believe also your draft SER, one of the ECCS LOCA codes that is in the table of approved codes is said not to have been previously approved, but to be currently under review and that is TASK.

MR. CARUSO: Yes.

DR. SCHROCK: Can you tell us the status of that?

MR. CARUSO: I can give you some history behind this. This is actually -- this is one of those examples of something of a change that might not be considered to be a change.

G.E. had previously been using a code called SKAT. The same four letters rearranged slightly different. That was the code that was explicitly approved in the methodology for -- I believe it is a LOCA methodology.

And along the line they are allowed to make changes to the LOCA methods to a certain extent without our approval. And in this case, they made a change that involved a change in the name of the code, and they didn't think it was a change that required

our review.

During an industry audit of their methodologies, the industry found this change and said we think you should send this to the NRC for review. And the staff, when they found out about it, said, yes, we agree.

So G.E. submitted the code to us for review, and I just go the draft SER from Tony Ulyses this morning, and he believes that it is acceptable. He thinks it is a relatively minor change, and we will be approving that.

So the change from SCAT to TASC is one of these changes that they are allowed to do, but we always do have disagreements about when is a change significant and when is it not. And those are things that we can work out with them.

DR. SCHROCK: I guess if my experience is relevant to what the committee knows about these codes, there is a large question mark as to what really the codes contain.

So what you have just described as a process of approval of a new code, which isn't going to come to the committee for review, it is one of about six things that are indicated as being a part of the ECCS LOCA evaluation, I don't know what they do.

And so I don't know how I can say yes, I think the ACRS ought to agree that NRR has a sound basis for saying that they have reviewed all of this, and it is in fact well accepted. There is something missing in here as I see it, and I may not be seeing it the way as members of the committee.

I don't see how you can expect to have people look at what you have said and accept what you have said if you don't show them what it is that you are talking about.

MR. CARUSO: Well, the LOCA codes are an unusual case, in the sense that 50.46 explicitly allows licensees and vendors to make changes to LOCA codes without approval of the staff. It is written in the regulation.

They are required to report to us periodically, at least on an annual basis, when they do make those changes. And the effect of those changes on PCT limits. But this is in the regulation.

And so it gets -- well, the difficulty is that it is not spelled out very well in the regulation what exactly is -- well, I shouldn't say that, because the regulation does have a criteria. It has a 50 degree criteria when the accumulation of temperature changes reaches 50 degrees, licensees are required to

make a report to us, and they are required to redo their analyses.

But when you talk about whether those changes have to be approved by the staff, the staff has an opportunity to discuss them with the vendors, and decide whether they should be reviewed.

But we do approve minor changes to methodologies all the time without coming in to ACRS. I am not sure though that you wouldn't want to see every one of them.

So we make a judgment as to whether something is major or significant, and we consult with the ACRS staff to see whether you would like to review it, and most of the time the answer is no.

MR. ZALENSKI: In fact, there is another provision in there, in 50.46, when the licensee trips 50 degrees, that is a 30 day report. When they trip 20 degrees, that goes into their annual report as to changes that they have looked at and anticipated, and maybe adopted, or maybe not adopted.

DR. SCHROCK: But these are the results of calculations and the ability to judge that the calculation is an adequate calculation that I am really questioning.

CHAIRMAN WALLIS: What you are saying is

that they could put complete nonsense into the physics and get 10 degrees.

DR. SCHROCK: Yes.

MR. CARUSO: And that's why I said we tried to write the acceptance of the methodologies in such a way that they can't be too creative. And we try to do that, and that's why we like to do these audits, because these audits give us an opportunity to go see how creative they are. That's why we thought that this was a nice opportunity for us.

CHAIRMAN WALLIS: Are we breaking this up and trying to do --

MR. CARUSO: No, I'm done.

CHAIRMAN WALLIS: You're done?

MR. CARUSO: I'm done.

CHAIRMAN WALLIS: So how many of these have you covered? I have lost track.

MR. CARUSO: The last one was number -- well, page 30.

CHAIRMAN WALLIS: And all these other numbers before that you have covered in some other sort of order?

MR. CARUSO: Actually, a lot of those were backup slides. I was going to offer those up if you had questions about particular issues, such as

stability of thermal limits, or fuel design, and I could give you details.

CHAIRMAN WALLIS: So your bottom line one of all these numbers here is?

MR. CARUSO: Is Number 33, which says that they used appropriate methods.

CHAIRMAN WALLIS: And they got appropriate answers?

MR. CARUSO: And they got appropriate answers. And we looked at them, and we looked at how they did it specifically as part of the audit, and we didn't find anything unusual.

And we have not heard any credible specific evidence raised that the methods are not appropriate.

DR. SHACK: Just following up on Virgil's question. What kind of changes are they making when they are making these changes all the time? I mean, can you think of some examples? Are they changing correlations, or they are not changing numerical methods?

MR. CARUSO: Well, no, they don't change numerical methods. They might change a correlation. I mean, very frequently, they will -- well, for example, they will come up with a new fuel design.

So they have got to put a new correlation into the model to account for the new fuel design, and I have had some people doing a bunch of those. A lot of times they find errors.

DR. SHACK: Right.

MR. CARUSO: But they are usually minor. They are minor errors, and a lot of what gets reported to us is that we have identified that we made a non-conservative assumption about the start of the ISI pump, and instead of starting at 28 seconds, it starts at 32 seconds. Something like that.

DR. SHACK: Okay. A lot of these affect input assumptions?

MR. CARUSO: Right. A lot of them affect input assumptions. I can't think of any off the top of my head that affected internal workings of the codes.

CHAIRMAN WALLIS: So you said you were done. What is the next move?

MR. CARUSO: Plant systems.

CHAIRMAN WALLIS: Thank you very much, Ralph.

MR. BAILEY: Starting on 35.

MR. CARUSO: Oh, let me ask one other question. Is there anything that I need to take away

from this session as a testing or a query, or something that you would like us to talk about specifically at the next session in front of the full committee that I have not covered?

CHAIRMAN WALLIS: Well, it is hard to say exactly what will happen at the full committee meeting. It is a fresh game, you know, and then our mines will be working between now and then.

MR. CARUSO: But nothing that you can think of right now?

CHAIRMAN WALLIS: I think you ought to read the transcript. Does any member have anything that they wish to add at this time? If not, let's move on then.

MR. ARCHITZEL: My name is Ralph Architzel, and I am the lead reviewer for the plant systems branch review for the extended power uprates for Dresden and Quad Cities. There were additional reviewers that looked at various areas during this review, and they were Ron Young, and he is not with us today, but other members are here that looked at the HVAC control room features.

Steve Jones looked at some of the spent fuel pool issues, and Rob Elliott looked at the strainer delta-P calculation aspects of it, and it's

not really related to EPU, but it got resolved during the course of the EPU.

And in addition, Rich LaBelle assisted with the containment performance reviews, along with Ben Gitnick, who is our ISL contractor, during the Duane Arnold audit.

Basically, the plant systems branch -- if you could go on to the next slide, and the slides are a little bit changed from what I saw last night.

Basically, the plant systems branch has a wide breadth of responsibilities. The way that we performed our review is that it is somewhat different than reactor systems, but I will go over it right now.

We reviewed the design operation requirements for the systems, using the UFSAR. We did examine application for conformance with the approved topical report, and the statements in the topical report safety evaluation, and that was quite an extensive review just to get that information and digest it, because I was not one of the original reviewers for the EPU.

We assured Agency regulations and reg guides are met under EPU conditions, and that is the reg guide standards, and in this context, you have to go back to the licensing basis for the plant as well.

So it is not always a straight correlation for a standard review plan, or for the regulatory guides. We held telephone conferences, quite a few, to clarify the applications, and to systems design and operation, and the responses.

And in that context, these applications aren't sometimes quite as extensive as what you see on the FSAR. So there is -- where we search for additional clarifications are in areas where there wasn't quite the detail that we felt was necessary to make the safety decision.

We issued RAIs to resolve questions regarding the licensee's EPU evaluation results, and the supplement to documented information. In our review, we did coordinate with different branches because we do have a wide breadth of responsibility, and where others might have the lead.

This included working with the PRA branch on the impacts on our affected systems, and we worked with the inspection programs branch on start-up test issues, and station blackout input with the electrical branch.

