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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

DECEMBER 6, 2001

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

488TH ACRS MEETING

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THURSDAY

DECEMBER 6, 2001

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ROCKVILLE, MARYLAND

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The Advisory Meeting met at the Nuclear Regulatory Commission, Two White Flint North, Room 2B3, 11545 Rockville Pike, at 8:30 a.m., Dr. George E. Apostolakis, Chairman, presiding.

PRESENT:

DR. GEORGE E. APOSTOLAKIS, Chairman

DR. MARIO V. BONACA, Vice Chairman

DR. DANA A. POWERS, Member

DR. STEPHEN L. ROSEN, Member

DR. WILLIAM J. SHACK, Member

DR. THOMAS S. KRESS, Member at Large

DR. JOHN D. SIEBER, Member

DR. F. PETER FORD, Member

DR. GRAHAM B. WALLIS, Member

ACRS STAFF PRESENT:

DR. NOEL F. DUDLEY, Executive Director

HOWARD J. LARSON, ACRS

SAM DURAISWAMY, Designated Federal Official

I-N-D-E-X

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

(8:30 a.m.)

VICE CHAIRMAN BONACA: Good morning. The meeting will now come to order. This is the second day of the 488th meeting of the Advisory Committee on Reactor Safeguards.

During today's meeting the Committee will consider the following: NEI 97-06, Steam Generator Program Guidelines; Proposed Rulemaking for Risk-Informed Revisions to 10 CFR 50-44; Standards for Combustible Gas Control System in Light-Water Cooled Power Reactors; ACRS/ACNW Office Retreat; and Proposed ACRS Reports.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Mr. Sam Duraiswamy is the designated Federal official for the initial portion of the meeting.

We have received written comments from Mr. Bob Christie of Performance Technology regarding proposed rule-making for Risk-Informed Revisions to 10 CFR 50.44.

You all have received a copy of Mr. Christie's statements, and this document would be made part of the record of this meeting. We have received

no requests for time to make oral statements from members of the public regarding today's sessions.

A transcript of portions of the meeting is being kept, and it is requested that the speakers use one of the microphones, and identify themselves, and speak with sufficient clarity and volume so that they can be readily heard.

Before we move to our agenda, I would like to make an announcement. I am sorry to announce that Jack Sorensen's term with the ACRS expires on December 31st, 2001. So, Jack will be leaving us. We will miss him, because Jack over the past four years has made significant contributions to the ACRS.

He has done work for the ACRS in a number of areas, including defense in depth, risk informed regulations, safety culture, and human performance research.

The latest paper that he developed for us was regarding risk-informing the GDCs, and we thank him for all his contributions. Fortunately, Jack is not going to move far away. He will be working with the Office of Nuclear Materials Safety and Safeguards, which is in this building.

So we will have hopefully many opportunities to meet again with Jack over the next

year or whatever period that you have with that organization.

I want to especially thank you from George Apostolakis. He really wanted to be here and recognize you, but unfortunately had a conflict, and I am sure that he will be sitting down with you and thank you personally.

I don't know if you have any statement that you would like to make.

DR. SORENSEN: Well, thank you for the acknowledgement. I have thoroughly enjoyed the four years that I have spent here. I certainly have had experiences that I would not have had otherwise, like writing a joint paper with Dana Powers, and Tom Kress, and George Apostolakis, and a number of other challenges.

I do thank you for the opportunity to work with you, and I hope that I will see you periodically over the next year or so.

(Applause.)

VICE CHAIRMAN BONACA: Okay. With that, I think we will move to our agenda, and the first item on the agenda is NEI 97-06, Steam Generator Program Guidelines. I will now turn to the Chairman of the Subcommittee, Dr. Peter Ford.

DR. FORD: Thank you, Mario. The last time the full ACRS subcommittee was briefed on the industry steam generator program guidelines, and that is NEI 97-06, was in April of 1999.

Sine then, there has been a hiatus in the staff's review to the emerging issues associated with Indian Point, Unit 2, tube failure event, and a differing professional opinion. The staff's planned actions in response to the steam generator integrity issues have been reflected in the Agency's steam generator action plan, in which we had a part.

In the last six months there have been a significant number of constructive discussions between the staff and NEI at all management levels. These discussions centered around, first, the staff's comments on EPRI guidelines referenced in NEI 97-06, steam generator program guidelines; and that was dated January of 2001.

And, secondly, the NEI generator license change package, dated February of 2000, which addresses irregularity aspects of changing the technical specifications.

There is now substantial agreement between the staff and NEI. The staff believes that the revised generic license change package can be

submitted that would offer sufficient regulatory control.

Some issues have to be resolved. For instance, management's inspection intervals need to be justified, and suitable language needs to be included in the administrative technical specifications in a change package to provide necessary regulatory controls on inspection intervals.

However, these issues are not seen as show-stoppers. Presentations were made to the Materials and Metallurgy Subcommittee on September 26th, and again on November 29th.

Given that the NEI plans to submit a revised generic license change package in mid-2002, and that the staff plans to review and approve the change package by the end of 2002, we thought it was timely that a full ACRS committee should be exposed to the regulatory approach and to the remaining technical issues, so as to offer advice to the staff and NEI as they go into the home stretch.

We have specifically asked that the presentations have data to back up the opinions and conclusions, and at this point, I will hand it over to Louise Lund to start off with the staff.

DR. SHACK: Before Louise starts, I would

like to state that I do have a conflict of interest in this area, because Argonne is doing work on some generator programs for the NRC.

MS. LUND: Okay. Can everybody hear me? Okay. Good morning. As Dr. Ford indicated, I am Louise Lund, and I am the section chief of the Component Integrity and Chemical Engineering Section.

And what I had hoped to present this morning is an overview of NEI 97-06, Steam Generator Program Guidelines, and give you kind of a basis for which you can understand the next few presentations, which one is going to be given by EPRI.

And then Jim Riley of NEI is going to make some comments, and then Emmett Murphy of the NRR staff is going to also get into more detail in some of the issues that are in my slides.

Okay. This slide presents a little history of the staff's activities in the past years in the steam generator regulatory framework. I think that most of you are familiar with that, and I am not going to spend much time on this, because I think that the committee is aware that there has been a rulemaking generic letter on different things that we worked through.

But I wanted to make a quick few points

germane to today's discussion. NEI informed the NRC in December of 1997 of the industry's intent to commit to a formal industry initiative called NEI 97-06, with all PWRs implementing at no later than the first refueling outage, starting after January 1st, 1999.

What this means is that the industry is currently implementing NEI 97-06 with the current tech specs. In the next few slides, I will discuss the components of the industry initiative of the NEI 97-06 document, the generic license change package, and the EPRI guidelines, and how these all fit together.

And to then discuss which parts the industry is currently implementing and what we are trying to move to. The other thing is that another reason that I put this together is to kind of give you a sense for the dates on this, too.

Okay. As promised, here is what the current framework looks like, and right now as you can see the current plant tech specs, and the NEI 97-06 steam generator program guidelines that I just mentioned, what it is, is that it is high level guidance for utility steam generator programs.

And there is lower tier EPRI guidelines which give you more of a detailed day-to-day guidance, and it is referenced in the NEI 97-06 program

document. So the question is what are we moving to.

Okay. This is where we are going, having the NEI 97-06 program document the EPRI guidelines, and a generic license change package, which is the new part of it.

And what it does is that it formalizes the NEI 97-06 into the NRC regulatory framework via new tech specs. And how it is envisioned is a generic license change package will provide a framework for taking advantage of the flexibility envisioned by NEI 97-06.

As proposed the tech specs and the generic license change package provide a framework for a fully performance-based approach. Currently, NEI 97-06 and the EPRI guidelines are implemented in conjunction with the existing tech specs which are prescriptive, with the expectation that soon they will be implemented with the new tech specs in the new generic change package.

The advantage to the generic license change package to industry is a streamline process for gaining NRC approval of longer steam generator inspections strategies, alternate tube repair criteria, and new tube repair methods.

For example, licensees will be able to

implement performance based strategies for determining inspection intervals which have been reviewed and approved generically by the staff, without the need for submitting changes to the tech specs.

The NRC also benefits, in that it is assured that the steam generator programs will be focused on tube integrity, rather than simply following prescriptive surveillance strategies.

And just to kind of give you a sense for what is in the 97-06 document, the program incorporates a balance of these items -- prevention, inspection, evaluation, repair, maintenance, and leakage monitoring.

And I will discuss also a little bit about what the generic license change package incorporates, but it is also important to realize that --

DR. POWERS: Can I ask a question?

MS. LUND: Sure.

DR. POWERS: You say a balance. Presumably any mix of those things is a balance. Is there some significance to the word balance?

MS. LUND: Well, I think -- well, you know, I am not exactly -- I don't think there is really a terrific amount of significance to the balance.

DR. POWERS: That's what I thought.

MS. LUND: But I think that there is -- that as you look at it, none of these exist independent of one another, you know, I guess is probably a better way to put it.

All of these, as far as your evaluation, your inspection, and what you repair, all of these don't exist independent of one another. So you really need to consider all of them within the same context. Does that make sense? Do you understand where I am going? Maybe the wording threw you off.

DR. POWERS: It seems like the most hopeless -- I mean, there is nothing that I am going to take home with this. I mean, I am not going to remember this particular slide for any significant period of time. Maybe I wasn't intended to.

DR. FORD: Well, maybe a better word might be interrelationship between these various parts? They are synergistic to a certain extent.

DR. POWERS: I guess I would understand it better if I thought I was working with steam generator tubes that are roughly intact, and don't have lots of cracks in them. Is this directed towards Alloy 800 tubes, or is this directed towards some better type or different type of tubes?

MS. LUND: It is intended for all of the different types.

DR. POWERS: Every one of them?

MS. LUND: Every one of them, and I think that you need to have a program that makes sure that not only you consider the inspection and repair, and leakage monitoring.

It is really a whole package, regardless of what type of tube material that you are talking about. It is to make sure that you have a strategy for dealing with the as-found condition.

DR. POWERS: So if I had a strategy on repair on detect, I would be okay, right?

