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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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PLANT LICENSE RENEWAL SUBCOMMITTEE

MEETING

+ + + + +

TUESDAY,

MARCH 27, 2001

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ROCKVILLE, MARYLAND

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

COMMITTEE MEMBERS PRESENT:

MARIO V. BONACA	Chairman
F. PETER FORD	Member
THOMAS S. KRESS	Member

COMMITTEE MEMBERS PRESENT: (cont'd)

GRAHAM M. LEITCH	Member
WILLIAM J. SHACK	Member
ROBERT E. UHRIG	Member

ACRS CONSULTANT PRESENT:

JOHN BARTON

ACRS STAFF PRESENT:

SAM DURAISWAMY

ROBERT ELLIOTT

ALSO PRESENT:

HANS ASHAR

RAJ AULUCK

GOUTAM BAGELU

R.D. BAKER

BILL BATEMAN

TAMMY BLOOME

JOSEPH BRAVERMAN

WILLIAM BURTON

GENE CARPENTER

ROBERT CARTER

T.Y. CHANG

PEI-YING CHEN

ALSO PRESENT: (cont'd)

OMESH CHOPRA

MANNY COMAR

H.F. CONRAD

J.F. COSTELLO

AMY CUBBAGE

JAMES DAVIS

JERRY DOZIER

ROBIN DYLE

TANYA M. EATON

BARRY ELLIOT

JOHN FAIR

DONALD FERRARO

GREG GALLETI

HERMAN GRAVES

CHRIS GRIMES

JOHN HANNON

ALLEN HISER

CHUCK HSU

DAVID C. JENG

PETER J. KANG

ANDREA KEIM

ED KLEEH

STEPHEN KOENICK

W. KOO

ALSO PRESENT: (cont'd)

P.T. KUO

SAM LEE

W.C. LIU

YUNG Y. LIU

ROBERT LOFARO

WAYNE LUNCEFORD

JAMES E. LYONS

MICHAEL McNEIL

S.K. MITRA

RICH MORANTE

KEITH NICHMAN

WALLACE NORRIS

K. PARCZEWSKI

ERACH PATEL

PAT PATNAIK

CHARLES R. PIERCE

JAI RAJAN

MUHAMMAD A. RAZZAQUE

KIMBERLEY RICO

K. RIW

JOHN RYCYNA

SYED SHAUKAT

PAUL SHEMANSKI

DAVID SOLORIO

ALSO PRESENT: (cont'd)

SHIU-WING TAM

BRIAN THOMAS

STEVEN G. TONEY

JIT VORA

DOUG WALTERS

I N D E X

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

(8:30 a.m.)

CHAIRMAN BONACA: Good morning. The meeting will now come to order. This is a meeting of the ACRS Subcommittee on Plant License Renewal.

I am Mario Bonaca, Chairman of the subcommittee. The other ACRS members in attendance are Peter Ford, Thomas Kress, Graham Leitch, William Shack, and Robert Uhrig. We also have John Barton attending as a consultant.

The purpose of this meeting is to review the final drafts of the Standard Review Plan for License Renewal; the Generic Lessons Learned Report; the Draft Regulatory Guide DG 1104, Standard Format and Content for Applications to Renew Nuclear Powerplant Operating Licenses; and NEI 95-10, Revision 3, Industry Guideline for Implementing the Requirements of 10 CFR Part 54, the License Renewal Rule.

The subcommittee will also review selected reports of the boiling water reactor vessel and internal projects associated with the license renewal. The subcommittee will gather information, analyze relevant issues and facts, and formulate proposed position and actions as appropriate for deliberation by the full committee.

Mr. Sam Duraiswamy is the cognizant ACRS staff engineer for this meeting. Mr. Rob Elliott, who is on rotation assignment to the ACRS staff from NRR, is also present.

The rules for participation in today's meeting have been announced as part of the notice of this meeting previously published in the Federal Register on March 8, 2001. A transcript of this meeting is being kept and will be made available as stated in the Federal Register notice.

It is requested that speakers first identify themselves and speak with sufficient clarity and so that they can be readily heard. We have received no written comments or requests for time to make oral statements from members of the public.

We will proceed with the meeting, and I call upon Mr. Grimes of NRR to begin. Good morning.

MR. GRIMES: Thank you, Dr. Bonaca.

My name is Chris Grimes. I'm the Chief of the License Renewal and Standardization Branch, and I want to thank the subcommittee for taking the time to review the results of the staff's effort to develop improved license renewal guidance.

As you may recall, we set off to review license renewal applications for Calvert Cliffs and Oconee with draft guidance, an industry guide, and a standard review plan that were untested and represented a very different way of staff review for a licensing action.

We accomplished those first two reviews through perseverance and with a focus on the objective of Part 54. And through those efforts we learned substantial lessons in how to improve that focus and concentrate the staff review.

During the course of the review of the first two applications, the industry also raised an issue which they referred to as credit for existing programs. That is described in a Commission paper, SECY-99-148. As a result of that issue, and also a reflection on the lessons learned from the Calvert Cliffs and Oconee reviews, the staff set out to develop improved renewal guidance largely in the form of generic aging lessons learned, a catalog of the staff's expectations of the attributes of effective aging management programs.

We've kept the subcommittee and the committee informed of our efforts as we've gone through the evolution of trying to develop that catalog and the improved renewal guidance that goes along with it, with a focus on achieving predictability and stability in the license renewal reviews and to facilitate the future workload that we anticipate because of the substantial industry input and interest in license renewal for other power reactors.

Today's presentation is going to focus on addressing the way that the staff has responded to public comments on the improved renewal guidance, and I call upon Dr. Sam Lee, who is going to provide the introduction for the staff's presentation.

MR. LEE: Good morning. My name is Sam Lee of the License Renewal and Standardization Branch, NRR. And as Chris had indicated, the INPO license renewal guidance document consists of the Generic Aging Lessons Learned, the GALL Report, which is a staff evaluation of aging management programs, and the SRP, which references the GALL Report, to focus the staff in areas where programs should be thoroughly evaluated, and also consists of the Regulatory Guide which endorses NEI document 95-10 that provides guidance to the applicants to prepare their license reapplication.

There has been a significant agency

effort. It involved the office of NRR and the staff who are conducting the license renewal applications, and also involved the Office of Research. And Jit Vora, on my right, he is the team leader from Research. And the two national labs -- Argonne National Lab, Yung Liu on my right, he is the Project Manager from Argonne. And Brookhaven National Lab, Mr. Morante on my left, he is the Project Manager from Brookhaven.

This morning we are going to discuss the changes or significant changes in the document as a result of public comment when we issued it in August. Back in August, the GALL Report has a format that is a double-sided, two-page table kind of format, and it turns out to be not very easy to use. So as a result we streamlined the format in the GAL Report into a one-page table format, and then we centralized the program evaluation into Chapter XI of the GALL Report.

We are going to discuss the GALL Report by structures and systems later on today. We are going to also discuss the associated changes in the program also.

The SRP references the GALL Report, so when the GALL -- when we make a change in the GALL

Report, we make the corresponding or conforming changes in the SRP. However, in Chapter II of the SRP, we discuss the scoping. This is separate from the GALL Report. Okay? So Mr. S.K. Mitra will discuss the changes in the SRP relating to scope this morning.