And the radiological source term with Steve Levine when we are doing the control room HVAC reviews. Our conclusion was that the EPU did not

adversely affect the operational basis of the responsible areas that we had under our review. Go to the next slide.

The next series of slides basically is a tabulation of the areas where we provided input into the EPU safety evaluation report. I assume you have it and that you have read it.

I don't know that I want to go over all these unless you really had questions. There were certain areas where we had significant review items, and I have asked Rick for those, and they are on the last page, but right now I will just flip through these areas, unless the committee has any questions.

DR. KRESS: I have a question about the containment performance, and it has to do with source term.

MR. ARCHITZEL: All right.

DR. KRESS: There is this alternate source term that is in 10 CFR 100 to show compliance with the thing, and there is one for BWRs and one for PWRs.

The question that I have is whether that is the source term that they used to show that they meet 10 CFR 100? And does the fact that you have a different power, should it influence the design basis source term from the standpoint of bypass around the

suppression pool, and the temperature and effectiveness of the suppression pool in removing source terms?

MR. BAILEY: This is Stewart Bailey, the PM for Quad Cities. The licensee did not go to the alternate source term as a part of this update.

DR. KRESS: They used the old source term?

MR. BAILEY: They were originally a TAD 14844 source term, and they ran the origin runs to get appropriate scaling factors, and usually just scaling up the critical isotopes. They have not gone to alternate source term yet.

DR. KRESS: Did they take credit for sprays, containment sprays? I understand that this particular --

MR. BAILEY: My understanding is that they did not. They would have to clarify that. Our reviewer, or the person who reviewed all of the dose analysis in detail is not here today. But my understanding is that they did not credit the spray for iodine scrubbing.

DR. KRESS: But do you know what they used for a suppression pool decontamination factor?

MR. BAILEY: I don't know that offhand.

DR. KRESS: I guess I would have to ask

the people --

MR. ARCHITZEL: Yes, as that was not within my review.

DR. FORD: Could I ask a question of the previous graph about radiological source terms? In that analysis that you did, you referred to Hydrogen 16. A case has been made that because you are using Noble Chem that Hydrogen 16 would be reduced.

Was there any analysis that was done as to how well the Noble Chem is going to stand up to the high flow rates, in terms of this adherence?

MR. ARCHITZEL: Let me just explain that my part of that review was basically asking or had some questions about the use of Noble Chem, and whether they wanted to credit it for reduced hydrogen usage, or excuse me, when they came to the limit on the recombiners.

So there are different aspects that have been involved on whether they were going to use or credit Noble Chem, and they stated in their response to the RAI that that was not their licensing basis. But they planned to use it.

As far as the aspect that you are talking about, the degradation of Nobel Chem, I did not look at that area, and I am not --

MR. BARRETT: This is Rich Barrett with the NRR staff. A number of questions this morning do seem to relate to the way in which the radiological consequences -- the source term, et cetera -- were calculated, and we do not have our reviewer here today.

If the Committee would be interested in having someone here, we could probably arrange to do that this morning.

CHAIRMAN WALLIS: Maybe you could arrange for someone to come after the break, since there have been several questions, and that would be helpful. Can you do that, Rich?

MR. BARRETT: Yes, we will look into that.

CHAIRMAN WALLIS: Thank you.

MR. ARCHITZEL: At this point, I would just like to return to the list of areas and quickly go over them, and then if there are questions, I do have backups for some of the areas of review.

Main steam isolation valves, residual heat removal/LPCI/containment cooling and shutdown cooling systems, are basically the modes that reflect on the containment response, and not to the heat portion of that.

DR. FORD: Will the discussion on the

steam separator performance, will that come in later on in materials degradation?

MR. ARCHITZEL: The discussion is a limited discussion, and the limited review that I did on the steam separator performance is strictly to verify that they were going to test the moisture carryover and you heard a discussion yesterday, but that was the response that they got in the REI.

As far as the structural part of the separators, and what the staff reviewed, that would be the mechanical engineer --

MR. BAILEY: Dr. Ford, you are interested in hearing from mechanical engineering on the structural integrity of the dryer?

DR. FORD: Yes.

MR. BAILEY: I think we can arrange that.

DR. FORD: Well, it is really just the process that you went through to assess their analysis that there would not be a big impact of fluence use vibration, for instance.

CHAIRMAN WALLIS: The loss of parts or whatever.

DR. FORD: Loose parts analysis, and just the process that you went through.

CHAIRMAN WALLIS: So you will have

somebody on after the break then?

MR. BAILEY: Yes.

MR. ARCHITZEL: If there are no questions on this slide, we will go on to the next slide. In the containment systems performance area, we did review the containment pressure temperature response, and this is one of the areas where you may have additional questions.

CHAIRMAN WALLIS: Did you do an independent calculations of any of these things?

MR. ARCHITZEL: What we did in the containment systems area is that we coordinated with the Duane Arnold review, and the independent review that was done for Duane Arnold.

I participated in that review and those calculations, and it contained code that was used there as the same containment code that was used for Duane Arnold and Dresden.

We also had those reviewers, Rich LaBelle and ISL, look over the containment response portions of the application, and they participated in the review of the additional questions and the details that we searched for, in terms of being able to make our safety decision.

We did not do independent calculations for

the containment response for Duane Arnold and Dresden, but we relied on that containment response. We may in the future do additional independent calculations, and mass energy release is an area that we may look at, but at the moment it was to compare it to the codes that G.E. used for this evaluation.

MR. BAILEY: And I guess another part of that is that we took a look at their inputs and methodologies. We had done confirmatory analysis of their containment response within the last 3 years. So we have looked at what they are doing recently.

MR. ARCHITZEL: And that was more in the MPSH area, which is a different slide. We did have those calculations. This may go fairly quickly, because if there aren't any questions, we can on --

DR. KRESS: Well, the containment dynamic loads, does that include the loads on the suppression pool --

MR. ARCHITZEL: Yes, it does, but basically those loads were bounded as per the EPU, and aspects like whether or not the -- you know, with the same pressure as the driving source initially, EPU is a second order effect sort of on the containment response.

So there wasn't a tremendous amount of

difference impacted by the EPU except in the long term. Now, the TORUS temperature went up for two reasons. One, the analysis methods changed. They used a more realistic blow down.

That gets the energy into the suppression pool faster, and they also no assumed thermal equilibrium between the TORUS air space temperature and the water and the TORUS, and the higher suppression pool temperatures, and the MPSH needs were increased because of the EPU.

And those are the types of things that we looked at, and we asked for curbs, and we have curbs for the containment pressure response, and trying to understand what was happening at different points. But we did not do any analyses.

The safety relief valve discharge loads and things like that were not affected, because there is a time when it affects the drain down, and we also looked at aspects like with the increased temperature, and with the squenchers, and the steam that was coming out of the squenchers intersect with the suction of the ECCS pumps.

And they provide discussions and envelopes for that would not be in the phenomena, and so therefore they didn't have a local pool temperature

effect addressed or limit addressed.

On the very last page, I happen to have a list of the ones that are on 46, are the areas where we had additional input, and one of them was the 4.2.5, and there is no more information there than the net positive suction head.

And I guess I would like to say on the net positive suction head that that was one of these cases where it was an existing open issue before the EPU started.

Most or a lot of our review items or aspects, the EPU has a negative effect on net positive suction head by raising that pressure, and therefore there was an increased demand, and it was addressed in the ELTR about the potential need for plants to take credit for net positive suction head, and there will be an additional need for net positive suction head.

And in this instance, that effect is there, and we have looked at it. I could show you the credit they have requested, versus the existing credit. There is no additional credit requested in the very beginning of the transient for either Dresden or Quad Cities.

But with time that credit does go up for periods of time and it hangs in there longer. So if

I could take a curve and show you how it is affected if you are interested.

CHAIRMAN WALLIS: Is this still acceptable to you, that we take this credit?

MR. ARCHITZEL: Right. We tried to minimize the credit that we allow them to receive. So the questions were along the lines of did you examine and replace the pumps, or some type of other mechanism to reduce the pressure, and of course that was not economically feasible was the answer that we got back.

So in that instance would the EPU have any approval for the potential additional over credit. We looked at it, and it was not a major increase in over credit over what has currently been granted.

CHAIRMAN WALLIS: And there is no basis for saying that the pump performance is likely to be degraded?