MS. LUND: As far as repair on detection for --

DR. POWERS: Tubes? Let's say I find a flaw. Fix it.

MS. LUND: Well, that has been one strategy for doing it in the past.

DR. POWERS: Well, I think the difficulty with -- I mean, the repair on detection strategy, I would find that completely unacceptable, because it is what happens between the time that I fixed everything and the next time I look that becomes important.

MS. LUND: Yes, which I think is a key to

this and why we are going away from just looking at surveillance intervals, and going to more of an approach where we do look at the condition, and we do look at what has been determined and evaluated as far as what the operational assessment -- you know, what the condition of the tubes are and what we predict the condition of the tubes to be at the end of the cycle.

And so I think that is certainly part of the new approach, and I think that Emmett is going to discuss this in more detail when he gets up here. But that certainly is an important part of it.

DR. POWERS: Okay.

MS. LUND: Okay. And I think that this one is another thing, and which we will discuss in more detail later, is that if it does establish performance criteria that define the basis for steam generator operability.

And which the performance criteria include the structural performance criteria, accident leakage and operational leakage criteria. Now, the generic license change package, the utilities are to submit revised tech specs based on NRC approved generic license change package.

And the generic license change package will contain a commitment to follow NEI 97-06, and the

licensee's submittal, as you will identify these three items -- the performance criteria and repair methods, and inspection interval criteria.

And we will be talking in some detail later about the inspection interval. How we will do this is through revised tech spec and bases, and a new spec with new technical specification steam generator tube integrity, and a new administrative tech spec, which is the steam generator program.

This will include revised limiting conditions for operations specification, and for operational leakage, and a new limiting condition for operational steam generator tube integrity.

The new admin tech spec states that the steam generator program must be implemented to ensure that tube integrity performance criteria are maintained.

The licensees will be explicitly required to assess the conditions of the tubes, versus the performance criteria, and that shall be performed at each steam generator inspection outage.

Changes to performance criteria, tube repair criteria, and repair methods, are subject to NRC review and approval. Now, just to give you a little bit of overview as to where we are.

This is the review status, is that the industry had requested inspection intervals beyond the current requirements, and where this is going to come in is actually in Rev. 6 of the APRI steam generator examination guidelines.

Mohamad Behravesh from EPRI is going to discuss that in some detail. In the initial part of the staff review, both the industry and the NRC were intending a review of performance based inspection intervals, and as we became aware of changes to the guidelines, it was apparent that the predictive methodologies to support performance based inspection intervals had not been fully developed.

However, the industry is proposing a reference inspection interval strategy for the newer steam generator tube materials, and what I am talking about is 600 thermally treated and Alloy 690 than those currently allowed in the tech specs.

The industry is currently addressing both NRC comments and internal industry comments with respect to this proposal. And the staff believes that this approach must ensure that tube integrity performance criteria will continue to be met and that tubing conditions not meeting the performance criteria will be promptly detected.

So based on that the staff concluded that regulatory controls on the inspection intervals were needed, and what we proposed was incorporating provisions in the administrative tech spec regarding the use of NRC approved inspection intervals.

And we have reached agreement with industry on this approach. So where we are now is that now that we have reached agreement with industry, we had a meeting to work out a schedule to reach a conclusion of the review of the generic license change package.

So one of the items that we have been asked to discuss is the schedule and based on recent meetings, we expect the industry submittal in mid-2002.

After the submittal is made, we will use the process of issuing the safety evaluation that we previously informed the Commission that we would follow, and that was in SECY-00-0078, and sending it out for public comment, resolving comments, briefing the Commission, publishing it in a regulatory issue summary.

And we anticipate that this will take approximately six months after we get the industry submittal.

VICE CHAIRMAN BONACA: Ms. Lund, during the Subcommittee Meeting that we had last week, we really had some difficulty with the issue of going to a performance based, because the ability to determine tube integrity was not convincing at this stage.

And I think that the NRC is not convinced either yet. And so we had some concern about this package coming, and then we had a presentation from EPRI that said that this is going to be far in the future.

Right now we are going from a prescriptive inspection interval process to a better and more conservative prescriptive process, or something of that kind.

MS. LUND: Kind of a reference interval is what I think Emmett is calling it.

VICE CHAIRMAN BONACA: Yes, it was specific to certain types of steam generators and so on. And now when I look at your presentation, I get the message that actually this new package within 2002 will also contain new criteria, new performance based criteria?

MS. LUND: Well, it is going to include performance criteria, but the performance criteria, some of it is just more explicitly called out than

what was called before.

But what I would suggest is that Emmett is going to actually discuss some of the components of it, and more of the details of what the performance criteria are. So that would probably -- and not wanting to steal his thunder, maybe -- well, would that be acceptable?

VICE CHAIRMAN BONACA: Sure.

MS. LUND: Okay.

DR. FORD: One of the conclusions from the meeting last week, Louise, was that if you take away the conclusion that I came away with, which was that, yes, in the long term -- and exactly what Mario was saying, that in the long term, yes, you are heading for performance based criteria.

But if we don't have the data quality to get that by the end or the middle of this year, and that we are going to a prescriptive --

MS. LUND: To an interim stage.

DR. FORD: That has not changed?

MS. LUND: Right. What we are doing is that as far as inspection intervals, we are going to have an interim step. Do you want to address that, Emmett? It looks like --

DR. FORD: Well, so far, you have only

been talking about -- in the words you have been using or saying performance based.

MS. LUND: That's right, and the performance based is more on the way that the program is constructed, and the intent at the beginning was to make it performance based, including the inspection intervals.

But the actual issue that we have been wrestling with has been that we are not ready for the inspection interval part of it to be performance based.

DR. FORD: So is it fair to say that the overall plan that you are proposing is going to be adaptable enough so that it can take a performance based, but right now practically it is sticking with a prescriptive --

MS. LUND: Right, for that issue, because the program itself based on the condition monitoring the operational assessment, and looking at the conditions of your tubes, and looking at how they are going to perform for the next cycle, and doing all that evaluation, that is a performance-based part of the program right now.

And the part that we are still trying to iron out is this inspection interval strategy. So

does that make sense?

DR. FORD: Yes.

MS. LUND: So I have just one more slide and then I am going to hand it over for you to get a lot more details on this. In our long term action for review status is to resolve outstanding issues with the EPRI guideline documents, and this will have future benefits, such as permitting the use of intended performance based approach for inspection intervals, in lieu of these reference prescriptive requirements.

If there is no questions on this overview part of it, I would like to go ahead and turn it over for more specifics in the next couple of speakers.

MR. BEHRAVESH: Good morning. I am Mohamad Behravesh from EPRI, and before I go further, I would like to get an idea of how much time do I have for this presentation?

DR. FORD: The whole time that we have is until 10 o'clock, and Emmett, it depends on how long you need.

MR. MURPHY: I prepared a presentation that is very short, and so your questions will drive the length of it.

DR. FORD: So you are the only two

presenters?

MR. BEHRAVESH: Well, Jim Riley from NEI will have some concluding remarks.

DR. FORD: How long do you need?

MR. BEHRAVESH: I think it would be a luxury to have about 25 minutes to 30 minutes. If I could have that much, that would be good. If I take less of that, then we will have time for questions.

DR. FORD: Okay. So, 25 minutes with questions would be perfect.

MR. BEHRAVESH: As Louise mentioned, this entire framework of NEI 97-06 stands on these various pillars called guidelines, and the strength of this framework really depends on the strength of these guidelines.

And one of these guidelines is the inspection guideline. A lot of the issues related to steam generators, at the end it sort of culminates in inspection questions.

So I would like to spend some time telling you about this industry document that details inspection requirements, and where it came from, and what it all involves.

The steam generator inspection guidelines goes way back to 20 years or so, and the reason for

it, the impetus for it, was that there really wasn't any recommendations or any guidance on how to do steam generator inspections.

And unlike pressure vessels, and unlike piping, steam ASME was somewhat silent, and to this date it is still somewhat silent as it relates to steam generating inspections.

So utilities took the initiative back in '80, putting a set of requirements together, and over the years that has continued, and from time to time they have revised it, and formalized it, and brought input from vendors to the process.

And they added some very important topics to it, namely performance demonstration, and it went on to a prescriptive sampling, and somewhat even changed the language 2 or 3 years ago that it is really no longer a recommendation or guidelines, but rather that it is requirements.

Everything has attached to it the word "shall" and it is sort of a de facto requirement for the utilities. So the point that I want to make with this slide with you is that the set of guidelines that the industry used for conducting steam generator inspections is very mature.

It is time tested, and it is field tested,

and it has gone through a whole series of reviews, to the point that it brings us to Revision 5, and that has been what utilities have been using for the last 3 or 4 years.

And in the guideline it also says that every two years it is required that we assess the need for revision of these guidelines. That is that Revision 5 of the guidelines, based on utilities input and other input that we have received, have actually been pretty good.

It has brought a lot of improvements to the practice. However, it did lack one thing, and that is that as utilities went and replaced steam generators, and went to better materials, this revision, this addition of the guideline did not make any distinction between 600 mill annealed material and 600 thermally treated, and 690, the newer material.

And so there was a lot of impetus for revising this, and for allowing for these new materials.

DR. POWERS: Is Revision 5 the 1997 version, with all the strong language, the one that was enforced at Indian Point at the time that they had their tube rupture?

MR. BEHRAVESH: It was one that they

should have followed when they had the tube rupture.

DR. POWERS: Oh, they should have?

MR. BEHRAVESH: Yes.

DR. POWERS: Okay.

MR. BEHRAVESH: This slide pretty much says what I mentioned to you, that the guideline delineates the hows and whats, and all those things as a result of using an assessment. It is a utility developed document, and we have started work on Revision 6 in March of 200, and we expect to finish it by the middle of next year.

It has lots of things in it, but I am going to concentrate basically on a couple of issues. The highlights of Revision 6 is these prescriptive examinations, and then some issues related to data quality which came out of the Indian Point 2, as a result of the experience at Indian Point 2.