And Dave Solorio is going to discuss the changes in the Regulatory Guide and NEI 95-10. And we were asked to discuss the one-time inspections, and Dave will also do that.

We are preparing a SECY paper to submit this document to the Commission for approval in April. And during the interaction with NEI to go over their comments on these documents, they identified five items that we should continue dialogue on. And we will discuss them later on this morning as they come up in the respective systems.

Another NEI comment is on the -- how these documents are going to be used. NEI is now performing a demonstration project which prepares some sample portions of an application, and they plan on submitting this to the staff by the end of April. And we will interact with industry to go through that document to see how we can work out the implementation details when all of these documents get folded into the process.

CHAIRMAN BONACA: Before you move that, could you expand on the second bullet? I mean, continue dialogue on these five issues.

MR. LEE: Yes. We're going to talk about this later on in the later portion.

CHAIRMAN BONACA: Okay. All right.

MR. LEE: Okay? As they come up.

CHAIRMAN BONACA: Okay.

MR. LEE: Basically, this is -- continue to exchange information with NEI.

MR. GRIMES: Sam, if I may, this -- those five items were issues that were -- that evolved from industry comments for which there was some controversy. And rather than take those issues to appeal, the industry requested that we -- that they be afforded an opportunity to continue a dialogue on those subjects, with an expectation that perhaps improved guidance or improved positions would be developed for future changes to the guidelines. And as we get to those topics and the particular sections that they apply, we will explain the details.

CHAIRMAN BONACA: Should complex assemblies be part of that list?

MR. GRIMES: No. I believe that complex assemblies has been clarified. There may still be some details to work out, but that issue did not rise to a level of potential appeal.

CHAIRMAN BONACA: Yes. Because it seems there is some kind of significant issue in the Hatch application.

MR. GRIMES: And we expect that we'll be able to resolve that, but we are continuing to discuss treatment of complex assemblies on the Hatch application.

CHAIRMAN BONACA: Okay. Thank you.

MR. LEE: Okay. Is there any more questions? Okay. Now I'm going to turn it over to Mr. Steve Koenick to discuss the public comments.

MR. KOENICK: Good morning. I am Steve Koenick. To my right is Ed Kleeh. I'll give you a brief overview of the public comments.

We issued four documents, as Sam stated, on August 31st in Federal Register Notice 65 FR53047. Following that, we had a public workshop with over 100 participants. We also received numerous comments on the improved regulatory guidance documents.

On the third bullet I reference NUREG-

1739, which is the analysis of the public comments. We received over 1,000 comments, the bulk of which was from the nuclear industry, with the majority of those being from NEI.

With the written comments, you see 100 -- over 100 individual comments. The majority of these comments were with respect to nuclear power as a whole and the license renewal process to which we responded to each comment with a description of the license renewal process. So that's how we dispositioned those comments. The rest are articulated in the NUREG, if you have any questions.

If none, why don't I turn it over to the SRP Chapter II on scoping.

MR. MITRA: Good morning. My name is S.K. Mitra, and with me from NRR on my left is Greg Galleti is -- he has contribution regarding scoping. And on my right is Brian Thomas, also from NRR, and he contributed on scoping and screening.

Today we'll discuss the changes in scoping, Chapter II, the standard review plan from the -- due to the industry comments. As Dr. Lee previously said, when the GALL changed, it resulted in a corresponding change in the SRP, and we will discuss later on as we talk about other GALL changes. But how that Chapter II of SRP addresses scoping which is separate from GALL, so in this slide we are only going to talk about SRPLR Chapter II, which is scoping.

The first bullet is we incorporated severe accident management to the source document to consider scoping. This is done in response to ACRS letter to Chairman dated November 15, 2000, to add severe accident management guidelines to SRPLR Table 2.1-1, which is sample listing of potential information sources for identifying structure, system, and components within the scope of license renewal.

The number two bullet is clarify the focus of scoping review. We clarified in response to industry comments. The industry took an issue that we should -- that the industry should only, under Rule 5421, request to identify the list of SSC data subject to aging management review, not a list within the scope of license renewal.

Previously, the previous application, the industry submitted a list of components that are within the scope of license renewal. So the change in the SRPLR will be from -- in the future, the industry is only going to submit the list which are in AMR, which is, you know, aging management review.

And the other list will be determined through the sample in PNID, review of FSAR, and other plan documents, what SSC are, you know, within the scope. And during the inspection, the plant -- the list will be available for the inspectors.

CHAIRMAN BONACA: Well, let me ask a question. I'm trying to understand if I understood. So the industry wants to have only the results of the scoping and screening listed in the application?

MR. THOMAS: Yes. If I understand the industry's comments appropriately, they -- basically, they're saying that the SRP should focus on the actual expected contents of the application. And when you look at the rule, it specifically states that it should just be the structures that are subject to AMR.

CHAIRMAN BONACA: Yes. I understand that. I mean, the way we have seen it, there was a scoping process that said this is -- potentially it should be in the application.

MR. THOMAS: Right.

CHAIRMAN BONACA: I mean, should be under the aging management programs. Then you have a screening process that will cut out a number of those, because they do not perform the function that -- the result of it is a list of components which will be subject to an aging management program.

MR. THOMAS: Right.

CHAIRMAN BONACA: That's what they want to have in the application?

MR. THOMAS: In the application itself, yes.

CHAIRMAN BONACA: How do you -- how does a reviewer understand the process by which the screening has been applied if you don't know what the list they started from is?

MR. THOMAS: Well --

CHAIRMAN BONACA: I'm trying to understand, you know, how you do that. I mean, the review process is a very important one. I'm saying this because even the ACRS struggles with the review, and we are -- you know, since scoping is important, and how you go through the steps is important.

MR. THOMAS: Right. There is a review of the scoping methodology itself that is performed. And then the review of the application itself is just focused on the results of that -- of the implementation of that scoping methodology, which is, you know, a subordinate list of structures and components that are subject -- yes, that list is subordinate to the bigger picture list.

What a reviewer essentially has to do is what we consider to be a negative review if you will, and what you're looking for is really what's been omitted from the scope of structures and components subject to AMR. What a reviewer then has to do is just canvass the PNIDs, the FSAR, any other plant supporting documents, the licensing basis, and so forth, to determine if there are any additional items that should have not been omitted from that list that presents the results of the screening, the scoping and screening.

CHAIRMAN BONACA: But it seems to me that this places all of the burden on the staff. I mean, I have a concern with that, and I would like to express it now, because I've seen it also in the Hatch application that we are talking about tomorrow. If the staff has to ask questions, many, you know, requests for additional information saying, "Why didn't you include in scope the following 27 components?" and then the answer comes and says, "Oh, of those, 20 are in scope, but you have to look at them some other way."

And so you keep asking questions, and you keep having some confirmation or some exceptions and expirations. At the end, you are making a statement in the SER that you have -- you have reasonable confidence that all components that should be in scope are in scope.

How are you making that statement? I mean, you have to do a lot of pulling strings to -- you know, I mean, the process it seems to me becomes some difficult for a reviewer that I'm just questioning how you're going to be able to make a statement that says there is reasonable confidence that all issues in scope are in scope.