MR. ARCHITZEL: Well, the cavitation, they do have cavitation at Dresden and Quad Cities after the peak as you heard yesterday. When I went to the audit, I did see the testing that was done, and it was like about an hour-and-a-half testing at cavitation conditions.

And so there is cavitation, and even though we have granted that credit, they still don't

have enough credit for 290 until about the 10 minute point, where they take credit for operator action.

The procedures are in place to reduce the flow for the operators, and so there is no reason to really believe that it would necessarily go that long, the cavitation route.

And part of the questions that I was asking was also to make sure that the operators actually weren't going to throttle back those flows and leave the extra pumps running if they did have sufficient MPSH.

So I guess if the question is if we are comfortable with the net positive suction head credit that we are granting, the open issue that existed did deal with strainer differential pressure.

And it has taken a long time to get that resolved, and there have been open issues. Actually, Quad Cities did not have credit for containment over pressure.

They had an application in-house which we had not approved. We rejected it because the methods that they had used were not in accordance with the URG. Very lately, we have gotten the submittal that does follow the URG recommendations and SER.

We have looked at it, and we have not

written the SER yet, but that should not be a problem for this uprate then. But as for the strainer and differential pressure, and the unique strainers they have got, they developed a head loss.

CHAIRMAN WALLIS: So the final SER will explain why you feel comfortable in some detail?

MR. ARCHITZEL: Well, actually the strainer differential pressure influence in this EPU was in the conservative or the effect of raising the temperature actually results in a lowered differential pressure.

So in that aspect, it is not a concern, but we will explain that in the SC.

MR. BOEHNERT: What was the issue with the fuel pool cooling?

MR. ARCHITZEL: The issue for the fuel pool cooling is strictly the increased decay heat and how you handle increased decay heat. We are taking new looks at fuel pool coolants these days, and what single failure exists, and it turns out that with Dresden there is a difference between Dresden and Quad Cities.

And that they use and credit the RHR fuel pool system, and they have a dedicated RHR -- well, excuse me, a dedicated shut down cooling system at

Dresden, and Quad Cities has the residual heat removal mode.

But basically it is the single failure. We examined the single failure that they are talking about, and with the RHR pump, it is just identifying the single failure, and we got into discussions about do you really have an RHR backup or you don't you, administratively, and things like that.

And what temperature are you going to go to, and what are your makeup rates, and do you exceed the design of 150 degrees or not. You get a little more detail, and there is very short sentences in the application.

So finding out all the details of how that worked, and what administrative controls were in place to assure that you had a backup, and assumed the right single failure.

The make-up rates were not really stated correctly in the application, and so we got an understanding of it really has significantly more makeup, and they provided us the boil off rate, and those types of issues.

CHAIRMAN WALLIS: There is no ultimate heat sink?

MR. ARCHITZEL: The ultimate heat sink

-- and if you are on to that page.

CHAIRMAN WALLIS: I am looking at the slide behind you there that says that was an area --

MR. ARCHITZEL: Well, you are one ahead of my slide, but okay. In the area of ultimate heat sink, the staff review is not complete on the ultimate heat site. This is another area -- well, the EPU effect just for Dresden.

At Quad Cities another fairly short discourse provided by the licensee, but the basic bottom line is that with dam failure at Quad Cities, the pool behind that dam separates from the plant after a defined amount of time, and that defined amount of time is what they currently need to provide portable pumps for their ultimate heat sink.

Dresden is the area where we have not completed our review at this point, and one of the principal reasons that I did go to the site to do an audit on their calculation of the situation.

This is another existing open issue. The licensee discovered problems with their design basis reconstitution several years ago, and after they discovered those problems -- they are dealing basically with which volumes are available in the seismic aspects of the system and the timing of the

operator actions.

And we evaluated those conditions before the EPU, and we provided the region a TIAA response to what areas to look at, and basically the EPU effect is to shorten the time period for manual actions go get portable pumps, and make up into the canal, which they consider their seismic -- if you will, a seismic source.

There still is no seismic source from that point into the isolation condenser. So that is part of the staff approvals that is really part of the issue that is still open, but basically the new information came out fairly late, and the EPU effect is not significant from a safety standpoint.

We have looked at that, the 4.5 days to the 4 days is the latest information that we have received, there is other information, for example, that with EPU that you need 2.9 million gallons in the intake canal, versus 2.5 million before.

That is just boiling water, and it is not really what you really need, and so the 30 days is not -- and whether that was in their licensing basis is questionable. So it is not clear if there ever were a 30 day type of a plant.

And these are just discussions in the

history that we are evaluating. And there are also aspects that are currently under review, like proposed modifications to add a seismic Class One capability within several years for the IPEEE.

CHAIRMAN WALLIS: I was going to ask you about seismic. Are you the right person to ask?

MR. ARCHITZEL: I can describe my understanding of what is seismic and what is not seismic with the Dresden plant.

CHAIRMAN WALLIS: Well, we were given this IPEEE part of the draft on the SER, and it talks about that it is an inadequate seismic margin at some point.

MR. ARCHITZEL: Well, I guess that is where you consider, and Donnie maybe could talk a little bit to those numbers that you heard some about yesterday, and the impact is not tremendously safety significant of those future modifications.

CHAIRMAN WALLIS: It may not be safety significant, but are they meeting the regulations then, in terms of --

MR. ARCHITZEL: Well, let me just say that for the current regulations -- and Donnie can talk about the safety aspects of it, but for the current regulations and with the seismic makeup that they have, the isolation condenser, which would last now

and which would last before, 20 minutes approximately.

They are keeping that power level just like the bypass valves, and they have got a set power level, and it is a fraction of the existing power level when it uprates, and so for 20 minutes they have a make-up capacity that is seismic.

In addition to that, they have the containment, and they have got the ability for a day of containment. But the remainder of the seismic capability to make up to the isolation condenser, they have diverse sources.

And the diverse sources have some seismic rigidity, but they are not safety related. You wouldn't credit them an existing plant today. And we have looked at some of the seismic statements. There is one statement in the SEP that the far water system was qualifiable.

MR. BAILEY: I think we are talking two different things here, in terms of the low rigidity that is discussed in the safety evaluation, and I don't believe that that applies here. Can you give an --

CHAIRMAN WALLIS: I am referring to this .909G.24G.

MR. BAILEY: That is not really the issue

we are talking about for the ultimate heat sink.

CHAIRMAN WALLIS: No, it's not.

MR. BAILEY: For the ultimate heat sink that the staff review is still ongoing, we are trying to make sure that we understand all of the scenarios, and all of the available water, and --

CHAIRMAN WALLIS: And that is a different issue.

MR. HARRISON: This is Donnie Harrison from the PRA branch, and the reference you are making to the .09G HCLPF value is a reference out of the IPEEE for Quad Cities.

CHAIRMAN WALLIS: Right.

MR. HARRISON: And it was recognizing that that was, if you will, an unacceptably low seismic capacity for a plant. At that time the licensee was still in the process of making modifications, and most of that was I believe Cable Tray and Anchorage.

And since that time I think at Quad Cities, they are going to complete all their modifications by the next outage, the completion of the next outage for each of those two plants.

At that time the concern that the staff was raising was there is not going to be a reevaluation to see where the plant is. So the staff

used some numbers from Dresden, partly because the Dresden -- well, we had the information on Dresden, and the seismic hazard at Dresden is actually a little higher than Quad.

So we felt comfortable as just being a perspective of where the risk was for the .09G plant, as opposed to going up to, let's say, your design basis at 1202.4 from a HCLFP value.

And that was provided mainly to raise the issue and to get a risk perspective of where the plant was.

CHAIRMAN WALLIS: Is there going to be a presentation from the staff on the risk perspectives?

MR. HARRISON: We can at any time you want, yeah.

CHAIRMAN WALLIS: And that is where we could revisit this seismic margin issue then perhaps.

MR. HARRISON: Sure.

CHAIRMAN WALLIS: So we will have that again later in the morning, or timing willing, I guess.

MR. ARCHITZEL: We will do that after the break. And we can work out the order of presentation after the break.

CHAIRMAN WALLIS: And we are approaching

the break as we approach the end of this presentation.

MR. ARCHITZEL: Well, I think that is about it for ultimate heat sink. Part of the issue also is whether the calculations were conservative or not, or formalized, and those issues are still being considered.

DR. SCHROCK: And that issue is limited to the Dresden?

MR. ARCHITZEL: That's correct.