We have a new addition of the new draft of this guideline out for draft out for review, and we should be receiving --

DR. FORD: Mohamad, could you just expand a little bit on what you mean by data quality? Is this laboratory data quality, field data, and what sort of scatters are we looking at? What are the quality issues specifically?

MR. BEHRAVESH: Sure.

DR. FORD: If you could go briefly over that.

MR. BEHRAVESH: Yes. Briefly, it is on-line monitoring of the data as you are collecting it to determine whether has the data quality, has the data deteriorated to the point that it can no longer be trusted for collecting and making decisions. So changes have to be made.

And so it is on-line such that you would know that the data that you have used can be -- that the data that you have collected can be used, and if that is not the case, then remedies must be made.

DR. FORD: So it is inspection data that you are talking about?

MR. BEHRAVESH: Inspection data quality while you are collecting it.

DR. SHACK: Sort of signal-to-noise?

MR. BEHRAVESH: Signal-to-noise would certainly be the number one element, yes. Data quality are other things, too. For example, are you in the right tube. I don't want to get mundane, but yes.

DR. WALLIS: Does it say what you do with the data once you have got it?

MR. BEHRAVESH: Well, what you do with the data is that you do a whole lot of other things based on your analysis procedures. But collecting it, and before you take the instrumentation out and leave the place, you want to make sure that what you have got is acceptable and useable.

DR. WALLIS: But you are not addressing what you do with the data.

MR. BEHRAVESH: Not at this stage, no. There is a whole set of guidance on what to do with the data.

DR. FORD: And on your graph beforehand, or you slide beforehand, you said when. So there is a time component to this?

MR. BEHRAVESH: Not to the data. A time component to the data quality, but what I said by when had to do with prescriptive inspections; when do you do and how often.

DR. WALLIS: It sounds like a ritual.

DR. POWERS: That is not a bad characterization.

VICE CHAIRMAN BONACA: Yes, if that is a condition that is a ritual.

DR. POWERS: You get to anoint a brief to it, and collect the data, and then they bless it.

VICE CHAIRMAN BONACA: Yes.

DR. WALLIS: Once a day and twice on Sundays.

DR. POWERS: And every day during a outage.

VICE CHAIRMAN BONACA: Then you hope and pray.

DR. POWERS: Twenty-four hours a day, three shifts.

VICE CHAIRMAN BONACA: And then you hope and pray.

DR. POWERS: And hope and pray that your probability of detection is high enough.

VICE CHAIRMAN BONACA: Yes.

MR. BEHRAVESH: Now, let's wait a minute now. You have to consider the following. It used to be that you would go there and collect a bunch of data, and go home, and then worry about what to do about it.

What is being done now is that know what it is that you are collecting, and is it what you intended to collect, and can you use it, and does it have all the attributes, before you leave the place. It may sound like a ritual, but it is a good ritual.

DR. WALLIS: Well, did someone go through

the exercise of what you are going to do with the data, and how much data do you need in order to satisfy the needs of whatever the process is for processing the data?

MR. BEHRAVESH: Yes.

DR. WALLIS: And the questions which are being asked by the whole process?

MR. BEHRAVESH: Yes. There is a whole set of tables, and the rationale, and tables that says this is the data that you collect, and this is where you collect it from, and this is how many times you collect it, and how much you collect.

DR. WALLIS: And you should deduce that from your needs for whatever it is or whatever the questions are that you are asking. The process for collecting data seems to become lost once you have figured out what questions you are asking, and how much data you need, and on what frequency in order to answer the questions.

MR. BEHRAVESH: That is correct.

DR. WALLIS: Am I right in assuming there was a process of that type that you went through?

MR. BEHRAVESH: Yes. Now, in a nutshell, the big changes that are happening in Revision 6 of the guideline, in comparison to Revision 5, is that

the distinction that has been made in inspection of 600 mill annealed thermally treated, and 690 thermally treated.

And those distinctions are that for 600 mill annealed material that you inspect it at every outage. For 600 thermally treated, it must be inspected at least every other outage.

And for 690 thermally treated, it must be inspected at least every third outage. And this means that you cannot skip more than two times, and this means that you cannot skip more than one outage.

DR. FORD: Last week, we discussed this, and there are two issues, practical issues.

MR. BEHRAVESH: Yes.

DR. FORD: One is the probability of detection, and the other one is what is the database to give you those --

MR. BEHRAVESH: I can get to that and these are all experience base. This material has failed in service and is being looked at at every opportunity.

In this material, there are, oh, 15 or 16 plants in the U.S. that have this material, and they have gone without any cracking in them for as long as 15 years.

DR. FORD: And did I understand that there are some incidences of cracking of 600 TT?

MR. BEHRAVESH: Well, two things. There are alleged cracking in the U.S. that have not been confirmed. For example, what they thought was cracking in the Braidwood and Bryon plants that are 600 thermally treated, and they took three tubes out.

And after a destructive assay, they decided that those were really manufacturing flaws, and they were not cracks, and they were basically what is called OD groups. This is in those two plants.

They thought that they had the same or they thought they had what appeared like cracking at Turkey Point 3 and 4, and then they went and did an additional examination with the ultrasonics, and in reviewing the data and comparing it with the other similar indications, they again have concluded that those are not cracks.

Now, there are facts that have been confirmed in this material in foreign plants, and there is an explanation for them. For example, in France, they have quite a few of these, but their expansion are all very different, done differently, and what is called the KISS rule, which has introduced additional residual stresses.

And in those cases, the ones in France, they have failed in the cracking mode. No such expansions do exist in the U.S. There may be cases in Japan where again the thermal treatment has been different than in the U.S. based on everything that we know today.

Again, I need to add that this study is ongoing and we have a study under way to get all of these details in one place to support these things for the NRC review.

That in everything that we know today, this material in the U.S. has not failed in the cracking mode, and the experience with it in the field, the number of plants are 13 effective full power years, and up to 15.

And there are two 30 plants, both of them are at 15 plus effective power years. So this one is new and there have been no evidence of failure of it in the cracking mode in the field. So there is data being collected for all of this.

DR. POWERS: Your slide implies that the 800 Alloy will be treated the same as the 600 thermally treated?

MR. BEHRAVESH: Pretty much. That is what we are considering.

DR. POWERS: Is there a reason for treating 800 the same as 600?

MR. BEHRAVESH: Nothing that I can elaborate on.

DR. POWERS: I mean, the Germans seem to be pretty enthusiastic about 800.

MR. BEHRAVESH: Yes, and 600 has not been bad here either.

DR. POWERS: Yes, apparently not.

DR. SHACK: Do we have any 800 plants in the U.

MR. BEHRAVESH: Not fully, no. Things are made with 800 material, but not fully steam generated plants. Anyway, this is in a nutshell what the changes are. Now, let's look and see --

DR. FORD: Mohamad, you are going to get to this question about why these specific multiples in the inspection periodicities. You are going to get to it?

MR. BEHRAVESH: Well, I would come to it. Again, I would come back to it and hopefully be able to answer your questions. So when we go to 600 mill annealed, the requirement is that you inspect all of the tube in every steam generator within 60 effective full power. And also it means that mechanical --

MR. ROSEN: You are talking about full power months?

MR. BEHRAVESH: Months, effective full power months, 60 effective full power months. Steam generators shall be inspected at every outage, and every time you do an inspection, you must do at least 20 percent random samples.

If you do samples of less than 20 percent, this is really no change. This is the way that we have been doing it in the Revision 5 as well.

DR. WALLIS: Typically, how many months are there between outages?

MR. BEHRAVESH: It depends on the outages, which are often times dictated by fuel cycles, and so you can assume about 12 months, all the way to 24 months, but typically 18 to 22 months or so.

DR. WALLIS: And this is 20 percent guessed at by some experts or where does it come from?

MR. BEHRAVESH: Well, 20 percent is sort of the optimum sampling that if you do less, you are not going to get a lot more information. And if you do more, it is not going to give you a whole lot more. So it is backed by -- in fact, it was based on the study that was done --

DR. WALLIS: So 20 percent if you do it,

say, three times between the time that you inspect everything, and the chance of missing a cracked tube is pretty high. Just take the probablistic thing. You do three measurements of only 20 percent, there is probably a 50 percent chance --

MR. BEHRAVESH: Well, the idea is that it doesn't matter how many cracks you have in tubes. You need to catch one of them to have knowledge of the tubes being cracked.

DR. WALLIS: But there is quite a chance that you wouldn't catch a particular cracked tube if you did that?

MR. BEHRAVESH: A particular cracked tube, that is correct, but if you find a cracked tube, then you must expand your inspection all the way to a hundred percent, which would allow you to catch every cracked tube.

DR. WALLIS: I am just trying to get the rationale for it.

DR. POWERS: Graham, do you think that is true that if I inspect 20 percent randomly selected, that I have a high probability of having missed a tube?

DR. WALLIS: Yes.

MR. RILEY: This is Jim Riley from NEI.

Mohamad, would you take a couple of minutes and explain the degradation assessment? That might help answer this question I think. The selection of tubes is not completely random.

MR. BEHRAVESH: Well, as part of this whole process, you select the tubes to inspect, and also at the end you must inspect all of them. You select them based on the knowledge of at which locations degradation may have the strongest chance of appearing.

DR. WALLIS: Oh, so it is not random cracks.

MR. BEHRAVESH: No. Within a given population, once you have selected a population, within that population is random. It is random.

VICE CHAIRMAN BONACA: But again going back to the previous slide, an important bullet is missing, which is that if you find one, you expand your inspection beyond the 20 percent?

MR. BEHRAVESH: Oh, yes, exactly that.

VICE CHAIRMAN BONACA: Okay. That's important.

MR. BEHRAVESH: In 600 thermally treated, if the steam generators are free from cracking, and that is a big if, you must inspect all of them first

within 120 effective full power months, and --

DR. WALLIS: If you know that they are free from cracking, you don't have to do anything.

MR. BEHRAVESH: Pardon me?

DR. WALLIS: It seems to me that if you know that they are free from cracking, you don't have to inspect anything.

MR. ROSEN: Really, what is being said there is that if they have been free from cracking in the past.

DR. WALLIS: If they were free from cracking?

MR. ROSEN: Yes.