MR. THOMAS: It is a very involved review process, and it's very involved review on the part of the reviewer. But it forces the reviewer to, you know, do a thorough evaluation of the systems and structures and components, and to do just that, what you said, to prod and probe to see if there has been any omissions from the screening results.

MR. GALLETI: Excuse me. This is Greg Galleti. I'm with the IQPB part of NRR. We're responsible for the scoping methodology review. The staff would have two opportunities to review the scoping methodology in detail.

One would be during the scoping audit which is performed by the staff reasonably early on in the process. We would be on-site at the engineering offices looking at the design documentation and going through with the cognizant engineers the specifics of the scoping review, scoping methodology, and looking at the scoping results.

In addition, there's a second opportunity for the staff to go through in detail and look at the scoping results, and that would be during the scoping inspection which is performed by the regional offices. They would go out and do a more formal review of the results, system walkdown, things of that nature, to determine if in fact the scoping was accomplished in accordance with the methodology put forth.

CHAIRMAN BONACA: I understand that. It doesn't change the -- yes, sorry.

MEMBER SHACK: Yes. You know, it seems to me, and I guess we've argued around here, that it would certainly be helpful to the reviewer to have these results. What is the major -- is it really just the burden on the licensee to provide this list? He's got the list.

CHAIRMAN BONACA: He's got the list, hopefully. I think I started from somewhere, and --

MR. GALLETI: The list would be available to us during the audits. Obviously, the list has been developed by the licensee as part of their methodology. When we go out to do the audit, that level of detail would be available to us, and we would exercise reviewing that information.

MR. GRIMES: This is Chris Grimes. I'd like to clarify that we can reflect back that it was the focus of the renewal rule that established that the application need only provide the results of the process, and the rule focuses on a process-oriented screening -- scoping and screening activity for which the application is specifically told to only produce the result.

The guidance that we have provided in the SRP explains to the staff how to go about testing the results of the process. And, admittedly, it forces the staff to stop and think about the insights gained from, in this particular case, severe accident management guidelines, but also the FSAR and other source materials for which the staff then applies its experience and knowledge in order to go through a process of testing those results in order to determine whether or not the staff can identify any structures, systems, or components that have been omitted. And that's the way that we have constructed the guidance, is to explain to the staff how to go about doing that.

As Greg pointed out, during the methodology review and the scoping inspection, the staff has an opportunity to look at the underlying documentation that includes things that were originally considered and then excluded for whatever reason. And our safety evaluations have explained what we found, how we've tested, and how we reach a conclusion that is framed in terms of the staff hasn't found anything omitted, and, therefore, there is reasonable assurance that the result is complete.

And we certainly could consider a new construct for the rule that would present the front-end of the process, but that would tend to detract from the process orientation of the rule.

CHAIRMAN BONACA: Yes. I'd like to note that the rule -- it's written in a few pages, and the guidance is written in hundreds and thousands of pages. And I'm saying there is quite a latitude in support and documentation to help the processes which are implied in the application of the rule, which is the development of the application, the review, the SCR, and everything else.

So I -- I can't argue now -- and you may, in fact, have available during your inspection a full listing and very scrutable. I'm only saying that it doesn't facilitate, for example, for a reviewer like myself. I spent time looking at the Hatch application, and I really was troubled by the fact that it was hard to pull strings to find how it went from A to B to C. And I think that documents should be more scrutable than that. Anyway, that's my comment here.

MEMBER LEITCH: Wait a minute. I had a question on the first bullet, if you were getting ready to move forward. As I understand it, all that was done as a result of the ACRS comment was that you added severe accident management guidelines to Table 2.1.1. That table says sample listing of potential information sources.

So there's a suggestion that one might look at severe accident management guidelines. It leaves me with a question about whether that's really required or not. In other words, if there is equipment that is necessary to carry out actions prescribed in the severe accident management guidelines, is that equipment required to be in the scope?

MR. GALLETI: If I could answer that. This is Greg Galleti again. What is required is that the application be consistent with the current licensing basis. To that extent, if there is -- when you review the severe accident management guideline, if there is equipment in that -- described in that guideline that would be consistent with the COB, then one would consider that to be potentially within the scope.

Just because something is in the severe accident guideline does not necessarily mean that it must be within the scope of for license renewal. But, generally, what we have done is we've put, you know, a rather large listing of potential documents that would be available to the staff to review really in preparation for embarking on the scoping evaluation.

The mandate of the staff is to come up with a safety determination, based on getting a good understanding of what the current licensing basis is. That's a formidable task, and the staff felt it was appropriate to try to encompass as many technical documents that pertain to the licensee and the design of the plant as possible. That's really the general reason why we felt it was appropriate to incorporate it there.

MEMBER LEITCH: But doesn't it -- the severe accident management guidelines are not in the current licensing basis, are they?

MR. GALLETI: That's correct.

MEMBER LEITCH: So it seems to me it still begs the question as to whether we're -- what is our expectation with regard to severe accident management guidelines.

MR. GALLETI: I think what we've tried to do is provide the staff with an opportunity certainly to look at that information to try to glean some insights as to what would be risk significant or important SSCs for the purposes of this plant -- you know, any particular plant.

I think what we've determined is that the efficacy of the SAM guidelines is really going to be considered on a site-specific, case-by-case basis. Again, that's why we had incorporated into that level of this SRP.

MEMBER LEITCH: And, again, the only change that was made as a result of that was just the added listing in this table. There's nothing in the text that refers to that?

MR. GALLETI: I believe that's true.

MEMBER LEITCH: Okay. Thank you.

MR. MITRA: The last bullet we have -- item which we are having continued dialogue with NEI. And it's IPE/IPEEE has a source document to consider for scoping. Since license renewal rule is deterministic, not probabilistic, the industry commented that PRA techniques have very limited use for license renewal scoping.

There is one element -- the review of individual plant examination, which is IPE, and individual plant examination of external event, which is IPEEE, in the SRP. The staff agrees that license renewal rule is deterministic, but also feels that the use of IPE and IPEEE does provide useful insight for current licensing basis.

The dialogue with the industry is still going on, and hopefully we will have some kind of a resolution on this.

MR. GRIMES: This is Chris Grimes. I'd like to expand on that thought in further response to Dr. Leitch's question. The standard review plan generally explains to the viewers your source material as part of this challenge to the results of scoping and screening, and particularly in the area of the use of severe accident management guidelines and IPEs.

The staff has very powerful tools to go -- to prod into the current licensing basis and to determine the extent to which there may be systems, structures, and components that are important to safety that may not be part of the current licensing basis.

And I believe that it's reasonable to characterize the industry's concern as further guidance in the standard review plan in terms of how to use those devices without causing damage, and that is to unnecessarily challenge the current licensing basis to be more risk-informed without an explanation of the process by which risk-informed changes to the licensing basis should be made.

I believe that the guidance is reasonable, in terms of the importance of the focus on maintaining a current licensing basis and simply selecting from that those systems, structures, and components that need to be considered for aging management reviews.

But I do also see an opportunity for us

to draw experience from risk-informed licensing to further expound the explanation about how to use risk insights in a constructive way. And that's why we'll continue a dialogue in this particular area that may result in additional guidance to the reviewers in the future and how to challenge the current licensing basis in a constructive way.

MR. MITRA: That's all we have on scoping.

MR. BARTON: Is there going to be any more discussion on the standard review plan in today's presentation, or is this it?