DR. FORD: And the feed water issues and corrosion, that will come in later?

MR. ARCHITZEL: Yes. There is something there on feed water, and about flushing out and how the system changed, which was not in the application. And getting additional information on the logic behind running the pumps and saving the plan, and the plant availability on how you run it, and where the suction trips come in.

And actually trying to maintain the plant on line was the focus of my review in the feed water area. And the next slide.

CHAIRMAN WALLIS: This is the last one.

MR. ARCHITZEL: That's it. And the last one was just going over the -- well, it is sort of an open listing of areas that we reviewed, and if you had

questions, I could go into more. But if you don't have questions, then -- you know.

CHAIRMAN WALLIS: Are we ready for a break now? Are there any questions from members of the committee?

MR. HANNON: Excuse me, but this is John Hannon. I wanted to make sure that one of the points that Ralph made is clear, because it relates back to one of your concerns on the Duane Arnold review, and John Zalinski asked me to follow up on that.

One of your points was that the staff should develop criteria for when independent assessments should be performed to compliment our reviews of the applicant's submittal.

And this is one case where we did it on an ad hoc basis. We sent Ralph to the site to do some independent verification of the calculations that they had done for the ultimate heat sink.

And the point that I wanted to make is that we do do that on an ad hoc basis when it appears to be appropriate. And this is a case where we thought it would be appropriate for us to do it.

MR. ARCHITZEL: And also when I went to the site also, you looked at the calculations for the net positive suction head that the licensee had done.

So it was two different areas where we examined, including that.

CHAIRMAN WALLIS: Thank you. So are we ready for a break? So we will take a break until 25 until 11:00, a 15 minute break; and after the break my colleague, Jack Sieber, is going to Chair, and I am going to turn the Chair over to him.

I would ask my colleagues to send me comments on this whole issue so I can prepare a letter for the full committee.

(Whereupon, the meeting was recessed at 10:19 a.m., and resumed at 10:36 a.m.)

MR. SIEBER: I would like to call the meeting to order. In looking at the agenda, we have on the last page a response to ACRS questions, which I think we should go through at this time.

And then we had some additional questions on source term in the PRA, and so we can deal with those at the staff's convenience. You can arrange however you want to give the remaining presentations.

MR. BAILEY: We wanted to make a small change in the agenda to address your request for a PRA presentation.

MR. SIEBER: Okay.

MR. BAILEY: Donnie Harrison will present

his PRA analysis, and if this is all right with you, then we would return to the responses to ACRS questions portion.

MR. SIEBER: Okay. That's fine.

MR. BAILEY: And for clarification, we did not get somebody or we were not able to get somebody here to answer the questions related to the radiological analysis.

MR. SIEBER: Okay.

MR. BAILEY: So if there are questions or information you would like us to bring to the full committee, we can offer you that.

DR. KRESS: I think those were mostly clarification questions that I had, and I can dig in to the stuff we have and get them out.

MR. BOEHNERT: So why don't you stand by and we will let you know if we want something in follow-up on that.

MR. BAILEY: All right. Very well.

MR. SIEBER: Okay. Why don't we begin.

MR. HARRISON: Good morning. My name is Donnie Harrison, and I did the PRA portion of the review of the power uprate. And these slides are just back up information in response to your questions.

MR. BOEHNERT: We will need copies of

these.

MR. HARRISON: We will walk you through it. If we could just move on to the next slide. Basically, the information that we received from the licensee is provided on this slide, as well as what the staff used in its review.

We have the original submittal by the licensee, which was just a couple of paragraphs if I remember correctly. That was supplemented in about the February time frame to address the key areas of review that the staff typically looks at in the risk area.

We then had a series of -- one major round of RAIs with a series of clarifications and meetings and such, and conversations on, and again this covers the areas of internal events, external events, shutdown operations, and then also just an area of PRA quality, and does the plant reflect the as-built as operated facilities.

The staff review looked at the licensee provided information. We also looked at other areas. For example, much of the external events questions from the staff were derived from the Ses that were written on the IPEEEs. We also pursued areas that maybe the SE called out on the IPE.

DR. KRESS: And how exactly did you assess the quality of the PRA?

MR. HARRISON: The quality of the PRA was done in a couple of different ways. One is in July, at the end of July, we actually -- two members of the staff took a trip down to the Exelon facility to look at their maintenance procedures and processes, to see how Exelon actually ensures for themselves that their models are up to date to ensure that the models actually reflect significant changes to the facilities that go on throughout a period of time.

They did -- and I will return Dr. Burchill's compliment. They did an excellent job of providing us information, and providing us a whole series of their PRA materials, their procedures. We understand that it is an evolving process, and it is getting better all the time.

DR. KRESS: Has their PRA undergone the industry peer review process?

MR. HARRISON: Both PRAs have undergone that. Dresden went through it twice, and if you talk to Dr. Burchill, he will say the first time was probably premature for them to go through.

And they learned a lot of lessons and reflected that in the Quad Cities and in the revision

to the Dresden PRA. So both events were both received by March, and with their evaluation criteria, all of them were -- all of the elements were at a high level that could be used in a risk informed submittal supporting deterministic information.

DR. SHACK: Was that the owners' group one or the NEI? I mean, could we assign a Level-3 to this thing? I mean, was there a number? I am not sure whether the owner's group gives you that.

MR. SIEBER: The BWR owners group.

MR. HARRISON: They assign a number for each of the 11 elements. For 10 of the elements, they received a three; and for the 11th one they received a four. So, higher is better than lower. So it was a 3-4.

MR. BOEHNERT: Out of what?

MR. HARRISON: Out of four. That is a good question. So, yes, the staff actually spent some time, a few days, at the facility just to look at the process. We looked at their -- they have a software program that is kind of like an XL spreadsheet that they track the modifications going on at the plant.

They evaluate those modifications to see if they need to do an update immediately of the PRA, or if it is something that they can wait until their

next periodic update.

Today, they have never had anything rise to the level that requires that immediate update. One of the things that the staff noted in its draft SE write-up was given all of the changes going on with the plant with this power uprate, and things in parallel with this power uprate, the staff would probably recommend doing an update on these PRAs just to make sure that everyone is reading from the same sheet of music.

But again that is more of a statement of what the staff would recommend, and it is not a required thing.

MR. SIEBER: If I look at the Section 10 of the safety evaluation, I see a lot of places -- and I guess I have both Dresden and Quad Cities here -- where a statement was made that the delta-risk was insignificant.

Does that mean that they actually modeled the changes in the PRA and then looked at the numbers, or does it mean that in the PRA the issue wasn't even modeled at all?

MR. HARRISON: What I would say is that there is a couple of things that the licensee did. There were places where they put something in the

model and recalculated, and reran the model.

There is places where they used a simplified model, where they were making the design of the -- let's say the recirc run back circuit, and that was in design at the same time they were doing their PRA evaluation.

So they put in a simple model and ran that through and saw what the impact was. Other cases -- and typically in response to the staff's RAIs, they may provide us a calculation that says that the loss of off-site power fast transfer is a new event that we are going to evaluate.

And that we will just give you the calculation to show you that the number is 10 to the minus 10, or that the loss of off-site power initiating event frequency would have been increased by 2 times 10 to the minus 6, but it is a very simple calculation.

So there is a smattering of different approaches, depending on what the issue was, and how we are dealing with it.

MR. SIEBER: Is it possible to pick that out of the safety evaluation report on which method they used when they were rerunning the model, or --

MR. HARRISON: I think I pointed out in

the write-up where they used simplified models or simplistic calculations. I tried to make it clear -- and that is where after going into each of those sections the staff made a conclusion that it was using a simplistic model.

If it had been a risk-informed submittal, we might have sought for the licensee to confirm that the design and the simple model either match, or the simple model actually bounds it for sure.

So I think that would come out. We don't necessarily go through and say here is all the modeling changes that they did.

MR. SIEBER: Right. Well, I think that would be too extensive, and would make this too long.

MR. HARRISON: Right. As it is, for a section that is supposed to be an insight section, it is still 20 pages long.

MR. SIEBER: Right.

MR. HARRISON: I hope that there is a lot of insights.

MR. SIEBER: Okay. Thank you.

MR. HARRISON: We can move on, and the next few slides are just going to repeat really what Dr. Burchill mentioned yesterday, with maybe a different slant on it from the staff's perspective.