VICE CHAIRMAN BONACA: If no cracks had been identified yet.

MR. BEHRAVESH: Once we get back here, if this material is cracking, you don't go through this. You don't go through this. The first time around is 120 months, and 120 months is effectively about 10 years.

And what I mentioned to you is that there are a number of plants that have 15 years of crack free experience. So that is part of the rationale for this 120.

Now, the second time around, the

prescriptive methodology is getting more conservative, and you drop to 90, provided that you live through 220 orderly and completely trouble free.

If you live through that, then the next period would be 90, and after that, 60 and 60, and 60, and so forth.

DR. FORD: Mohamad, again looking at this graph, and the following graph, I come back to my original question. What is the database upon which presumably a statistical analysis has been done to come up with these periodicities? Where is that database?

MR. BEHRAVESH: That database is the collection of 15 or 16 plants that have this material in them, and they have been operating for periods that exceed this number. So, this number has been taken as a conservative representation of that experience.

If you have an experience that says 15 years, I would say that at 10 years would be a conservative representation of that.

DR. FORD: And maybe we are not playing fair, but have the staff seen that data, and have they confirmed that those are significant?

MR. BEHRAVESH: Those are public data, and those are all the --

DR. FORD: Well, has the staff examined these data? You can have publicly available data, but have they examined the data?

MR. BEHRAVESH: There has not been a table that in one page that we have handed it to them, but they periodically get reports from all of the -- they continuously get reports from all of these plants that they know their operational experience.

And the other part of the answer to your question is that as I mentioned, we are embarking on a study that is ongoing now to formalize all of this information; that on one hand appears to be obvious, and on the other hand, doesn't appear to be obvious to the uninitiated.

DR. FORD: I guess I am going away with the impression from this graph and the next one, and indeed the previous one, that these inspection periodicities are completely empirical.

MR. BEHRAVESH: Empirical?

DR. FORD: Yes. Is that a fair statement?

MR. BEHRAVESH: Yes, it is, experienced based. So there is no closed form formula that I can put some input in it, and out comes on the other side 120.

DR. WALLIS: You could. You could say

that you want to be sure that there is some 99 percent probability that if there is a crack that you detect it before it becomes serious, and you determine from some technical basis how long you can allow it to be undetected.

DR. FORD: Maybe we can cut this one short. Emmett, are you going to discuss it?

MR. MURPHY: I don't have viewgraphs that speak directly to your question.

DR. FORD: But this is one of the concerns that you have, correct?

MR. MURPHY: Yes.

VICE CHAIRMAN BONACA: Okay. I'm sorry, but I would like to ask a question of clarification here. Is the 120 90-60 starting from the implementation of the tech specs, or from the construction of the steam generator?

MR. BEHRAVESH: From the replacement or construction of the steam generator, with a caveat that after the first cycle of operation -- because what happens is that once you start, at the end of the first cycle of operation, you do a hundred percent examination of everything to make sure that everything is okay. And from that point onward, this clock starts.

VICE CHAIRMAN BONACA: Okay. Very good. Thank you.

DR. FORD: I keep coming back to where there is data out there, statistical data, and Staehle has done a lot of this sort of stuff. Does this come into your argument? I mean, that is scientific data.

MR. BEHRAVESH: Those are all of the ones that we -- well, we thought that it was obvious, but apparently they are not. We are collecting it to make this case as you are mentioning, and that is what I keep saying, is that it is ongoing now.

VICE CHAIRMAN BONACA: But since you have no history of cracking whatsoever in the 650, and how could you possibly have a probablistic basis? I mean, I don't understand that.

DR. FORD: Some of that is based on the laboratory data that --

VICE CHAIRMAN BONACA: I'm sorry?

DR. FORD: Some of it is based on the laboratory data.

VICE CHAIRMAN BONACA: Okay.

MR. ROSEN: Well, just because you have no failures doesn't mean that you can't do statistics. You have thousands and thousands of tubes that have been in service for many years.

VICE CHAIRMAN BONACA: I am talking about the fact that you are changing from 1210 to 90 to 60, okay? And you would have to have some criteria of understanding of how, for example, how cracks initiate and develop to the point where you can detect them.

I mean, it is not an easy task to simply understand -- well, all right. Why don't we just hear from Mohamad further on this.

MR. RILEY: This is Jim Riley again from NEI. Let me talk a little about where we are going here. This is a draft document and I would like to remind everybody of that. The values that have been put into this document initially are based on experience.

We have got a bunch of folks who are working on the documents that are experts in the field, and they have a good idea of what is going on out there, both within our country and outside.

And they have put together what they believe are achievable inspection intervals. The industry is involved in a study to develop the basis for these intervals to back up what we are putting in this document.

Please, right now, these are what we have in a draft document. We are developing the basis to

prove that they are indeed the right intervals, and we will have that done before this document is issued in final form.

There are lots of other things that I think Mohamad is going to go into that explains not only the basis, but why these values, even where they are, are quite conservative.

We have what is called a degradation assessment, and we have briefly touched on it. A degradation assessment is required before every steam generator inspection, and it is required every time you shut down your plant for a refueling outage, and you take a look at what is going on in my steam generators, and even if I am not doing an inspection.

And that degradation assessment looks at what is going on around the industry, and what is going on around the world. Do I have anything, any mechanisms that are going on. If I do, I need to evaluate how that affects me.

It may change the time that I have until I do my next steam generator inspection, and it may change what I look at when I do my inspections. These degradation assessments plan.

They plan what you are going to look at, and how you are going to look at it, and what

techniques you are going to use. And they, along as you are going through your conditions and looking back and determining what your steam generator looks at, affects your sampling.

How much do you sample, and what do you look at, and how do you look at it. All of that then is rolled up into this operational assessment. The operational assessment looks at where am I now, and what is going on, and how long can I go before I have to worry about exceeding the performance criteria.

That establishes your next inspection interval. All these values have to be supported by an operational assessment. So there is a lot of things that are going on behind the scenes that back up these values.

DR. FORD: And that's why those things are synergistic.

MR. RILEY: Yes.

DR. FORD: Sorry, Mohamad, that we got off on a different subject.

MR. BEHRAVESH: So if they are free from cracking, and you inspect a hundred percent of them in these periods -- and again these go way into the future, and these guidelines are supposed to get revised every two years, which means that if new

information comes up any time within these, that these recommendations will change.

DR. WALLIS: I don't understand how that -- how is that compatible with this bottom bullet about no SG can operate for more than two refueling cycles without being inspected. There are lots of refueling cycles within 120.

VICE CHAIRMAN BONACA: That is confusing, and I was speaking to that last week, because if it is a hundred percent of the tubes within 120 months, but every other cycle you have to inspect some.

DR. SHACK: You inspect a 20 percent sample.

VICE CHAIRMAN BONACA: So, I guess --

DR. FORD: I guess these are uncertainties, and I was trying to move it along here, guys. My feeling is that all of these questions are tied up with the statistical evidence.

DR. WALLIS: Sure. Of course, they are.

DR. FORD: They haven't shown us that it will be developed.

DR. WALLIS: Well, I think these numbers ought to be deduced from something else. Let these numbers be "X" and you solve from "X" by working out some other --

DR. POWERS: Well, if it helps at all, if I assume that the probability in any given tube cracks is one in a thousand, and I take a sample of a fifth of the tubes, there is about a 50 percent chance that I am going to find any cracks.

If it goes up to five out of a thousand, there is only about a five percent chance that I am going --

DR. WALLIS: There is one in a thousand that what you are looking for, or one in 10,000 for what you are looking for. Are you looking for one tube or are you looking for 10 tubes typically before you do anything? It is all tied to your action, and I want you to find and detect.

MR. SIEBER: Right. Three thousand.

MR. BEHRAVESH: In a steam generator where you have two or three thousand, or something about that number of tubes, when you do 20 percent sampling, if you have 11 tubes in there that are cracked, this 20 percent sampling allows you to catch at least one of them.

DR. WALLIS: Yes, but is 11 tolerable is the question. I mean, what is the threshold were you do something I think is the key question there.

MR. SIEBER: Well, you something when you

get the 40 percent through all, and detect that, and a single tube in a steam generator isn't going to corrode and crack all by itself.

The whole steam generator starts to go back the very day it is born, okay? So when you take a 20 percent sample, you are going to take a sample of tubes that are beginning to corrode and crack and so forth.

And that gives you the confidence to say I generally know what the condition of the steam generator is, even though you may not have found a defective tube, but you will find a corroded tube after a few years.

And once you find a defective tube, then all of a sudden --

MR. BEHRAVESH: Well, if expansion comes into place, then you look at all of them, as opposed to --

MR. SIEBER: And you look at them and everything that you can get to.

MR. BEHRAVESH: Yes. The objective is to detect the onset of degradation. All you need to find is one degraded tube, and not even defective. One tube that you believe to be degraded, that puts you in the expansion of your sampling.

Again, these periods must be supported by degradation assessment and operational assessment, an acronym for degradation assessment and operational assessment, which means that if your degradation assessment says that you are more likely to have degradation in your plant, then these things do not hold. They must be revised.

This is where the industry experience comes in. You must also satisfy all of the secondary side requirements, meaning that foreign objects and things of that sort.

There is also a safeguard in there such that you don't inspect all of the tubes at the beginning of the period, and then go on for 10 years not looking at something, or inspect all of the tubes at the end of the period, going for 10 years and not inspecting everything.

And at least 50 percent of them must be done by about the mid-point within the period, and the other 50 percent towards the end. And in all of these, no steam generator can go for more than two cycles without being looked at.

And then if cracking is discovered in any time along here, then these things will not hold, and you go to 600 mill annealed requirements, which means

to look at every steam generator at every refueling outage.

DR. WALLIS: I could suggest that you skip this one, and it is exactly the same, but it is just different numbers.

MR. BEHRAVESH: Different numbers. Now, the basis for this is that you have 15/16 600 thermally treated, and you have about the same number of 690 more oncoming on line, and if you look at the industry as one aggregate of so many steam generators, you will find out that with more steam generators with new materials, experience of every one of them must be considered in the collective experience.