MR. MITRA: Well, as I said before, that any changes in GALL have an effect on SRPLR, and we will discuss along -- the changes with GALL in the later part of the presentation.

CHAIRMAN BONACA: Any other questions for --

MR. BARTON: Yes. Mario, I've got a question, and I don't know if it's timely or whatever. Section 1 of the SRP, paragraph 1.1.3.2, it talks about timeliness of the application and says the licensee must submit an application at least five years before the license expires. I don't know whether this paragraph is a "gotcha" from a licensee and decides late in life that I'm going to now extend my license, want to extend my license.

And I'm in my fifth year before expiration, and I submit an application which the reviewers decide is not "a sufficient application," and I have to modify it. It says I have to submit the modified application with at least five years.

I just wonder whether if you're late in submitting it and you have to modify it, whether you can still meet the requirements of the standard review plan, because the next section says if I don't do this, the reviewer checks off, "No, I have not satisfied this requirement," and I get a letter from the NRC that says my license will expire in five years. End of story.

And I just wonder whether that's what this thing really gets you -- is it a real "gotcha" or is there a way out of this thing? That's the way I read this.

MR. GRIMES: I'll respond to that question. The provisions for timeliness are established by the rule, the guidelines, for the -- to the staff are simply the guidelines on how to treat the timeliness requirements in the rule. We've had several requests -- at least a couple of requests to take exception to the other end of the time scale, and that is not sooner than 20 years prior to expiration.

And it really gets to the Administrative Procedures Act in terms of the timeliness for the proceedings to occur, which were originally predicated on an expectation that it would take five years to complete a review.

I would expect that if an applicant were to determine late in life that they still want to apply for license renewal, and they come in with less than five years to go, that they would be able to make a case for taking exception to that requirement, and then the staff would be given specific guidance on how to treat those specific cases.

But this statute wasn't intended for the staff to be backed into a corner on making the timeliness decision. It's an administrative requirement for the process.

MR. BARTON: Thank you, Chris.

MEMBER LEITCH: I guess I had a couple of technical questions in the standard review plan. I'm a little unclear how we're going to proceed today. Is this the appropriate time to ask those questions? Or could they be discussed when we talk about GALL? You're just talking about a few changes that have been made to the standard review plan?

MR. GALLETI: Well, to the specific section of the SRP. If your question relates to that particular section, I guess we can discuss it right now.

MEMBER LEITCH: No, it does not. Okay.

MR. LEE: Are your questions relating to Chapter III of the SRP? This is Sam Lee from NRR.

MEMBER LEITCH: No. They're mainly Chapter IV, actually.

MR. LEE: Chapter IV? And those -- yes, what are the questions? Maybe he can help the, you know, panel, you know, answer that for you when they come up.

MR. BARTON: If you want to talk about Chapter III, the comment I've got on Chapter III is there seems to be a lot of repetition in subsections of Chapter III. And I don't know what your plan is with this document to go back and do some more editing, or if this is the final shot, or whatever, but I think you could significantly improve this document just by looking at Section 3.2 and some of the subsections -- 3.2.2.2 and 3.2.3.2 as an example.

There is so much repetition I think that you could kind of take out 90 percent of the repetition here and still get your point across.

And the same problem occurs in the power steam and power conversion in Section 3.4. If you'll look at those sections, I think you can significantly improve this document by a good editing job.

MR. GRIMES: Our editors are going to be sorely disappointed.

CHAIRMAN BONACA: I had just a couple of questions, too, about Section 3. There are a number of -- for example, under auxiliary systems, there are some sections where the section is still there but at the beginning of it there is a parenthesis that says, "Program no longer used." And I don't understand, what does it mean? I mean --

MR. BARTON: 3.3.2.2.6 and 3.3.2.2.8 are examples of --

CHAIRMAN BONACA: Are examples of --

MR. BARTON: -- our program you say "Program is not used."

CHAIRMAN BONACA: Yes.

MR. BARTON: Kind of confusing.

MR. LEE: I guess when we come to the auxiliary system, the panel can explain to us.

CHAIRMAN BONACA: Also, before that, in a number of other sections, like 3.2.2.2.2 on the crack initiation and growth due to stress corrosion cracking, that was in the old document. It's not there anymore. There are many examples of certain issues under certain sections that have been totally eliminated. I'm sure there is a logic behind that.

I would like to understand how you restructure that eliminated those sections from the previous draft. In some cases, I mean, I thought the issue was still there. But I guess the discussion is gone, so either it has been absorbed somewhere else and I don't understand where, or it doesn't belong there and I don't understand why.

So if you will talk to me about that.

MR. LEE: Yes, we'll talk about that later.

MR. MITRA: Any other questions on Chapter II SRP? If not, we'll leave the floor for Mr. Peter Kang for Chapter II and Chapter III structure.

CHAIRMAN BONACA: As we get ready for this presentation, there was one more question regarding the SRP. It would be probably good to provide it now in case you want to look for an answer from NRR.

MEMBER LEITCH: It was regarding Chapter IV, actually. I wasn't sure if we were coming back to that or not. 4.2.3 related to the elimination of circumferential weld inspections for boiling water reactors, and I was just wondering why we were doing that. Is it very difficult or impossible to inspect circumferential welds?

It seems like what we're doing here is saying, well, we've made an analysis and they're good for 64 effective full power years. And we're going to improve operator training so that we don't have any of these low temperature overpressurization events.

But my question still remains, why not just look at the welds?

MR. LEE: We'll discuss that later.

MEMBER LEITCH: Okay.

MR. LEE: In Chapter IV of the GALL Report.

MEMBER LEITCH: That will come up later? Okay.

MR. LEE: We will do that.

MEMBER LEITCH: Thanks. Okay.

MR. KANG: We are ready to talk to GALL Chapters II and III.

My name is Peter Kang, K-A-N-G, with the License Renewal, and --

MR. DAVIS: Jim Davis from Materials and Chemical Engineering.

MR. COSTELLO: Jim Costello from Office of Research.

MR. BRAVERMAN: Joe Braverman, Brookhaven National Lab.

MR. ASHAR: Hans Ashar, Mechanical and Civil Engineering Branch.

MR. MORANTE: Rich Morante, from Brookhaven National Lab.

MR. KANG: Okay. For Chapter II, which is containment structures, and Chapter III, structure and the component supports, So those two areas -- chapters we had in -- although there was a lot of changes, comments on that, but this is the most -- four most important issues.

The first has been dealt with before. The first bullet is dealing with managing aging effects of concrete and steel for inaccessible areas. In the August version of GALL we required evaluate the plant-specific programs whenever for any inaccessible areas. When the conditions in accessible area may not indicate, then it presents degradation to some inaccessible area.

Since the industry commented that such a requirement is over and above 10 CFR 50.55A, which states, "Licensees shall evaluate the acceptability of an inaccessible area when conditions exist in an accessible area that could clearly indicate the presence of degradation to such inaccessible areas."

So our position was a very stringent, which is -- obviously, was that you've got to have a plant-specific whenever you have an inaccessible area. So staff decided to clarify this aging management of an inaccessible area.

The latest GALL has revised it to include specific criteria for, let's say, aging effects of concrete due to aggressive impact or corrosion of embedded steel. The applicants should establish periodic monitoring of below-grade water chemistry and evaluate whether the below-grade environment is found to be aggressive.