They evaluated the key areas, and in the initiating events area, component reliability, success criteria, and operator actions. They addressed all those areas.

There were some impacts pretty much identified either by the staff or by the licensee in each area. Again, as you mentioned, each area seemed to have -- we are talking a percent here or two percent there change in CDF.

We weren't seeing any major changes. The next result is that there is -- and I think yesterday that you saw Exelon had a CDF delta increase of 9 percent, and I listed 8 percent.

Maybe we count different. I have probably got more of an error in the way that I added them.

Quad Cities is looking at a five percent, and those are very small risk increases. The LERF numbers again are 10 percent at Dresden, and 4 percent at Quad Cities.

The difference between Dresden and Quad Cities, I would probably argue, is mostly because the base CDF and base LERF numbers at Quad Cities are about twice as high as they are at Dresden, and therefore, the change in risk is half at Quad Cities.

DR. KRESS: So the actual deltas were

about the same?

MR. HARRISON: Yes, for the most part. The numerical number would be about the same. Again, we would just point out that there were simple models and simplistic calculations performed, as well as on the transformers, and there was some question on the switch gear and the breakers.

And there were some tests that the licensee stated that they were going to perform to show that they were acceptable, and they might have to make some field modifications to make that acceptable.

It wasn't clear to me that those tests had been completed and that the modifications had actually been implemented. So that was to recognize that there was some uncertainty there.

And then on the thermal hydraulic area, the staff recognizes that they did an analysis of what their typical thermal level will be, and not what their licensed thermal level would be, which means that they did the thermal hydraulics runs using MAP about two percent below what the licensed level is.

And the staff recognizes that puts us into a little bit of an uncertainty area as far as success criteria and operator action time. But again we are only talking about two percent in a 17 percent uprate,

and we don't see that as being something that would trip us into a concern.

DR. SCHROCK: Did they have some reason for doing that?

MR. HARRISON: The rationale again is that the PRA is supposed to reflect more of your realistic operations, and the plant will typically be operating at a lower thermal limit to achieve the same electrical output, except for I think during the summer months.

And there might be periods during the summer where they actually have to increase that to get that output. So, yes, it was mostly just to get a realistic perspective.

Again, the staff would have preferred that they do it at the license level to just take any doubt out. So that was just to recognize that that was the condition.

DR. KRESS: Did they do any uncertainty analysis?

MR. HARRISON: No. They did do sensitivity analysis I think in the past, and I think you heard some of that yesterday. But there were no, if you will, sensitivity calculations done at a higher thermal limit, or at least not provided to the staff

to verify that they were acceptable in that area.

DR. FORD: To somebody in the public, the use of your words, use of simplified models and simplistic calculations, is somewhat negative. Could they have used a more professional approach?

MR. HARRISON: This is not questioning their professionalism. This is more of just recognizing -- and maybe I need to change my words, but recognize the fact that in some cases they were designing a circuit, or designing a feature at the same time that they were modeling that feature.

And Exelon took the approach of trying to bound that, and they bounded it by using simple models.

DR. FORD: But that --

DR. SHACK: Simplified bounding.

MR. HARRISON: Simplified bounding, or simplified conservative models. Again, there is not a confirmation at the end to ensure that the circuit that they actually did install is bound. I mean, there is uncertainty there.

And again if this had been a risk informed scenario, we would probably be chasing down that confirmatory analysis to make sure that what was installed is truly bounded by what they actually

analyzed.

Typically, an example would be that on the reactor recirculation pump run back feature. They increased their turbine trip initiating event frequency by a few percent, and ran it through their model, and did not take credit for at Dresden the fact that the recirc pump would keep you from tripping.

So in that sense the staff then has confidence that their analysis should have bound the impact.

DR. FORD: The only reason why I am bringing up this question is that this is open to the public, and someone in the public could construe that as being a simple, but inadequate, analysis, and that is not your meaning.

MR. HARRISON: Right. That is not my meaning. I am meaning to say that it is a -- if you want to use a conservative -- well, I don't like using bounding in PRA language, but that seems like an oxymoron.

It is a conservative approach to trying to address the condition you are in, where you are designing a component while you are modeling it at the same time. So it just recognizes that fact. If we could move to the next slide.

We also looked at external events and shutdown operations and PRA quality, and we have already touched a little bit on the last one. The staff spent quite a bit of time on the external events portion, primarily in the area of seismic outliers.

The IPEEE for both of these stations identified outliers in the seismic margins analysis, and we aggressive pursued those with the licensee. And especially for the seismic dam failure, which I think you have heard about now at least partially twice.

We saw after addressing those scenarios specifically from a risk specific to see where we were. At Dresden, the rest of the plant meets its seismic margins analysis criteria for a .3G focus scope plant.

We didn't pursue those things that were already at that level. We wanted to see where the outliers were. The results of that were that we had some -- I think if you add it all up on the seismic side, it comes out just a little below 10 to the minus 5 as the risk.

And that includes not just the outliers, but also taking into account the fact that you could lose the isolation condenser seismically as well. And

if you add that on, you get it right around 10 to the minus 5 as a CDF value.

And the isolation condenser does meet the .3G margins analysis, but I put that in just as a perspective. On the fire analysis, they indicated that there was a small risk increase that is mostly due to operator actions.

However, again, using Dresden as an example, their methodology is what I would call a progressive screening criteria type methodology, where if you get an acceptable answer, you stop analyzing.

MR. SIEBER: That was strictly a control room fire.

MR. HARRISON: That was a control room fire, and they took a 50 percent chance of going to core damage if I lose the control room. So any kind of operator actions that changed by 5, 10, 15 percent, are never going to raise to the level that would offset that high of a conditional core damage probability, unless you find out that you just can't do it. That would be about the only way to get there.

I think we have talked in the past about shutdown operations for BWRs. Typically, you have long times to boil, and it is not a concern as much as it would be for, say, a PWR.

MR. SIEBER: They did not have a shutdown PRA?

MR. HARRISON: They do not have a shutdown PRA. They do have a risk management program called ORAM.

MR. SIEBER: Yes, and I am not sure that you get a quantitative number out of that. You get a color, and it really just looks at multiple paths.

MR. HARRISON: Right, success paths.

MR. SIEBER: So I am not exactly sure how you can draw a conclusion that says negatively small increase in risk from using an ORAM as a tool.

MR. HARRISON: Right. We are not basing our conclusion there on a model. It is more of a qualitative conclusion saying operator actions will be reduced by some amount because of the higher decay heat.

However, they do have a risk management process in place, and I think there was a discussion yesterday about their backup cooling systems, and that whole topic becomes moot because of their short refueling cycles, and refueling outages.

If you are only out for 20 days and it takes you 26 days of cool down to get to a point where you could use a pump, it becomes a non-issue. That

pump is not available.

So given that, we are just acknowledging the fact that there would be some impact, but we don't believe that it would be significant.

MR. SIEBER: Okay. Now, I do not recall anyplace in the safety evaluation where the idea that the refuelings are probably going to be a day or so longer because of the higher decay heat level. Was that evaluated at all, and will that have an impact on shutdown risk?

MR. HARRISON: I would answer that in two ways. No, I did not evaluate that, but off the top of my head, if you are -- and again if I am not going to get -- well, yes, there would be some increased risk, because you are operating another day out there.

MR. SIEBER: Right.

MR. HARRISON: Again, the backup systems that would be available are marginal at that point anyway. So you would be just progressing your risk management just a little further.

You could also argue that backwards and say then if I can shorten my outage by a day or two I save risk. Given the drive of the industry, the shorter they go -- it is an economics question.

The licensee is going to drive for a short

outage, and if he can shorten that outage, he will. So there is no way to quantify that type of an answer.

On PRA quality, like I said before, they did go through the owners group peer certification process. The last two bullets just point out the fact that with simple models and simplistic calculations, you don't necessarily have a hundred percent confidence that everything is precise.

When you are in PRA, nothing is precise. So there is a little bit of -- I would like to make me feel a little if they did a few extra things, but they don't think -- I don't think that would be -- it wouldn't change the answers and that is the bottom line.

The last bullet really just recognizes that in the IPEEE the plant too credit for conditions that do not exist, and they are in the process of making modifications to make that fit.

And as part of our review, I believe they conducted their -- they had a seismic condition with the dam failure, and they had assumed that the LOCA conditions were fine.