And such that although a steam generator may not be looked at, although your steam generator may not be looked at at this time, someone else is looking at this, and someone else is looking at this, and all of that information must be considered.

And also if cracking is detected the inspection interval has to revert back to the 600 mill annealed, and the second requirement must be met, and of course this is a considerable enhancement over what is currently the law of the land, which is the technical specification, which says that you must do three percent in about every 40 months.

And it doesn't even say that that has to be a different three percent. Effectively, you could go and look at the same three percent sample of tube within 40 months. So it is a big improvement.

VICE CHAIRMAN BONACA: When you are looking at this collective experience, I imagine you are also tracking differences in chemistry, and so on and so forth?

MR. BEHRAVESH: Yes. That is all part of the degradation assessment.

DR. WALLIS: Now, the basis for being more conservative than the current tech spec is presumably experience, and statistics, or something? Is there some reason why you have made it more conservative?

MR. BEHRAVESH: Well, if you look at this, these are plans that have 600 mill annealed material that have all degraded, and 3 percent would have been hardly sufficient to detect the onset of that.

DR. WALLIS: So then you can do so kind of math which says three percent leads ot something unacceptable?

DR. POWERS: You need another term that we just don't have I think, Graham, to answer the question; and that is that given that there is a crack in a tube that you don't know about, what is the

probability that that tube will rupture during a cycle of operation. And that is a number that I just don't know.

MR. BEHRAVESH: That's right.

DR. WALLIS: Yes, but apparently his experience has led him to change the inspection, and so there must be some kind of qualitative connection between what you expect and what you --

MR. BEHRAVESH: Yes. The operational experience. Remember that I said these guidelines, and these recommendations have been evolving over a 20 year period.

And so once you started seeing a cracking through this type of material, it was obvious that the three percent was not the right number. And I doubt that it has been exercised by anyone.

On the matter of data quality, is that the question is the data getting noisy to the point of effecting detectability and sizing, and this is really a synopsis of all the objectives for data quality.

And then these examination techniques specification sheets are all those attributes of a technique and system and those parameters that you need to follow.

And then if data gets to get noisy and

affects these parameters, and affects your probability of detection, and so the question again is to have the bounds of these examination technique specification sheets, and if performance has been exceeded such that the performance indices have been degraded, these are the basic questions that are being asked.

And as a result, the guidance provides frequency, location, acceptance criteria, and corrective action for each of the listed quality parameters. And these are some of the attributes of Revision 6 of the guideline.

Currently as I mentioned, too, the draft of the guideline is outside for review, and we expect to get comments by December 18th, and start evaluating those comments early in January, with the hope of getting this revision out by the middle of the year.

VICE CHAIRMAN BONACA: That is the same question that we had during the subcommittee meeting, and again you presented to us a plan that is going from a description inspection intervals to prescriptive inspection intervals.

MR. BEHRAVESH: Okay. Let me take a minute to answer that.

VICE CHAIRMAN BONACA: You didn't say anything about changing to --

MR. BEHRAVESH: Sure. I was looking at the time. Let me take a minute to address that. Everyone talks about prescriptive versus performance based, and most of them are saying that ultimately we have to go by way of performance based, where the prescriptive methodology is not good.

What you need to do in order to do performance based is that you need two things to do performance based. You need data and you need methodology. You can sit around the table and discuss methodology as long as you want until you agree upon methodology and put it aside.

When it comes to data, you can't manufacture data. You can manufacture history, and you have the data that you have. Now, if you take that data and put it through the methodology, then are you willing to accept the outcome.

If the outcome is very good, chances are that the outcome will be more credible. If the data is questionable, then the outcome would not be very good.

The industry recognizes that the NRC recognizes that the way to go about this performance based, but right now if you don't have sufficient data as we have had an example, you put the data that you

have in the methodology, and it comes out and says here you can go for about 22 years and not look at this thing.

And everybody says, whoa, wait a minute. Do I really want to go 22 years without looking at this, and then you step back, and then the question is asked, well, what is the problem. Why don't you accept this.

Is it the methodology that you don't accept, or is it the data that you don't accept. Well, data is what you got. There are 690 and there are two plants in the U.S. that have the experience of about 8 years or so.

Is that sufficient information, and you can debate that. Is that good enough information, and you can go along with it and accept it, and so as experience, as this collective experience is accumulated for all these plants, the industry as a whole will be in a much better position to use that data and put it in an acceptable methodology to come up with performance based.

And we have provisions for performance based within Revision 5 of the guideline, as well as within Revision 6 of the guideline. In Revision 5, no one had taken it up.

In Revision 6, some people have sort of experimented with it, and they are sort of discussing it, and discussing whether they want to go along with it or not.

And we anticipate that there will be more exercises in that arena and with the new agreements that are being discussed with NRC, there will probably be some limitations on the maximum interval that the utility can go without getting that approved by the NRC.

And I think Jim Riley had some concluding remarks as part of our collective representation.

MR. ROSEN: Well, I had something to say on a different issue.

DR. FORD: I will allow 10 minutes at the end here to ask the Committee here their advice as we move forward on this. So between the two of you can you take 10 minutes?

MR. RILEY: I think it is going to take me longer to walk up there than it is to tell you what I have to tell you here.

DR. FORD: All right.

MR. RILEY: I am kind of jumping subjects on you here a little bit. My name is Jim Riley, and I am NEI's project manager for steam generator issues.

And I came here to talk about another item that we are addressing as an industry, specifically on an application of safety factors in one of our performance criteria.

Now, this is issue has not come up today, but I will go ahead lay it on you anyway. We are you know have been working on this generic license change package for a number of years, and as it is getting nearer to its completion, we have asked the NSSS vendors to take a look at what we are putting down here to make sure that we are consistent with the design basis requirements.

Let me step back a little and put this into context. As you have already been told, NEI 97-06 is the overall document that governs steam generator programs. Its details are handled through a whole series of EPRI guidelines.

NEI 97-06 establishes what are called performance criteria to make sure that your steam generators continue to operate properly. There is three of them.

There is a structural integrity performance criteria which is what its name implies, and which ensures that the tubes are capable of withstanding the forces that they are going to need to

withstand in order to prevent their failure.

There is an accident-induced leakage performance criteria that addresses how much they can leak, which again is based on design basis requirements and exposures, and those kinds of things.

And then there is an operational leakage performance criteria, which is one that you can actually measure real time while you are operating, and it is basically just a leakage requirement, a primary-secondary leakage requirement.

The three of them together act to ensure or to maximize the probability that you will maintain tube integrity between steam generator inspections. And that is the whole goal of what we are doing here.

You know, the old tech specs were very prescriptive, and very small sample sizes, and they were based on surveillances that you did every time you shut down the new steam generator for inspection.

This whole program is set up much more on maintaining tube integrity. It includes not only a look back at what my condition is right now, but it includes methodologies to look forward, and to make sure that the next time that you shut down and do an inspection, there is a very high probability that you will continue to meet your performance criteria.

So within all of this mixture, performance criteria are very important. They are central. As we were reviewing the performance criteria this summer, we found an issue that needs to be addressed, and right now it is an open issue, and I am not going to be able to give you much detail at all on the specifics because we are still looking at it.

But this is a performance criteria for structural integrity. I won't read the whole thing. The underlying portion of this is the portion that we have some questions about, and it has to do with what safety factor you apply to the loads during an accident condition.

The current performance criteria says that you apply a safety factor of 1.4. It turns out that when we asked the NSSS guys to take a look at it, there was some questions about how that 1.4 is being applied under the different designs, and whether that criteria is accurate for everybody.

Now, all I can tell you at this point is that we are undertaking some work internal to the industry to take a look at how this 1.4 is applied, and may possibly end up revising the performance criteria to make sure that what it states can be met, will be met, for all the NSSS designs for the

different steam generator designs that are out there.

We will incorporate that change, that generic license change package revision as we proceed for its final submittal to the staff at the middle of this year.

And we will involve the staff in our discussions on what we come up with on this application for safety factors and as we come up with something more concrete. But this is another open issue. That's really all that I have to say in the interest of moving things forward.

DR. FORD: Thank you.

MR. RILEY: If you have any questions on NEI 97-06, or how this all fits together --

DR. WALLIS: Well, it seems to me that the testing has got to be related to the performance criteria.

MR. RILEY: It certainly is.

DR. WALLIS: And somewhere or another there must be a link that is explicit.

MR. RILEY: The testing that we do is called condition monitoring, and it is done every time you do an inspection, and the testing includes all the stuff that Mohamad was talking about, or that his guidelines talk about.

DR. WALLIS: He didn't explain how it is related to the performance criteria.

MR. RILEY: No, there is a different guideline that is called the integrity assessment guideline.

DR. WALLIS: But they must be linked. You don't want to assure the others.

MR. RILEY: Yes. And the results of the testing gets fed into an integrity assessment that actually does an analysis of whether or not you meet the performance criteria now, and whether you will in the future.

DR. WALLIS: Good. Thank you.

MR. RILEY: You're welcome.

MR. MURPHY: Okay. I am Emmett Murphy of the Materials and Chemical Engineering Branch, NRR, and I have a relatively short presentation, but I am going to go out of sequence right from the get go.

I want to first talk about performance sine what I say here I think will serve as useful background purposes for subsequent discussion about inspection interval issues.

During the briefing that we provided to the subcommittee last week, questions were raised with respect to the basis and the adequacy of performance

criteria that are being proposed for inclusion as part of the generic license change package.

Before answering that question directly, I would like to just reiterate that it was the intent -- it was ours and the industry's intent when developing these performance criteria to maintain consistency with the original design basis, in terms of structural margins and in terms of accident induced leakage.

This is also consistent with the philosophy of Section XI of the Code, which in the absence of a specific safety margin criteria, directs you back to Section III of the Code.

Also, these criteria are consistent with the current licensing basis of PWRs as embodied in the specification plugging limits. But are these -- well, before getting on to your question then, with respect to the issue that Jim Riley was just discussing concerning the 1.4., I can't really respond to what he said yet until we see what they come up with.