But then we have a definition of -- or criteria for aggressiveness -- is based on NUREG-1611, which is for pH levels and chloride levels and sulfate. And then --

MEMBER LEITCH: Could you point us to a specific page on GALL? Do you have that information?

MR. KANG: Yes. The latest or the August versions?

MEMBER LEITCH: This is the March 2001 version.

MR. KANG: Oh, the 2001. 2000 is the August version.

MEMBER LEITCH: No, the latest one.

MR. KANG: Oh, okay. The latest one. Okay.

This is first -- okay. PWR is in the front sections, and BWR is in the back. And the PWR Section 2, Chapter 2A, 1-3, has -- let's see here, this is -- okay. Aggressive chemical is actually 1-4.

MEMBER LEITCH: Okay.

MR. KANG: Aggressive chemicals and -- okay. That's for one. And then, four, aging effects on concrete due to leaching of calcium hydroxide, this is on A-1-3, the first items on the bottom, identified as A.1.1-B. That one the applicant has to establish the leaching is not significant by evaluating whether the concrete is exposed to the flowing water.

Even then, you also have the conflict as to whether -- evaluate whether a conflict is constructed based on ACR 201.2.R. This is to ensure the conflict is dense and well-cured and has low permeabilities.

And then the last one is steel. For aging effects of steel area of containment due to corrosion, the concern was this is water on the containment floor, seeping through cracks in the concrete floor, or past degraded joint sealants.

So to determine whether loss of material due to corrosion is significant the applicant establishes -- there was a list of four items, whether they -- their concrete meets the requirement of ACI, and the monitoring of concrete for penetrating cracks, and also moisture barrier. Is it constructed or built in accordance with IWE requirements? And then, also develop a program to minimize water spillage.

Then, so what we said was if any of those criteria cannot satisfy, then a plant-specific management program has to be developed to address each of those items.

MEMBER LEITCH: So conversely, then, if all those criteria are satisfied, then no further action is -- no further evaluation is required.

MR. KANG: Yes, that's correct. Yes.

MEMBER LEITCH: thank you.

MR. KANG: Second bullet. This is on managing loss of material due to corrosion of containment of steel elements. In our August version of GALL, the report described -- what we said was IWE, with Appendix J and the coating program -- in other words, you've got to have all three components together. But industry commented that Appendix J and the coating should be deleted, because IWE alone should be -- is acceptable as a stand-alone program.

MR. BARTON: Excuse me. "IWE" meaning -- what's IWE?

CHAIRMAN BONACA: What does it stand for?

MR. KANG: IWE relates to the in-service inspection of metallic liners and --

AUDIENCE MEMBER: The code.

MR. BARTON: Oh, the code? Okay. All right. Gotcha. Okay.

MR. KANG: So then staff did that -- we

had a lot of discussions back and forth, especially pertinent to Appendix J. And the staff could not -- we did not agree to deleting Appendix J and coating program. However, in the past, the staff has granted the relief request for a few certain plants on IWE inspection, on the maintenance of the protective coating to control corrosion.

So on that basis, the final version has slightly revised on the coating program. We just added a statement which says the coating program is -- if the coating program is credit for the managing loss of material due to corrosion during current licensing terms, then you should continue on.

So that's a slight difference on this managing loss of material due to corrosion on the containment steel elements.

MR. BARTON: Does this take care of corrosion of containment on the exterior of the steel as well?

MR. DAVIS: No. No, it doesn't. It only applies to inside.

MR. BARTON: How do you handle exterior corrosion?

MR. DAVIS: I'm not aware of it being a

problem, but it --

MR. BARTON: How about Oyster Creek's drywall?

MR. DAVIS: Except Oyster Creek. And it's not covered by the code.

MR. MORANTE: This is Rich Morante from Brookhaven. The basic in-service inspection requirements of IWE would include inspections of the exterior surface of a steel containment.

MR. KANG: Accessible.

MR. MORANTE: Of the accessible areas of a steel containment.

MR. BARTON: Accessible areas.

MR. KANG: Accessible areas.

MR. MORANTE: Except that IWE, through 10 CFR 50.55A, which invokes IWE, does require an evaluation of inaccessible areas if there is suspicion that there may be degradation there based on what is seen in an accessible area.

The sand pocket region would fall into one of those areas that would have to be specifically reviewed by an applicant, and it is identified in the GALL tables as an area for review during license renewal.

MR. BARTON: Thank you.

MR. KANG: Okay. Third bullet. The third bullet is for managing stress corrosion cracking and the crevice corrosion for the stainless steel.

MEMBER SHACK: Can we just back up for just a second?

MR. KANG: Yes, okay.

MEMBER SHACK: Go through that coatings program once more. So if they have the coatings program -- only if they're taking credit for it -- I mean, that's the thing. A lot of the time -- I see that in other sections, that they may have the program but it's only sort of required if they are asking credit for it. They may try to continue the program, but if they can live without the credit then they don't want to sort of commit themselves to the program, is sort of what I see happening here. Is that the basic idea?

MR. DAVIS: A number of utilities have come in and asked for relief from the code requirements of IWE to use our coatings program because it's a more intense program. And so they're doing it in relief of the code requirements.

MEMBER SHACK: Requirements. Oh, okay. So you don't want to have both.

MR. MORANTE: Well, let's say we're not required to --

MEMBER SHACK: Required to have both.

MR. DAVIS: A lot of them do both, actually.

MEMBER SHACK: Right. Yes. But required to only --

MR. ASHAR: But the earlier applications like Calvert Cliffs, Oconee, and Hatch that I'm reviewing now, they all have credited coating program for corrosion. So far we have seen that.

MR. DAVIS: That's only in containment, though, not in the coatings program outside of containment.

MR. ASHAR: Yes.

MR. KANG: All right. The third bullet -- this is for managing stress corrosion cracking and the crevice corrosion for stainless steel spent fuel pool liner issues. Industry commented that deleting monitoring of a leakage detection system that was discussed in August version, we had a leak chase monitoring of leak chase system drain lines and leak detection sump.

They commented that it should be replaced with just a water chemistry program as applicable, aging management program. Their justification was the water chemistry program precludes aging effects by maintaining spent fuel parameters so that the degradation would not occur.

Staff has agreed or concurred that the water chemistry program could be identified as applicable aging management program. And then also, in addition to water chemistry program, staff took the position reliance solely on controlled water chemistry does not manage potential degradation from concrete side of a spent fuel pool liner -- the other side of a concrete.

So because -- and this is because we -- such degradation we have seen at the one plant. So -- so and the latest GALL uses -- revised this one and said uses both a combination of the water chemistry program and the monitoring of pool water level to manage the corrosion of a stainless steel fuel pool liner.

MEMBER LEITCH: So you're talking about monitoring the pool water level --

MR. KANG: Yes.

MEMBER LEITCH: -- rather than tell-tales?

MR. KANG: Well --

MEMBER LEITCH: I mean, it would have to be a pretty gross leakage --

MR. KANG: Right. We --

MEMBER LEITCH: -- pool water level.

MR. KANG: We had a lot of discussions with industry at the time. When was it? December, right? And not all industry uses that generic term such as leak chase, leak chase systems, or -- so we -- probably more appropriate just to more general -- make it very general, say water level. Go ahead.