And as part of our questioning, I think they went back and did the study that they had committed to in the IPEEE a few years ago, and the

results of that were that they do need to add a means of -- an alternate means of -- or a seismically qualified means of getting a containment cooling service water path in.

MR. SIEBER: But those modifications were just hangers in supports, right?

MR. HARRISON: Those modifications for Quad Cities were mostly anchorage. For Dresden, it is not. For Dresden, the modifications that we are talking about are the portable pumps, the hoses, the connections, being able to route the lines through, and drop the pumps in, and get the water where you need it.

MR. SIEBER: Right.

MR. HARRISON: That is how they are going to address the seismic issues at Dresden. It is not going to be a hard-wired implant system. The next slide just goes over what we concluded through our review.

Again, this recognizes that we identified a number of issues, and the licensee -- the methodology that they used, and the simple calculations, this just kind of goes over that again.

With the last couple of bullets just recognizing that they had been risk informed, we would

probably require some type of confirmation that the simple models and the simple calculations truly are bounding the conditions.

And to actually analyze the procedures that they are creating for like load shedding in a transformer, to verify that their screening human error probability really is screening, and there is not something out there that might be higher.

The last bullet there just says, however, the submittal is not risk informed. They are meeting their deterministic requirements, and the information that we have does not make us question the adequate protection of the plant.

So with that conclusion, we pass it back to the deterministic folks to address the issues in their areas, and that's all that I had on the risk assessment piece of it. Are there any questions?

MR. SIEBER: Does anyone have any questions? If not, thank you very much.

DR. FORD: Again -- well, I'm sorry, but just about the last thing, when you say that submittal is not risk-informed. It doesn't have to be risk-informed does it by the regulations?

MR. HARRISON: No.

DR. FORD: The deterministic requirements,

are they adequate?

MR. HARRISON: That is not a judgment for me to make. That is a judgment for each of the deterministic branches that do their reviews collectively and come together as a basis for the final solution.

MR. SIEBER: Actually, the submittal is risk-informed, and the decision making was not.

MR. HARRISON: Was not, yes. And we may be talking about technical questions, but risk information is provided, but in the terminology of risk informed, it is not risk informed.

MR. SIEBER: Right.

MR. HARRISON: And again we kind of talked past ourselves.

MR. RUBIN: This is Mark Rubin from the staff. It was not submitted as a risk informed licensing action.

DR. FORD: Well, the reason that I am bringing it up is that it might sound nitpicking, but again I come to this public perception being that it is out there, and that bold statement of not risk informed.

On the face of it, it would sound negative. It is not negative. It just is not

required. It is a factual statement.

MR. HARRISON: And it is a factual statement in that it just recognizes that the LTAR requires them to provide risk information. We review that information, and it is not conveying that there is something wrong with the submittal the way it is. I don't want to convey that. Thank you.

MR. BOEHNERT: Again, I would like to get copies of your slides.

MR. HARRISON: I will make them now and give them to you.

MR. BOEHNERT: Thank you very much.

MR. ROSSBACH: Okay. Next in our presentation -- well, actually, we didn't have further presentations prepared, but we do have reviewers available to answer questions in these other areas.

The first one we have listed is material degradation issues, and it is because in your letter responding to Duane Arnold, you pointed out the significance of flow assisted corrosion and irradiated stress corrosion cracking to the evaluations.

Although in yesterday's licensee's presentation, you seemed to be satisfied with that, but we do have reviewers here if there are questions in these areas.

MR. SIEBER: Do we have any questions? I recall someone suggesting that they would like further information on seismic.

DR. FORD: As an independent person with a conflict of interest, I have no problems at all with the materials degradation. I was more interested in just the process by which you evaluated those potential degradation modes. And I don't know if this is the forum to ask those questions. For instance --

MR. ROSSBACH: Would you like us to address the process?

DR. FORD: -- in the flow area, a lot depends on the CHECWORKs and its qualification, et cetera. Did you perform or did you oversee that qualification of the use of CHECWORKs?

MR. PARCZEWSKI: Yes, we did look at it, you know, because this is the only way --

MR. BOEHNERT: Could you identify yourself for the record, Kris?

DR. FORD: Kris Parczewski, from Material Chemical Engineering Branch, NRR. You need to look at the other CHECWORKs prediction, and we were satisfied that there were relatively low, and what is most important is that the licensee has the program, ongoing program.

And you can always verify, and if you are going to verify the prediction, then he will be able to project it in the future. So this will be a well controlled process for the licensee.

And I find that it is not really a very significant change due to a power uprate. The highest one is obviously in the feed water because of the high velocity change.

The other components are considerably smaller changes, and so it is not very significant really.

DR. FORD: There are a few other minor questions in the area of flow induced vibrations, for instance, and in the new design of putting in a steam dryer. Were those reviewed?

MR. ROSSBACH: That would be the mechanical engineering branch.

DR. FORD: And the transfer of those loads to the support brackets, and the effect they may have on stress corrosion cracking in that area which is not protected by Noble Chem.

MR. MANOLY: My name is Ken Manoly, and I am a section chief in the Mechanic Branch, and I would like to address your questions on the steam dryers. I have one slide to maybe give you a summary of what

are the conclusions in that area.

We noticed that you were interested in the topic last time and that's why we gave it more of a focused attention this time, and pretty much the conclusions from both plant reviews, both from Dresden and Quad, were pretty much the same.

That there is no increase in the actual pressure of the temperature, and the core flow is not much increased. The only increase is in the steam flow, and to get into flow induced vibration, maybe I can get into detail if you want to get into that.

The key thing to emphasize in the submittal is that the component is not faulty, but they still want to ensure its integrity for the fault condition, which is a main steam line break.

And for that they evaluate the stresses to the ASME NG Section 3, which is fairly new. It came way after the plant was built. The stresses all meet the code limits.

DR. FORD: Just to interrupt you and to save time, I can see all those factual things there. What is not covered is when we had the Duane Arnold review, they stated that there would be a transference of those stresses to the dryer support brackets welded to the RPV.

MR. MANOLY: Right.

DR. FORD: I assume the same would apply in this situation, too.

MR. MANOLY: That's true.

DR. FORD: Was there an analysis done on your behalf of the impact that it might have on environmentally specific cracking on that welded bracket?

MR. MANOLY: Well, we didn't do that analysis. We responded to questions in REIs about the adequacy of the anchorages.

DR. FORD: Good.

MR. MANOLY: And they said to evaluate the anchorages, and they were fine.

DR. FORD: And how would that be managed, by the inspection process? Would the dryer brackets also be inspected by BWRVIP-06?

MR. MANOLY: Yes. I think with every refueling that the dryers are inspected and removed.

DR. FORD: And the brackets, the brackets are also inspected?

MR. MANOLY: I am not certain, but I can get back to you on that. I am not quite so certain about the brackets.

DR. FORD: The reason that I keep pushing

this is because if they fail, then the whole thing falls, or potentially falls.

MR. MANOLY: Right. That would be a very easy thing to verify, the statement in the VIP, because we have the VIP SERs already written up.

DR. FORD: I am moving along here, Jack, and I am just trying to get a feeling of the assessment that went through. On the cracking issues, the cracking of the main structural welds in the reactor, in the core shroud, for instance, H-4 and H-3, H-6 welds, was there any analysis done on how the increase in flux of 17 percent, how that is going to affect the cracking of those components?

MR. MANOLY: I will have to defer that to the materials branch.

MR. CARPENTER: This is Gene Carpenter with the materials and chemical engineering branch. Basically, what we have done with the core shroud or other internals is that we have asked licensees to take a look at just what their fluence levels are.

And when they get to a certain threshold limit, that drops them into a higher crack growth rate regime, and at that time they have an increased amount of inspection that is required.

DR. FORD: Okay. Is the current -- I have

forgotten the VIP numbers. There are so many of them. But are those fluence values that might be accrued in the next -- since they are going for license renewal in the next 10 years, are they likely to get into fluence regions where they might be a marked increment in cracking susceptibility?

MR. CARPENTER: Some licensees have already reached the 5E to the 20th neutrons per square centimeter fluence value, which is what we consider the threshold value.

And as these reactors age, they obviously have more internals coming to that point. Now, when I say some licensees, what I am saying is that is at the core shroud. We are not talking about the vessel.