All I can tell you right now is that it has been our intent to maintain consistency with design basis and with the licensing basis, and to the extent that we have not fully done that, then of course we will be open to discussing how we do that,

and I will just leave it there.

With respect to the thrust of your question from last week, I think we have to turn to experience, and what does experience tell us about the adequacy of these criteria.

We have had eight tube ruptures. When you examine the circumstances of these eight tube ruptures, the safety margin goal that you are trying to maintain really was not material to the circumstances of the rupture.

Five of these ruptures took place because the utility was not aware of the damage mechanism taking place in its generators. Irrespective of structural margins that you are applying to your analyses, if you are not aware of the mechanism, it is going to hit you.

On three of the ruptures, the licensee utility had some knowledge of the damage mechanism, but he was not adequately managing the program, either because of inadequate inspections, or inadequate assessment of how quickly the damage mechanism was progressing.

Again, a question or an issue of safety margins was not really material to the circumstances of the rupture. I think we also need to consider risk

when answering the questions that arose last week.

The staff has examined risk issues pertaining to tube integrity in NUREG-0844, the steam generator U.S. side program. Also more recently, in NUREG-1570. In spite of the eight tube rupture events to date, the risk associated with spontaneous SG-TR events has been found to be acceptably low.

Similarly, the risk associated with tube ruptures which occur as a consequence of transients or accidents that are within the design basis again have been found to be acceptably low.

Before going on, and as background for our next discussion on inspection intervals, I think it is important to note that this risk experience reflects the way that steam generators have been managed through the years.

And one of the important attributes of that management process has been to inspect steam generators in general in every refueling outage. Very few plants have ever had the opportunity to operate for more than a single fuel cycle between inspections.

When plants were first coming on line in the late '60s and early '70s, they ran into problems very quickly, and they didn't have the opportunity to take advantage of the 40 month provision in the tech

specs.

It has only been in very recent times, and I don't know how many plants with the latest replacement generators were able to take advantage of the 40 months. I think it is only a handful; 1, 2, or 3, something along that order.

And in the main through the years people have been examining their steam generators every fuel cycle, and these risk numbers reflect that practice. And as we contemplate moving to longer intervals, we have to consider what are the risk implications.

Are we able through inspection and analysis and tube integrity assessment to ensure that the necessary margins will be maintained. And a final point about risk, is that the studies that have been performed do show that medium performance criteria are also important from the standpoint of minimizing severe accident risk beyond design basis type situations.

However, severe accident risks as you, know, clearly there is a lot that we don't know about it as of yet, and it is a subject that is being assessed as part of the SG action plan.

That program addresses issues addressed or identified by ACRS in its DPO findings, and it is our

objective that an approved generic license change package will not increase risk relative to the current regulatory framework.

We will go now to inspection intervals, and let me make a couple of observations here up front. I think as we sat in the back of the room listening to some of the proceedings it was observed that perhaps there is some confusion or some confusion between the performance-based attributes of the framework, the new framework that we are trying to put into place in the tech specs, versus a prescriptive versus performance based strategy for dealing with inspection intervals.

We are putting into place a framework which is performed based in the sense that the specific objective of the program is to ensure that you are meeting the performance criteria; rather than to ensure that you are inspecting every so often, and you are plugging tubes essentially at 40 percent.

But the specific objective is to or the main objective is to ensure that you are meeting the performance criteria, and that you periodically assess the condition of the generators relative to that performance criteria.

And in that sense we are performance

based. The tech specs do not include the development of strategies for determining inspection intervals that are also performance based. That is, you have determined how long you can operate before you will exceed the performance criteria.

As we discussed last week, and as we have been talking about today, so far the guidelines are not sufficiently well developed to allow people to make these kinds of determinations accurately.

And so we rely on a prescriptive strategy, which based on experience expects to prove corrosion resistance of the material, and give us reasonable assurance that we will be maintaining the performance criteria.

Time is very limited, but we have had the opportunity to look at the strategy, the prescriptive strategy that Mohamad was presenting earlier, and we commented on that strategy quite extensively back in September.

We identified quite a number of issues, and among them was the importance of receiving as much information as can be gathered concerning operating experience with the Alloy 600 thermally treated and Alloy 690 thermally treated tubing.

We were aware of reported incidences of

cracking abroad, and we didn't know the circumstances, or even if it was real, or if people were just making conservative calls. So, we do think that this is an important consideration as we consider revising the prescriptive strategy for determining inspection intervals.

The second important issue has to do with the definition of active degradation. Mohamad talked about operating for 2 or 3 cycles, depending upon your tube material, to the extent that you are free of active degradation.

Well, that is not quite exactly what they mean. Active degradation doesn't mean the absence of degradation activity under the proposal. It does allow for a certain minimal or a certain level of degradation.

And we think that there needs to be a tightening up of that definition to ensure that we don't have significant degradation actively taking place, particularly cracking activity, if one is going to be operating for multiple intervals.

DR. FORD: Just to -- Emmett, because of time, do I in just reading the rest of that, you really are reiterating the concerns that we have independently brought up. Is there anything new with

the "burst" small volumetric flaws? What is that in relation to, the last bullet?

MR. MURPHY: This is an issue that is not uniquely related to inspection intervals. It is a general issue that exists with respect to how you conduct condition -- as to how you conduct operational assessment relative to the performance criteria for small volume flaws.

It is an issue that has existed all along up to now, and going to a new regulatory framework doesn't change the significance of this issue, unless you are going to operate from alternate intervals.

To the extent that the treatment of small volume flaws relative to performance criteria is to the extent that that treatment is not appropriate, then if you go to longer intervals, then you can aggravate the potential risk associated with that.

So we would need -- that to the extent that we are going to go along with longer intervals, we need some interim approach for ensuring adequate safety margins for small volumetric flaws.

DR. WALLIS: I hate to slow you up --

MR. MURPHY: Well, let me make one more comment.

DR. WALLIS: This is the first time in

time detectable cracking that I have seen any evidence that this inspection procedure somehow is related to what you think of the actual characteristics of the material.

How does it behave is probably related to what you do, and this is the first time that I have seen any kind of mechanical term defined which you are actually trying to detect.

And so it would be useful if there were some scientific basis for how you expect things to perform, and what you do in order to measure various characteristics of performance.

MR. MURPHY: Well, we have a fleet of plants out there with advanced materials, and there will be plants on the leading edge in terms of the accumulated operating time.

DR. WALLIS: Well, I am not saying that. I mean, it is not a random process. Either they fail randomly or there is some kind of physics which says that they tend to last pretty well up to certain times, and then they begin to crack.

And then they are all going to crack very soon after that. That there is some kind of mechanical basis for how you expect them to perform, and which has terms associated with it.

And that has got to be related to what you actually have as a strategy to inspect, and this is the first time that I have seen a term actually brought up in the discussion.

MR. MURPHY: Okay. Well, let me just make one other general point. It is not the objective. It has never been the staff's objective either with the old regulatory framework or with this new one to eliminate the likelihood of future tube ruptures.

The strategies that we have been considering are not going to accomplish that objective. It is to maintain the frequency of such occurrences, tube ruptures or situations where we don't meet the performance criteria's sufficiency low frequency, and that the risk implications are acceptable.

DR. KRESS: Do you have a number for that sufficiently low frequency that you want to give us?

DR. POWERS: If I back calculate from the numbers, and assuming that the past frequency is acceptable, which I think Emmett said, it turns out that they want to be 99 percent sure that tubes are not cracking. And it comes out in such a round number that I can't believe it is an accident.

DR. WALLIS: Well, that must be based on

some model of how they crack.

DR. POWERS: It is strictly a probablistic model.

DR. WALLIS: Yes, assuming that it is random.

DR. POWERS: Yes.

DR. WALLIS: But it ain't random.

DR. POWERS: Well, I don't know whether it is or not, but what struck me as interesting is the --

DR. WALLIS: Well, old tubes are more likely to crack than new ones presumably. So, it is not random.

DR. FORD: I'm just forgetting the time. Mr. Chairman, what leeway do I have on time? I mean, we can call a halt right now.

VICE CHAIRMAN BONACA: Well, I was just pointing out that we had a goal to even shorten the upcoming 50.44, and so your time is very short. I would say another five minutes, and then that's it.

DR. FORD: So, five minutes?

VICE CHAIRMAN BONACA: Yes.

MR. MURPHY: All right. I would like to complete a thought. It is not our objective to prevent tube ruptures entirely. In some small frequency of tube ruptures and failure to meet the

performance criteria is not going to be unacceptable.

With that in mind, I would argue that it is possible to entertain the notion of longer inspection intervals before you developed methodologies and data, and have data concerning how long it is going to take to develop degradation mechanisms that you have not seen before; new cracking mechanisms and I-690, for example.

How long is it going to take to initiate those cracks before it may threaten the performance criteria. So long as the industry works in a coordinated fashion, and everybody is aware of everybody else's experience, and to the extent that one plant is finding cracking, then that information is disseminated among all the utilities.

And then all the utilities take that experience into account in determining when they should be doing their inspections. This kind of empirical or approach based on experience I think if properly set up and properly designed will do or will accomplish the objective of minimizing the frequency at which you're not meeting the performance criteria and minimizing risk at acceptable levels.

That concludes my comments.

DR. FORD: Bear in mind that the objective

of this particular presentation was to let the full committee know where we stood on that particular steam generator program, and to give advice on any of the outstanding technical issues that still remain as they go into the home stretch.

Obviously, we don't have time for us to go around the table, and I would suggest that we do that when we come to the letter writing session. Thank you.

MS. LUND: Excuse me, but could I make one quick comment? On the handout, I noticed that there was a typographical error, and I just wanted to bring that to everybody's attention on the last page.

Emmett, I assume that it is fuel cycles not to exceed 24 effective full power months, correct?

MR. MURPHY: That's correct.

MS. LUND: Okay. It says EFPY, but it is actually supposed to be EFPM, and so as long as this is transcribed, at least we have it in the record, okay?

VICE CHAIRMAN BONACA: Thank you. Any other questions or comments from the members? If not, we will recess now for 15 minutes.

(Whereupon, at 10:01 a.m., the meeting was recessed, and was resumed at 10:18 a.m.)