MR. DAVIS: Nobody really looks at the leak chase system to see leakage. They watch water level. And if the water level starts dropping, then they go look at the leak chase system and see if they have a leak. That's what the industry is telling us their experience is. So we agreed to that.

CHAIRMAN BONACA: Please.

MEMBER FORD: You must forgive me if some of my questions are simple, because this is my first time on this committee. You mentioned just now inspection of accessible regions. What happened to the inaccessible regions?

MR. ASHAR: They were the first bullet. If you see the first bullet that we have, it was referring to the inaccessible areas. And that is where we concentrated, because accessible areas are being covered by the code -- code requirement, IWE.

MEMBER FORD: Okay.

MR. ASHAR: Okay. Inaccessible we were a little bit concerned about. We said did not -- was not covered in the code, and we had to do something about it. So the first thing what we have done was to put some provisions in the regulation, which is 10 CFR 50.55A, the requirement that if the weaknesses are found in accessible areas that indicates degradation of the inaccessible areas, then they will go and check out what is going on in an accessible area. That is the way the rule is written.

Then, in NUREG-1611, we said, "If there is no evidence in the accessible area, and still there is corrosion going on, how do we get to the bottom of that?" And this way in a generic way you say, "There is no evidence. If the environment and conditions are such that could give rise to certain corrosion or degradation in inaccessible areas, that has to be investigated as a part of the license renewal."

MEMBER FORD: Okay.

MR. ASHAR: And in order to resolve this particular item, we had quite a discussion with the industry on this area. And what we did was it looked like an open-ended thing for the industry. So they said, "Identify the areas that you think are the most susceptible." So we identified two areas. One was the -- under the -- just over the basement, and on the top of it, in PWRs particularly, there is a concrete -- two feet of concrete.

Okay. And we said, "Water always goes to the top of the -- up to the top, and then if there is cracking in the concrete, then it can seep in, and then it can degrade the liner below." That was one concern.

The second concern that we expressed was if the chemical constituents of the soil is aggressive enough, it can degrade the concrete foundation part. So there are the two areas that we identified, and then together with industry worked on the criteria and everything. And we came out with the criteria that we have in the GALL Report.

MEMBER FORD: Thank you.

MEMBER SHACK: Just on this water chemistry program for the spent fuel pool liner, they're arguing basically the temperature is low enough that if they control the water chemistry they can manage the cracking of the stainless steel.

MR. DAVIS: That's right.

MEMBER SHACK: And what temperature are we talking about here, and how stringent are the controls on the water chemistry?

MR. DAVIS: It's always below about 200 degrees F.

MEMBER SHACK: 200F.

MR. DAVIS: And that's controlled.

MEMBER SHACK: And what controls do they put on the water chemistry, typically? I mean, it's not as pure as a BWR, obviously.

MR. DAVIS: It's the regular reactor vessel, RCS chemistry that --

MEMBER SHACK: Chemistry.

MR. DAVIS: -- guidelines, the EPRI guidelines. You have the same chemistry in the spent fuel pool that you have in the RCS.

MEMBER SHACK: RCS. I see. There's no boron additions, or something? No?

MR. DAVIS: Not in a BWR.

MEMBER SHACK: Not in a BWR.

MR. DAVIS: But since you're transferring fuel back and forth, you have to have the same chemistry.

MEMBER UHRIG: If you dump the water and boron in the fuel pool at all, is it soluble?

MR. DAVIS: In a PWR, you do. In a BWR, you do not.

MEMBER UHRIG: In the fuel pool.

MR. DAVIS: In the fuel pool.

CHAIRMAN BONACA: This is pretty much what they do right now, right?

MR. DAVIS: Yes.

CHAIRMAN BONACA: That's all.

MR. KANG: Okay. The last bullet deals with that -- the August version of GALL included -- we had included cracking of metal component support members due to vibratory loads and the cyclic loading. The industry commented that there was -- that this is not a license renewal item and should be deleted.

Their justification was that, number one, proper design eliminates or compensates for the vibrations and the cyclic loadings. And then, also, what they said was vibration characteristically leads to cracking in the short period of time on order of hours or maybe days of operations. Such a failure is probably early -- also occurs early in life.

Because of this time period that -- because this time period is short when compared to the overall plant operating life, cracking will be identified and corrected to prevent occurrence long before the period of extended operations. And they also said that this degradation is very limited in small -- a small set of components, and there is corrective as -- as discovered.

The staff has agreed that cracks in the steel elements component supports caused by vibratory stress would be developed in a matter of hours or days.

This timeframe is not consistent -- so this timeframe is not consistent with the requirements of the license renewal rule, which addresses a slow aging process affected by extended operations. So staff agreed to delete cracking of metal components from the latest GALL Report.

MEMBER LEITCH: Now, that comment, again, still applies just to steel structures.

MR. KANG: Yes, supports. Yes. Component support sections of Chapter III.

CHAIRMAN BONACA: Only support section. So it doesn't affect your definition, for example, of complex assemblies that we have seen; for example, the casing of a structure like fans that --

MR. KANG: This is a Class I and a Class II and III and small support areas.

MR. MORANTE: Well, I'm not familiar with the complex structures issue on --

CHAIRMAN BONACA: Well, I'm talking about, for example, an HVAC fan hanging from some ceiling out there, and there are structural members that hold it. Typically, the fan will have some vibrations in it maybe.

MR. MORANTE: Right. I would expect that in that case we -- we must keep in mind that there are certain cases where supports, especially piping supports, may have been designed considering cyclic loading. Those are still included in GALL as -- they need to be addressed as a TLAA.

The areas we're considering here is where the supports for piping or other structures were not necessarily designed to withstand any type of cyclic loading. So the vibratory loading that might occur would be an unusual event, not a design basis event.

For the case of the fan support, one would expect that the design of that supporting system for a fan that would tend to have a certain vibratory load would be inherent in the design, and it should be considered that way. So this would not really cover that particular case.

CHAIRMAN BONACA: I'm trying to understand it because I know in the Hatch application that we will review tomorrow there are a number of issues to do with passive components of active systems that should be still within license renewal, and a list that was disseminated made by the SCR. And some of those passive components include casings of HVAC systems as well as frames, or whatever, supports of active components.

So I just am wondering, you know, when we begin to cut it so close in the different issues, and then it becomes hazy, or whether it applies, whether it doesn't apply.

MR. MORANTE: In the current GALL, in Chapter IIIB, we do specifically address supports for components such as fans, probably a vibration isolator. That's a specific line item in the GALL tables that are subject to review.

CHAIRMAN BONACA: Okay. So there is --

MR. MORANTE: Whether it exactly covers the case you're concerned about on Hatch, I couldn't answer that question.

CHAIRMAN BONACA: We'll talk about it tomorrow.

MEMBER SHACK: Now, again, are these anticipatory -- anticipated vibratory loads or unanticipated vibratory loads we're talking about here?

MR. ASHAR: I would say unanticipated. If they are anticipated, they will go into the analysis or TLAA.

MEMBER SHACK: Well, I mean, I can sort of envision an anticipated fatigue load I'd handle in two ways. One, I'd do a cyclic analysis, and the other one I would say, well, my vibratory loads are below my threshold, or, therefore, I can run forever.