DR. FORD: I asked a question the other day about the delta-P across the access hole covers, and I presume there will be an increased delta-P, and they mentioned that they had a redesign of the access hole covers. Was that analyzed or examined by the staff? Is there any increase in the cracking of -- and I am not too sure what the redesign is. Are they still welded designs or bolted designs for the access hole covers?

MR. MANOLY: I cannot respond to the question right now. I need to get back to you to see

what information we have on it.

DR. FORD: It is not a major safety issue I don't believe. Thank you. Those are the only major questions that I had. I just wanted to understand what the process was.

MR. SIEBER: Do we have anything else that the staff would like to present?

MR. ROSSBACH: Earlier, we did have one question from the ACRS dealing with the pipe supports modifications, and if you want any information on that, I can tell you that some main steam and TORUS attached piping systems were determined to require support modifications to bring the piping within code level stress limits.

Now, some TORUS attached piping support MODS are required due to higher power uprate thermal loads, and some main steam support modifications are required as a result of applying the turbine stop valve closure loads. If you want any elaboration on that the staff is here.

MR. SIEBER: Well, that is basically in the SER, almost verbatim. So does anyone have any questions? Okay. I would like to -- I think we are done now, and so I would like to thank the staff for their presentation, and also Exelon and G.E.

I think it was very informative, and very knowledgeable, and you certainly brought enough people with you to cover anything and everything that we could have asked.

What I would like to do now though is spend some time with the members so that we can get an idea of what members comments are at this point so that we can provide those comments to Dr. Wallis while he begins drafting a letter.

I presume that the staff wants a letter from us at their next full meeting, and so with that, Dr. Shack, do you have any comments that you would like to make?

DR. SHACK: No. I missed much of yesterday's presentation and so I feel a little restricted about making comments and so I will just defer to the members who attended the full session.

MR. SIEBER: Okay. Dr. Ford.

DR. FORD: There seems to me to be five kind of areas in the materials degradation area that needed or should have been addressed, and in large part were.

And those include the flow induced vibration, and the flow assisted corrosion, the embrittlement of the pressure vessel, and the whole

question of cracking of the main structural welds in the reactor, all of which could conceivably be affected one way or the other.

I think they all have been addressed both by the licensee and analysis done by the staff of all of those. And I don't think that with the ACRS that they should be discussed in any detail. I don't think there is a major problem that cannot be managed with the management programs that exist.

It would be an idea just to put those up as I mentioned yesterday in just one page just to record that they have been analyzed. And one area that wasn't discussed yesterday was a question of Nitrogen-16, which would depend very much on the adherence of Noble Chem with the higher flow rates.

I personally don't think it is a problem, but it is something that should be addressed somewhere.

MR. BAILEY: Would you like to discuss that now?

DR. FORD: Well, I am just asking has it really been looked at and are people satisfied. Can it be managed.

MR. CARPENTER: This is Gene Carpenter again with materials and chemical engineering branch.

We have been looking quite closely at the chemistry that is involved with the BWR internals, and specifically hydrogen water chemistry and the Noble Chem issues.

Obviously if you have an increase in N-16, you are going to have an increase in shine, and so it is a very easy problem to ascertain that you have.

We have also asked the industry to go back and have a monitoring program to ensure that the NMCA is appropriately applied, and that it is maintained throughout the operating cycles so that they do need to know when they are going to reapply it to maintain effectiveness.

We have also asked them to have an effective hydrogen water chemistry program in place, and we have been making some great strides towards that. So the N-16 problem, I think, is under control.

MR. SIEBER: Well, that was actually discussed in the safety evaluation report and the issues were does this provide additional safety to workers, and does it affect equipment qualification, and things of this nature.

And obviously N-16 without some additional offsetting treatment is proportional to the change in power, and that the safety evaluation radiological

evaluation indicated that the increase was negligible as far as to workers and potential dose off-site.

And in equipment qualifications space, I think they had to run or get additional data on Rosemont transmitters. And there were some transmitters that were installed that weren't EQ, and that had to be changed out to make them EQ.

And so I think the N-16 issue was pretty well covered.

MR. CARPENTER: Yes.

MR. SIEBER: And as far as fluence is concerned, it seems to me that the Dresden and Quad Cities reactor vessels are fairly large compared to the core that is inside them. So there is some absorption that takes place, which means that the fluence does go up by 17 percent at the vessel wall or the shroud.

And so the impact isn't as great as one might presume, and also in that type of vessel there are other plants that operate with higher power levels, and so that doesn't make Dresden or Quad Cities any different than those plants, at least in my way of reasoning.

DR. FORD: That is my point.

DR. SHACK: Just to come back to Peter's question, and again it is a question for Gene. The

way the hydrogen water chemistry will run under the Noble Chem is that they may not be continuously modeling potential.

And so they will probably be putting in a fixed amount of hydrogen, which means that if they lost their Noble metal coating, what would really happen would be their susceptibility to cracking would go up for a portion of the cycle.

MR. CARPENTER: That is correct.

DR. SHACK: And then with an N-16 concern, their susceptibility would increase presumably until the end of the cycle and they found out that they had somehow mis-estimated the potential wear rate for the Noble Chem. Isn't that the way it would work basically?

MR. CARPENTER: That is the way that it would work, and we have also asked the industry to go back and have a way to monitor during the operation that they do have an effective hydrogen water chemistry in place at least 80 percent of the time, which we believe is sufficient to ensure the crack growth rate will maintain itself at a sufficiently low level.

MR. SIEBER: Okay. I guess from my standpoint, I am not -- I need to study some more

about the unit auxiliary transformer and the RAT to assure myself in my mind that what has been done is okay from an electrical standpoint and I will do that on my own.

I did have another question where I would note that a number of set points have been changed, and the safety evaluation, the draft safety evaluation discusses the set point change methodology, which I presume originally came from Commonwealth Edison?

MR. BAILEY: Actually, it was done more recently. We just approved a new revision or a new version of their set point methodology with the ITS or improved tech specs, which was granted to these two plants this March.

MR. SIEBER: Since March?

MR. BAILEY: Yes, since March.

MR. SIEBER: And do you have a safety evaluation specifically for subpoint methodology?

MR. BAILEY: It is part of the approved tech spec safety evaluation.

MR. SIEBER: Which is probably huge, right?

MR. BAILEY: It is big.

MR. SIEBER: Is there a chance that somebody could send me the pages that relate to the

set point methodology?

MR. BAILEY: You would like the pages related to the set point methodology?

MR. SIEBER: Right, because you referenced them, and I remember Commonwealth Edison set point methodology from a few years back, and so I would like to assure myself that what they are doing now is in conformance with the way that the industry is doing that.

MR. BAILEY: Okay. It was done as part of their transition to a 24-month fuel cycle.

MR. SIEBER: Okay. But just send me the pages, as opposed to sending me the whole thing, because my office is now full of papers. Dr. Kress.

DR. KRESS: One of my points that I would like to have a little more help from the staff was how they were able to assure themselves that the LOCA codes to meet the figures of merit, and Appendix K requirements were still valid for flat flux, knowing that the validation was based on 2D and 3D type tasks, which did not have a flat flux.

I would like to know how they assured themselves that the codes were still valid. The other thing that I would be interested in is maybe a little more on Virgil's point about the Origin code, and how they

assured themselves that it was used properly to get the right inventory.

MR. SIEBER: Okay.

DR. KRESS: And I guess I would like to see a little better explanation of why the MELLLA curves were different, even though I understand that there is good reason for them to be different. But maybe a little explanation of why precisely they were different.

MR. SIEBER: Okay.

MR. BAILEY: I understand at the break that the licensee has looked at them again, and sees only differences in the low flow region. Did you want to --

MR. PAPPONE: I don't know where the proper forum is to address that is, but we can address that with the staff or with the ACRS afterwards, or at any time.

MR. BAILEY: Okay.

MR. SIEBER: Well, I think if we are going to discuss it, we ought to discuss it while we are in formal session, as opposed to having a sidebar that is not on the record.

MR. BAILEY: Dan, can you give a description of what we learned about those curves.

MR. PAPPONE: This is Dan Pappone from G.E. As I said yesterday, when we draw that MELLLA line on the power flow map, we are using a generic line for all the plants and all the product, and so that licensing line does not change. The line on that map for Dresden and Quad Cities, that line is the same for that.

DR. SCHROCK: Say that one time again?