CHAIRMAN APOSTOLAKIS: The next topic is Proposed Rulemaking for Risk Informed Revision to 10 CFR 50.44. Dr. Shack is the Chairman of the Subcommittee.

DR. SHACK: Okay. We previously reviewed a staff feasibility study of developing a risk informed version of 50.44, and we now have a draft version of the rule, and it is presumably the first fruits of the Option 3 approach, and Mr. Markley will be giving us an introduction to the proposed rule.

MR. MARKLEY: Good morning. My name is Tony Markley, and I work in the Office of Nuclear Reactor Regulation. I think you know one of my siblings here at the table.

Before we get too much further, I would like to introduce to you our project team. We formed this team back in early March. To my left is Mike Snodderly, who is in the Division of Systems and Safety Analysis.

We have in the audience Jim Pulsipher, who worked with us on the standard review plan and other input; David Cullison, who worked with the regulatory guidance; Pete Precinas and Charlie Tinkler from the Office of Research; Kerri Kavanagh, who worked with us on tech specs; and a number of other folks who

provided us input on new reactors and so forth.

Basically, we are here today to discuss the draft proposed rulemaking for Risk Informed 50.44, and we would appreciate receiving your feedback on our plans as we present them to you on moving forward with that rule making.

With respect to the background, as Dr. Shack indicated, this issue has been before the Committee in the past in the form of SECY-00-0198, where a framework for risk informing Part 50 regulations was presented.

In addition, in that paper the presentation also included some specific recommendations on how we were going to proceed with risk informing 50.44, and we also included within that paper an attachment that addressed some of the issues that the petitioner, MR. Bob Christie, had raised with respect to 50.44.

Since that time, we have received a staff requirements memorandum from the Commission in January, that directed the staff to proceed expeditiously with the rulemaking on Risk Informed 50.44.

We sent another paper to the Commission in August, and that was SECY-01-0162, that specifically

indicated the staff's plans for moving ahead with 50.44.

There were some changes in approach that were identified in that paper. The first was that as opposed to providing a voluntary alternative rule making for 50.44, the staff looked at the fundamental mission of what RIP50, Option 3, was all about.

That was going back and looking at the fundamental reason why we had a regulation, and what does it do, and how does it work. And then once we had established a need for that regulation, we took risk insights and risk information to look at the relative importance of what we think we need for regulation in that area.

And then to the extent possible afterwards, we tried to incorporate some performance based concepts in he regulation, and specify more of what is to be done, as opposed to how to do it.

So this was discussed in the SECY that went up in August, and there was another item that went up and that was a major issue in that paper. One of the issues that was identified in this RIP50 option pre-process associated with 50.44 was an issue associated with the MARK III blowing water reactor containments, and the PWR ice condensers.

The issue basically involves if you look at the risk significance sequences for those facilities that would get you into a severe accident, if it involves station blackout, then was there a need for independent or backup power to the igniter systems of those facilities.

This was identified as a generic safety issue and has been transmitted to the Office of Research, and the Office of Research is now in the process of evaluating that issue.

And that is moving on an independent track to the rulemaking. So we are not constrained in terms of moving ahead by the resolution of that generic safety issue.

With respect to stakeholder interactions, we have had numerous public meetings on what --

CHAIRMAN APOSTOLAKIS: Are you going to use your transparencies or --

MR. MARKLEY: I'm sorry. I am going right ahead here. We will get this up. I had a captive audience here that was paying attention to my speaking and no watching the board here.

Now, we did have quite a number of stakeholder interactions on this subject. We held meetings and workshops in 1999 and 2000, and based on

the input and feedback that we received back from that, that has been taken into consideration, in terms of where we stand on this proposed rule.

We also had a Commission briefing associated with the Option 3 and some of the other risk informed initiatives in July. In addition to that level of stakeholder interaction, the Commission also asked the staff to make draft rule language available to stakeholders.

And as of November 14th, we did have draft rule language for 50.44, as well as some bracketed information, to try and provide stakeholders some additional insights into where we were headed with that regulation, rather than just raw old language on the paper for them to try and guess at the meaning.

So we received a few comments and questions and so forth on that, that we have had by means of telephone communications and so forth, but we have yet to have any formal comments submitted.

Well, I take that back. We did receive Mr. Christie's comments yesterday, which I believe you received as well. So with that, let's go to the next slide.

Basically where I want to take you with what we are doing with this rulemaking today is

basically a summary of the changes -- where we are, and where we are going, and what we believe the rule is going to look like.

For currently licensed and future reactor licensees, this rulemaking will eliminate the design basis accident as a source of significant combustible gas.

Based on the analysis and the work that was done in the framework, and previous studies, and so forth, the design basis LOCA accident just cannot produce enough combustible gas to challenge containment.

The second thing that this rule will accomplish is that it eliminates. Because the design basis accident in essence goes away, you are more concerned with beyond design basis, and consider accidents.

And you no longer have a need for recombiners, or purge and repressurization systems. So this rule eliminates the requirements for those. Once again because the design basis accident is eliminated, your monitoring systems and other combustible gas control systems no longer meet the definition of equipment required to be safety related.

So what this will in essence do will allow

the commercial grade procurement of these items. The next item. While these are -- well, while the items that I have discussed already allows a significant level of burden reduction for current licensees and future licensees, there are a number of regulations within 50.44 that are still pertinent. And this rulemaking endorses those regulations.

DR. SHACK: One thing I noticed is that most of this is consistent with what you had in the feasibility study. The one element that I found that was different was that you were retaining the 75 percent hydrogen generation; whereas, the feasibility study talked about coming up with a combustible gas source term that was more mechanistically based.

And you seemed to have punted on that. Is that a matter of time, or you just decided that it wasn't worth the effort?

MR. SNODDERLY: Dr. Shack, let me try to address that. Basically what we found was that the time frame that had been established for completing the hydrogen source term was such that it was going to hold up the rule.

And the Commission challenged us to present alternatives for speeding up the rule. One of the options that we presented was to use the 75

percent metal/water reaction, and that has been produced to the Commission, and we have not heard from them one way or the other on how we should proceed.

But we were told to continue to proceed, and we have done so. But we feel that the -- and we discussed the adequacy of the 75 percent metal/water reaction in Section 4 of the paper.

And basically what we found was that the hydrogen source term work that was performed by the Office of Research -- Charlie Tinkler and Pete Precinas are here today from the Office of Research to help support us.

But what we found was that the hydrogen generation -- that there is two key variables when designing a hydrogen control system. One is the amount of hydrogen, and the other is the generation rate.

And what we found was that the generation rates that were used in the design of the existing systems are comparable to the generation rates that are being calculated in the latest calculations.

So that gives us a level of comfort to go ahead and continue with the 75 percent metal/water reaction as an adequate basis for the purposes of this rulemaking.

MR. MARKLEY: One thing that I would like to comment on is that the thought and the idea as far as evaluating the individual source terms, and going through uncertainty analysis, that effort is still under way, and is progressing as we speak.

Its function will be more to help resolve that generic safety issue associated with the MARK IIIs and PWRI condensers. We will get some additional information as far as other containment types, but the initial indications that we have coming back from that is that even with this source term here, we are still on the mark for where we need to be with this regulation.

DR. SHACK: Why embedded in the rule, rather than -- you know, than putting it in some guidance document?

MR. MARKLEY: Essentially, this is a historical construct. One of the things that we are looking at is that we are risk informing, and we are trying to make the rule more aligned to the needs that are out there.

The decision was made to utilize this, as opposed to trying or as opposed to waiting for perhaps more detailed information.

DR. SHACK: Well, I can see utilizing it.

But once you put it in a rule though, then it is a rule change, and you are going to have a Reg guide associated with this rule anyway. Why not --

MR. MARKLEY: Does it potentially beg another rulemaking down the road if we get better information and so forth? Yes, it possibly does. That is a risk that you do take by putting this in here.

Okay. The last bullet on this page also deals with a petition that we received. We became aware of this petition a little bit later in the process. Another part of our organization was working on it, and looking at it.

We had already made a decision to focus the applicability of this rule on the containment types, and the challenge to those containments, as opposed to using specific fuel cladding information.

And whether it is a Zircalloy or ZIRLO, or that sort of thing. So we had already encompassed that when we became aware of this. So that is another change to this rule. And the next slide.

DR. SHACK: And couldn't -- well, couldn't that potentially affect the source term though?

MR. MARKLEY: We are not so much -- I think in this case if we are looking at the studies,

the source term that is out there for the large drawn and sub-atmospherics will not challenge the containments.

The source term that is utilized in the MARK I's and MARK II's will not challenge those containments because those are maintained inerting, and we are maintaining the requirements for those.

The question is whether the PWR ice condensers and the MARK IIIs. We don't have a final answer yet on whether this source term would be significantly increased for those facilities, or it could be less for those facilities.

We are relying on this research to be accomplished, and that research is supporting the generic safety issue. And that generic safety issue as I indicated earlier is on its own independent track for resolution.

And what comes out of that could affect rulemaking in terms of the PWR ice condensers and BWR MARK IIIs, or it could affect plant specific backfits if you will.

You are looking at a very defined set of population with the BWR MARK III containment types. I think there is four in the country, and then the ice condensers, I think there is eight facilities for

those.

So it is a discreet population that you are dealing with. So our decision at this point is to let the generic safety issue sort itself out, and what comes out of that, then we will look at the implications of that, and whether we need to go to plant specific backfits, or do we need to get back into the rulemaking space to adjust what we have here for the ice condensers and MARK IIIs.

On our next slide, the first bullet for future reactors is we took advantage of this opportunity at risk-informing 50.44 to try and consolidate a lot of the combustible gas regulations.

Part 52 has a reference in there that endorses the technical requirements of 50-34(f), and we essentially pulled those at the same level that they currently exist into the revised 50.44, with two exceptions.

The exceptions of course being as noted on the previous page that you don't need recombiners, and that you are allowed a commercial grade other combustible gas controlled systems and monitoring systems.

There were some other conforming changes that we had to consider when making this change. We

looked at that, and we made a change to -- this says 50.43, and that should be 50.34, and that is a typo on my part, but 50.34(a)(4).