MR. ASHAR: Exactly.

MEMBER SHACK: If I have an unanticipated load, it doesn't seem to me to follow into either one of those.

MR. ASHAR: And then it wouldn't be any measurement. It will be just like in the current license what is happening. Same thing will happen in an extended period of life, and it should be taken care of.

MEMBER SHACK: When I find that I have vibratory loads that I didn't anticipate, I mean, I do something about it, right? I either go out and I do an analysis, or I --

MR. ASHAR: Yes.

MR. MORANTE: I'd like to address that. You're correct when you say if the -- if the vibratory loads are below the endurance limit, then you can have an infinite number of these cycles. You're not going to see a problem. So, obviously, the concern is vibratory loads that would exceed that level. If you exceed that level, and it's a true vibratory loading, you're going to generate millions of cycles in a very short period of time and are likely to generate a failure locally.

Now, what the industry has said is we have to deal with that in the hear and now. It's really not a license renewal issue. It's an operation -- it's an operating issue. And whether we're operating in the first 40 years of life, or years 40 to 60, is irrelevant. We have to address it when we find this kind of problem, and we basically looked at it again and said, "Yes, we agree with you that it doesn't -- it's not really a slow aging process. It's an operational problem that you need to address immediately."

So that's the reason for us removing it here.

MEMBER SHACK: Okay. I mean, I guess you're right.

MR. DAVIS: It goes into your Appendix B, Corrective Action Program.

MEMBER SHACK: But, I mean, it is a cumulative damage process. But in high cycle, the difference between 60 and 40 is nothing.

MR. MORANTE: Right. If it's going to happen in a matter of days or a week or so, does it matter at what point during that 40-year or 60-year life that it occurs? And that's the basis for removing the consideration.

MR. KUO: This is P.T. Kuo, License Renewal and Standardization Branch. If I may clarify a little bit. This item here only deals with those supports for the steel structures or frames or cabinets or -- it is not -- those supports are not designed for any vibratory motion.

If they are, then it will be designed according to the fatigue rule that -- that is described in ASME Code Section 3 or used under the code requirement. But these are those things that are not designed according to those rules, not required to design -- to be designed according to those rules.

And that the vibration were due to some unanticipated sources like pump vibrations. We never expect it, but because of some other reasons it vibrates, you know, high vibration amplitude. There are two ways to mitigate those problems. One is to immediately correct the problems, the problem source. The other one is that if it vibrates really with high intensity, you see the result right away. It doesn't accumulate from 40 to 60.

CHAIRMAN BONACA: Okay. Any other questions? If not, then I think we need a break. It's 20 of 10:00. So we will meet again at five of 10:00.

(Whereupon, the proceedings in the foregoing matter went off the record at 9:40 a.m. and went back on the record at 9:56 a.m.)

CHAIRMAN BONACA: Okay. Let's resume the meeting now, and we have a presentation on Chapter IV of the GALL Report.

MR. DOZIER: Yes, sir. Good morning. My name is Jerry Dozier from the License Renewal and

Standardization Branch. I have Barry Elliot from Engineering, Omesh Chopra from Argonne National Lab, and Mike McNeil from Research.

Chapter IV deals with the reactor vessel internals, the vessel itself, and also the reactor coolant system. These five bullets represent examples where public comments were resolved for repackaging, providing minimal acceptable programs, providing a real focus of concern, ensuring relevance and completeness in the GALL Report.

For the first item, that's an example of repackaging. In the ACRS meeting, we had considerable discussion about neutron fluence levels, and what is the threshold for ISCC, or when does void swelling come into effect. We also had industry discussions and debates about that particular issue.

On the one hand, it was an argument of accounting of materials versus thresholds, or we could focus on what we really wanted the aging management program to be. What we really wanted in this aging management program was to monitor the most susceptible locations and provide a method for inspection to detect that mechanism.

And that's what we really wanted, and we wrote an additional program, and it was consistent with Calvert Cliffs, that would accept that program. And if the licensee was willing to do that, then it would require no further evaluation.

The second one deals with minimal acceptable programs. Earlier, in the August edition, we had boric acid corrosion, and we also credited in-service inspection. NEI goes into --

MEMBER LEITCH: Before you move on to the second bullet there, where is the -- could you point me to the section in GALL where the change was made?

MR. DOZIER: Yes, sir. In Chapter XI, Program M16 titled "PWR Vessel Internals" is the new program that was written.

MEMBER LEITCH: Okay. Thank you.

MR. DOZIER: Was there any question?

MEMBER LEITCH: No. I just --

MR. DOZIER: Okay.

MEMBER LEITCH: -- want to know for reference. That's all.

MR. DOZIER: Yes, sir.

For boric acid corrosion, as we see it earlier, ISI could be a mechanism also -- could be a program that could be credited. NEI asked for the minimal acceptable program. Boric acid corrosion has been effective in the current term, and we feel like that it would be effective in the extended term for controlling boric acid corrosion.

So now in GALL we only have the boric acid corrosion program monitoring being credited for the boric acid corrosion.

CHAIRMAN BONACA: The boric acid corrosion problem, this is a visual program?

MR. DOZIER: Yes, sir. It is a visual program, whereas in ISI we were also looking at crediting possibly -- when the -- during the pressure test, you make it to detect some boric acid corrosion. If it was in an inaccessible area, or if it was covered by insulation, we thought that it might be effective, you know, also for that. For --

CHAIRMAN BONACA: And this is all components, anything which is effective -- this is effective boric acid corrosion. I mean, so in general it doesn't talk about --

MR. ELLIOT: This is not a coupon program. This is an inspection program of the actual components.

CHAIRMAN BONACA: Okay. I understand. All right.

MR. DOZIER: Okay. The next one is an example of how we got -- we made GALL more focused. Earlier this was -- this PWSCC was primarily plant-specific, but now we focused it on for -- for the Inconel 600 penetrations they are primarily being adequately managed by the chemistry and ISI program.

However, for the Inconel 182 welds, we do need a plant-specific evaluation. Now, of course, in that example, again, we're trying to focus the licensee really where they need to be in the -- or what we really want to see in the review process.

There was also some comments that for -- for some components there were a lot of aging effects. And sometimes maybe one or two of those aging effects may not have been really applicable, and we removed those from the GALL Report. For example, wear/loss of material for the core support pads and the guide tubes. Those were really not significant and we removed them.

Have we removed the component? No. They are still in there. Just that particular aging effect was removed.

CHAIRMAN BONACA: Just because we haven't seen wear or loss of material for core support pads and guide tube cards? Or why else?

MR. ELLIOT: That's the reason. They've been looking at it over the years, the industry, and they -- and they mention it as something they look for, but they haven't seen anything significant. So since it was not significant all these years, that we've decided to remove it and concentrate on the other aging effects that could affect these components.

CHAIRMAN BONACA: But you are telling me they are looking at them. That's why they know that there isn't. So --

MR. ELLIOT: Right.

CHAIRMAN BONACA: -- I mean, it's a closed circle. Are they going to stop looking at them, because --

MR. ELLIOT: No. There's an ISI program, you know --

CHAIRMAN BONACA: No. I mean -- all right. So it's not specific -- specifically tied to license renewal, but it's still -- okay. So there is not a commitment under license renewal. That's what you're saying.