MR. PAPPONE: The line itself is the same. It is following the same equation as was proposed for the license.

MR. BAILEY: Are there scaling factors that make the figures look different?

MR. PAPPONE: Where the point of confusion is coming in --

DR. SCHROCK: Let me say that Point A has numerical values in the little table in the set of 43 pressure, and 23 full.

MR. PAPPONE: Right.

DR. SCHROCK: And I don't have the other one in front of me, but the numbers were more like 58 and something else.

MR. PAPPONE: Right. The difference between the two flow maps is in the natural circulation line, and we do have to investigate why we

have a difference in the two lines, and what the basis for that is.

But that corner point, I can take the equation for the rod line, which is a function of core flow, and put in that core flow value, and calculate the corresponding power value.

MR. BAILEY: And the points going down to, but not including, this natural cert point, would also be calculated from the same equation for both plants?

MR. PAPPONE: That's right. If you laid a ruler on that line, you would see a slight curve. If you would also take a look at each corresponding core flow, that power value would be the same. It is a piece that we need to go back and investigate for the basis for the natural circulation line, and the difference between the plants.

DR. SCHROCK: And so that is an item to be followed up on prior ot the full committee meeting?

MR. PAPPONE: That's right. We don't have that information.

DR. SCHROCK: But let me ask it another way. I think the question that Graham followed up with was that this line is in operation limits, and so if during your maneuvers you approach that line, you have to back off?

MR. PAPPONE: That's right.

DR. SCHROCK: The position of the line in the vicinities, say, of core flow of 50 and minimal power on the order of 60, is different on the two presentations in the two SERs. So which of those is it that --

MR. PAPPONE: Well, you may be seeing different sizes of the plots if you put the two together, and you may be looking at physical plot scales, but the equation for that line is the same for both.

DR. SCHROCK: I don't understand how the equation can be the same and then when you use the equation to plot a line, you get a different line.

MR. PAPPONE: That's what I am saying. If I go to each one of those points along the line for a given core flow for either unit, I get the same power.

It is just that the difference in those two plotted lines, the natural circulation line, and in one case it is minimum and in the other it is 32 percent, it is not quite the same.

So where those points that are identified in the table, we are looking at different core flow going into the calculation, and so we have a corresponding different power. Does that make sense?

DR. SCHROCK: Not yet.

MR. PAPPONE: So the difference in failing is the core flow.

MR. BAILEY: And what you are measuring is in percent?

MR. PAPPONE: Absolutely.

MR. NIR: This is Israel Nir from G.E. Let me help you. This is a quick mathematical exercise. Look at the two maps and establish what is the power level associated with 40 percent core flow, and you will find that in both maps it is 58 or approximately 58.

And I am just selecting one point, and that should convince you that these two lines are identical, except that one of them is extended further relative to the other all the way to natural circulation. But the same equation is used in the definition of the two lines.

MR. PAPPONE: Right.

DR. SCHROCK: Does that explain the differences in the position of Point A?

MR. PAPPONE: No, Point A is --

DR. SCHROCK: Point A is a different thing in each case?

MR. PAPPONE: That's right. And that is

the piece where we have to go back and get the explanation for why that natural circ curve is showing differently. We have a similar situation where one unit plotted that minimum speed line --

MR. NIR: Let me make another clarification. As part of this effort, we redefined the power level and the MELLLA boundary. Those are indicated on the flow map. There are certain portions of the power flow map that are not affected by power uprates, and the introduction of MELLLA.

And those lines are the natural circulation, the cavitation lines, and these are the same or maintained the same as a power uprate. And the differences that you observe are differences that exist now. Those features that are new are identical.

DR. SCHROCK: So you believe there is a difference in the natural circulation characteristics of Quad Cities versus the Dresden plants?

MR. NIR: There is a difference in the presentation and we need to get back with you as to the reason.

MR. PAPPONE: That piece may tie back to the historical source that was provided and that Jason talked about earlier.

DR. SIEBER: Dr. Schrock, do you have any

additional comments that you would like to give us?

DR. SCHROCK: Well, first of all, the open issues, and the testing question I find a little puzzling. I thought that the authorities case was that testing would be unnecessary sounded pretty convincing.

It is still unclear to me what the G.E. position was. I heard that G.E. a new submittal related to this, and I guess we didn't hear very clearly a position put forth from G.E. representatives about that, and if they could comment further on that.

It is a little unclear to me on why the staff is unable to address that position of G.E. and the utility with regard to this issue. I don't know what evidence is missing that is going to be forthcoming in the making of that decision. So I just find that whole thing a bit puzzling.

And I understand the revision done on Duane Arnold, and that we are not to take these graphs for Dresden and Quad Cities is being final either, but it is not clear to me where that stands with regard to the nature of the modifications that are going to be made, and that there are very many weaknesses in these SERs.

And over-reliance on such statements as

that the submittal is done in accordance with existing approved codes and using existing codes, and therefore the results must be accepted, and that seems to me to be overly simplistic.

And I don't think you need a one inch thick SER to relay that message if that is really what the SER has to say. I found the SER in both of these cases to be rather weak statements of how the staff has come to the conclusion that the SERs should be accepted.

That is not to say that I don't think that they are acceptable. It looks to me like they are, but I do think that there are many ways in which things can be done with this sweep of codes that will produce different results.

And put them in the hands of different users, and they will come up with different results, and guaranteed almost every time. So, again I have not heard enough to convince me that the staff knows that the codes are applied in the right way to get the answers that justify saying that the thing is an acceptable uprate. That's really all I have.

MR. SIEBER: Well, I think that will give us some meat that we can work on over the next 10 days or so.

MR. BOEHNERT: Yes. I think I will get with Graham and we will come up with some agenda items for the licensing.

MR. SIEBER: That will be very good. Well, again, I would like to thank the staff, the Exelon, and General Electric, for their presentations.

MR. ROSSBACH: Mr. Sieber, I would want to address a little bit of information on the question on the access hole cover that was raised.

MR. PARCZEWSKI: Dr. Ford, you asked a question about the access hole cover, and we asked the question in the RAI and we evaluated the new replacements and the loads increased from 70 ksi to 80 ksi, but that is still way below their limit of 159psi.

DR. FORD: This is a bolted design?

MR. PARCZEWSKI: Yes.

MR. NIR: This is Israel Nir of G.E. again. Just for the record, there was a couple of times that you mentioned the G.E. position on the large transient. Let me just remind the subcommittee that we were here back in June of this year, and provided you some background on the constant pressure power uprate.

If you go back to the minutes you will

find that we provided you some information related to Hatch on start up tests, and elevated power up to roughly 114 percent. We also provided you some background on large transient events related to constant pressure.

And we will be happy to discuss it further, and I think it will be needed to be in a closed session and clarify our position.

DR. SCHROCK: So the reason that we didn't hear any G.E. position in this meeting is that it was an open meeting?

MR. NIR: That is the reason, yes, and I cannot get into any details, but we fully support Exelon's position.

DR. SCHROCK: All right.

MR. SIEBER: Are there any additional comments or statements? Yes, sir?

MR. BAJWA: Just a closing comment on the staff's presentation. I would like to thank you for the opportunity to present our review of the Dresden and Quad Cities extended power uprate.

The Commission has given a high priority to these amendments. These are the first applications of many that I am sure that we will see for power uprates of this magnitude. I would like to emphasize

that the NRR staff has undertaken an extensive review of these applications and for all areas affected by the uprate have been reviewed and evaluated.

The staff has critically examined the methodologies and their application of this power uprate request, and the exception of the open item as we have mentioned, and that were discussed today on the testing issue.

And I would like to emphasize that these applications are not risk-based applications, and the evaluations which were conducted on the deterministic evaluation analysis have demonstrated that the proposed increased power level for Dresden and Quad Cities units are acceptable and meets the regulatory requirements.

This concludes the staff's presentation, and if you have any questions, we would be glad to answer them.

MR. SIEBER: Thank you very much, and I think with that, it is a quarter-to-12, and so we have met all of our goals, and so I will adjourn the meeting.

(Whereupon, the meeting was concluded at 11:45 a.m.)

CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: ACRS Thermal Hydraulic Phenomena Advisory Committee

Docket Number: (Not Applicable)

Location: Rockville, Maryland

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Paul Intravia

Paul Intravia
Official Reporter
Neal R. Gross & Co., Inc.