And we are revising that to make sure that the need for high-point vents for the reactor coolant system is addressed in the applicant's PSAR. We are also revising adding a new paragraph (g) in 50.34 that will ensure all new applicants include the analysis required by 54 in their applications.

And the issue with the high-point vents. This was an interesting issue that we discussed in the team. It basically came down that the high- point vents were more associated with proper ECCS functioning than it really dealt with combustible gas.

Now, it did provide a combustible gas source term to the containment, which the containment systems have to deal with, but we felt that this regulation was really misplaced in 50.44, and so we are going to move that to 50.46, in a new a paragraph in 50.46.

Now, in moving this, I will say that there is an independent effort that is trying to risk-inform 50.46. So we chose not to try and improve the language or the risk basis for these high-point vents.

Rather, we let the team that was working

on that project have that opportunity. The last item on this page is the change to 52.47. That is that reference to the technically pertinent requirements of 50.34(f), the post-TMI stuff.

What we essentially did was say that except for X, X, and X, that would have referred them to the requirements if it was combustible gas control systems.

And essentially that is it with respect to where we are trying to go with 50.44. Now, we do have two other slides here that I wanted to present to you, because we do have two petitions for rulemaking and you have been apprised certainly of one, if not both of them.

The first one, of course, is Mr. Christie, who has made presentations here in the past. The proposed rule and his petition are significantly consistent in terms of where he felt the regulation ought to go, and in terms of what we came up with, and where we believe the regulation ought to go.

There is only three areas that we differ a bit, and one is the functional requirement for hydrogen monitoring. He didn't think that there was a need for monitoring. Well, from a combustible gas basis, we would tend to agree with him.

However, the monitoring of combustible gas in the containment is pertinent in your response to the emergencies, both for the actions that the operators would have to take, as well as input into emergency planning decision makers on whether your containment barrier is being challenged, and do you need to initiate protective action recommendations to either evacuate the surrounding population, or have them sheltered.

And so the monitors still provide a significant function, but it just is not combustible gas control. And since we are looking at a regulatory efficiency issue, would it be better to just keep all this monitoring here in one place, or try and put it in emergency preparedness and so forth, and we look from an efficiency standpoint to maintain it in the existing 50.44.

The other area that we differed from Mr. Christie's petition is the capability for ensuring the mixed atmosphere. We still feel that is very important, and that they have either passive or active means to have a mixed atmosphere, and to preclude detonations.

We will probably still have the potential for the flaming or the burning of the hydrogen, but we

would certainly like to preclude the detonation aspect of it.

DR. SHACK: You had indicated that you would accept either passive or active means?

MR. MARKLEY: That is the way that it currently exists.

DR. POWERS: Right. When they propose the passive means; that is, natural circulation will accomplish the mixing, what standards of proof do you require on that?

MR. SNODDERLY: Dr. Powers, I will try and answer that. I think what we were trying to do here was to codify the fact that active systems are important for ensuring a mixed atmosphere.

But during station blackout those systems are not available, and as part of the IPE process, licensees were requested to go through their containments and look for possible vulnerabilities.

So the answer to your question is what we would like to do is to formalize and put into the regulatory guide that guidance which is consistent with that which was used to implement that part of Generic Letter 88-20.

We want licensees to be aware of places where possible stratification could occur, and to be

aware of that. And for future designers, we want them to keep in mind the importance of having an open containment and want good communication between compartments to assist in natural circulation.

DR. POWERS: In a station blackout, you have steam enerting also on your site, and so it is not so important to have a well-mixed atmosphere there; is that true?

MR. SNODDERLY: Yes. But again I think the purpose of the rule is to communicate the fact that mixing is an important aspect of reducing the risk from combustible gas, and you can accomplish that by active systems, such as fan coolers and sprays.

But in the absence of those systems, we also need to look at the fact that you may be susceptible because of stratification. Now, the fact that you have steam is also going to be on your side, per se, but as time goes on that steam will be condensing out.

And certainly if you engage containment sprays you are going to be taking the steam out of it to some extent, and you will have some separation of the hydrogen. I think that is one of the insights that we have also gained from the Office of Research.

And that is that if you were in station

blackout situation, and then if you did get power back and you decided to use the sprays, it is important -- well, one aspect would be to bring one train on at a time, as opposed to two trains.

There was some experiments done at Sandia that looked at the fact that if you got sprays back and you quickly took out the steam, could you go into the detonable region.

And what they found was that for prototypical spray rates that it did not appear to be a vulnerability.

DR. POWERS: I wouldn't think so. I mean, mixing -- I mean, you turn on the sprays, and you condense the steam, but in doing that you do an awful lot of mixing.

MR. SNODDERLY: That's right.

DR. POWERS: And so I guess what I am driving at really is that I am trying to see how this plays out looking at like an AP600 type design, where you have a feed up until a cooled dome, and you are relying on the flow in that dome region to keep from ending up with a stratified hydrogen layer at the top.

MR. SNODDERLY: Yes. We wrote the rule in a way that the licensee could meet it with that type of an approach, and we would expect the analyses that

were done in support of AP600 to meet that requirement.

Now, for current plants though, we would not expect them to do anything more than what they have done --

DR. POWERS: Well, you have really answered my question, which was were you thinking about AP1000.

MR. SNODDERLY: Yes.

DR. POWERS: And the answer is yes.

MR. SNODDERLY: Yes.

DR. POWERS: Okay.

MR. ROSEN: Your presentation is silent on the impact of these activities on technical specifications. Could you tell me what you think about that?

MR. MARKLEY: I think actually that there is going to be a lot of benefit to technical specifications. We included in the package some draft changes, and essentially all the text specs with respect to hydrogen monitors are being proposed for elimination because this is more in terms of the emergency response and that type of activity.

And we don't normally have emergency response equipment in tech specs. With respect to the

oxygen monitors for the inerted containments, we are proposing to maintain those in technical specifications, because how do you know if your containment is inerted unless you have a monitor that would provide that indication.

And so we would look for that to still be retained in tech specs.

MR. SNODDERLY: And if I could add that we have Kerri Kavanagh here from the Standard Technical Specifications Branch, and she has been a member of the team and has helped us in this area.

What is interesting is that if you look at 5-36 and the four criteria for tech specs, the fourth criteria talks about demonstrating that the structure system or component is needed in tech specs because of risk significance.

This is a criteria that is not used very much at all, but we used it in this case in trying to make the determination of what stays in tech specs and what doesn't.

As Tony mentioned, we have determined that an inerted environment for MARK I's and II's is risk significant. That would stay in the tech specs, and the oxygen monitors for verifying that would also stay.

But now the basis will change slightly, and instead of being there for design basis accidents, it will be there for Criteria 4, and the fact that it shouldn't be risk significant.

Now, if you look in the past, hydrogen monitoring was there for design basis accidents, and to know when to turn on the recombiners, or when you might have to use the vent and purge system.

Now what we have found is that -- and maybe also what was needed was to actuate hydrogen igniter systems in MARK IIIs and ice condensers. Well, there is other indications that you can use to determine when you should turn those on.

And as Tony said, the hydrogen monitors now are more for core damage assessment and emergency planning, and to be consistent, they would not lead to -- hydrogen has not been shown -- hydrogen combustion has not been shown to be a risk significant threat to containments because of the mitigative features that have been put in.

So that made us say, okay, we don't need hydrogen monitors to actuate those mitigative features, but we do feel that we need them to support adequate severe accident management, and therefore, we felt that it was supported removing these from the

technical specifications.

MR. ROSEN: Well, your comments have been responsive with regard to monitoring, but what about control?

MR. SNODDERLY: Control? No changes. Igniters will stay in the tech specs, and inerting from MARK I's and II's will stay in the tech specs because those systems have been shown to be risk significant in the absence of those systems. So that's why they need to stay in the specifications.

MR. ROSEN: What about -- well, control in large dry containments, PWR?

MR. SNODDERLY: There aren't -- currently the only -- the recombiners are in the tech specs, and we proposed to remove those from the tech specs and large dry containments because they would not impact risk significant source terms.

The problem that you have is that the recombiners work at 200 standard cubic feet per minute, and when you talk about a large dry containment with a volume of 2 million cubic feet, it takes seven days to turn over that containment volume. And so the recombiners were not shown to mitigate the consequences of --

MR. MARKLEY: Basically, they are very

ineffective.

MR. ROSEN: So for summary in a large dry containment, you would not be required to continue to operate the recombiners.

MR. MARKLEY: That's correct.

MR. ROSEN: And they could be moved from the plant effectively?

MR. MARKLEY: That's correct.

MR. ROSEN: And the control or the monitoring would be required to remain, but would not be safety grade anymore?

MR. MARKLEY: That's correct.

MR. SNODDERLY: Exactly. It would just be a functional requirement and it would be removed from the tech specs and it could be met with commercial grade.

MR. ROSEN: Thank you.

MR. MARKLEY: The last item on this page is that we did explain the basis for the exceptions that we took in the statement of considerations. The last slide that I have is with respect to the NEI petition.

And as we had stated previously, they were concerned about the restrictive applicability language of using Zircalloy and ZIRLO, claddingness, and the

applicability entry for the existing 50-44.

And as I indicated earlier, we early on decided that that was not an appropriate applicability statement for what we were trying to deal with in terms of the subject matter.

So as you have seen in our discussions today, the new rule as we propose it focuses on containment types for the applicability of the various technical requirements.

There is going to be many different types of fuel come up, and certainly the pebble bed reactor and other things of that nature, and there is other things that we probably can't perceive at this time.

So this concludes our presentation, and I would certainly be happy to entertain any additional questions.

DR. SHACK: Any additional questions from any of the Committee Members? There being none, then thank you for a very clear and lucid presentation on the proposed rule.

MR. MARKLEY: Thank you.

CHAIRMAN APOSTOLAKIS: Okay. So we will recess until 1:30.

(Whereupon, at 10:50 a.m., the meeting was recessed.)

CERTIFICATE

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

Name of Proceeding: 488th ACRS Full Committee Meeting

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