MR. ELLIOT: Right.

MR. DOZIER: The last bullet is more of

a completeness issue. One of the -- we had several comments where NEI would ask for additional components be added, so that they could be credited. And we tried to accommodate those requests, so that it would be easier for the licensee to reference the GALL Report.

In this case, we are talking about the CRD head penetration. That was an NEI comment. Actually, this incore neutron flux monitoring tubes was a request from Union of Concerned Scientists. So we tried to accommodate and make GALL as complete as we could based on those comments.

CHAIRMAN BONACA: Before you move on, if you could go back to that PWSCC of pressurizer Inconel 600 penetrations. Now, here the concern you -- the intent was to focus the program where it's needed, you said. Okay?

MR. DOZIER: Yes.

CHAIRMAN BONACA: Is there a concern that when you begin to focus too much you may not -- now you may inadvertently neglect some areas where, you know, you don't know exactly but it would be -- you know what I'm trying to say?

MR. DOZIER: Okay. Well, the GALL Report actually is a self-check mechanism in it, and it -- even though -- say we don't mention an aging effect. If we don't mean the aging effect, that does not relieve the licensee to identify that effect and also report it to us in that application. He can only take credit for the things that are enveloped in the GALL Report.

So any -- any other -- that's the good thing about GALL is that any new aging effects, or whatever, that may come down the pike, if we have not addressed them, they will come in as a plant-specific evaluation.

Barry, I think you --

MR. ELLIOT: Yes. On PWSCC of the pressurizer, 600 components, what our experience is today is that the 600 component is-- the limiting materials are in the upper head. And that's where we're concentrating our inspections and our efforts.

If we see in the current license that we need to expand the locations for inspection, then we would -- we might include the pressurizer. But at the moment, our experience is that the Inconel 600 type cracking is in the upper head. And so that's where we're concentrating our effort.

The Inconel 182, of course, is a recent issue, and it has more -- you know, it is in a lot more locations, safe-ends, and all over, and that gets -- and that's why it's plant-specific.

CHAIRMAN BONACA: Okay. I think you have answered my question. My concern was when you focus on something, it implies that you know exactly where to look. Now, you know, these are -- there are so many applications of this -- different materials there, and that was the question I was asking you. And you answered that.

MR. DOZIER: Okay. From Chapter IV, we had a couple of issues that we were continuing the NEI dialogue on. One of those dealt with the operating experience with cracking of small-bore piping, and the other was management of loss of preload of reactor vessel internals bolting using the loose parts monitoring system. And those we are continuing the dialogue with NEI to come to resolution on.

MEMBER SHACK: Okay. Can you describe the issues of contention here?

MR. DOZIER: The first deals with small-bore piping, and basically they are asking about the operating experience. They are saying, have we really got enough operating experience for us to justify the one-time inspection that we are -- that we now have in the GALL Report? If you look at some of the operating experience, they may be because of, say, a weld defect, or there may be some event-driven issue.

But our bigger issue is that we feel like this -- that small-bore piping will be a concern in the extended period. So, really, regardless of our operating experience, we probably still want to pursue the small-bore piping.

And also, there is a -- a materials research project being performed by EPRI, and we want to follow that and -- you know, for the complete resolution of small-bore piping. So I think that -- in that particular case, it's really an issue that's -- that's continuing forward, and so it's one good to keep a dialogue on.

The next deals with loss of preload of reactor vessel internals bolting. Their contention is that ISI is good enough. We credited also the loose parts monitoring system, you know, for this aging effect. And the real issue is, is ISI good enough? And we're still exploring that.

Also, with loose parts monitoring, some of them took -- took loose parts monitoring out of their tech specs and had -- have not -- have not now got it even plugged up, or I guess not operating further. What we don't want GALL to be is a document that says, "This is the minimum program." If they don't have a loose parts monitoring system, of course, they can come up with any plant-specific ways to monitor that aging effect.

MEMBER SHACK: Well, I thought that's what GALL was was a minimum program, that this is what you have to have. If you have anything more, that's fine and dandy.

MR. ELLIOT: I think industry is arguing that loose parts monitoring is an additional program that they don't need for monitoring this aging effect, and that their concern -- it's our concern, too -- is that you don't want to put in a program that monitors a particular aging effect, and that puts the plant in a less safe condition. Like what happens if they -- one of the problems, they have loose parts monitoring. They've shut plants down looking for things that were not there.

So that we don't want to start that -- down that road again. We've already done it in the current license, take out the loose parts monitoring. We don't want to put it back in. You know, we're discussing that, whether it's necessary to manage this aging effect using that.

MR. DOZIER: The way it initially got in there was actually through a Westinghouse topical report that referenced that was the way they would do it. So we kind of got the idea from them, and then as this has grown we've learned more. And, again, I think the dialogue in this particular case is a good one to keep going.

MEMBER LEITCH: Can you help me work my way through here? I'm trying to find out about BWR circumferential welds. All right? So when I go to the -- I go to the GALL Report, and A.1.2 is for BWR vessel shelves, and I guess an intermediate belt line shell.

MR. ELLIOT: Do you want to take a look at this?

MEMBER LEITCH: Please, yes.

MR. ELLIOT: Okay. Page 5 -- 4.A.1.5.

MEMBER LEITCH: 4.A.1.5. Okay. And that's -- is that --

MR. ELLIOT: And it is the vessel shell -- intermediate belt line shell, belt line welds, and the aging effect is loss of fraction toughness, neutron irradiation embrittlement. Do you have that?

MEMBER LEITCH: Yes. Right.

MR. ELLIOT: In managing neutron irradiation in BWRs we look at the impact of the radiation embrittlement on the pressure temperature limits, on the upper shelf energy, and we look at the impact of the radiation embrittlement on whether or not we need to -- a circumferential weld inspection.

MEMBER LEITCH: Right.

MR. ELLIOT: And under the current licensing term, we did a review and we determined that the failure probability for circumferential welds were so low that we didn't need to include a circumferential weld inspection, that we could get along with just the axial weld inspection as like they would be more susceptible to cracking than -- the radiation embrittlement than the circumferential weld. And that analysis was done for four years.

MEMBER LEITCH: Right.

MR. ELLIOT: And it assumes certain radiation embrittlement criteria. Now, as long as you met that criteria for the 60 years, you would still satisfy the failure probability evaluation which was used for the first 40 years. And that's what this is intended to do is it -- is for the licensees to show how they meet that neutron irradiation embrittlement criteria.

MEMBER LEITCH: And there's a discussion about 64 effective full power years?

MR. ELLIOT: Well, 64 -- okay. What we did, we did the original evaluation of the BWRVIP 05, which is circumferential weld. They did the original evaluation for 32 years, effective full power years. And the ACRS raised the question: is this a cliff, that if you go past 32 effective full power years all of a sudden does radiation embrittlement cause a high increase in failure probability?

So we asked the VIP to evaluate 64 effective full power years, twice the amount of time. And they did. And it didn't fall off a cliff. It was a gradual change in radiation embrittlement.

For license renewal, we wouldn't be using the 64 effective full power year criteria. We would want them to meet -- and our evaluation was for the 32 effective full power criteria. We would want them to show that at 48 effective full power years they could meet the 32 effective full power criteria.

MEMBER LEITCH: Okay. So 48 effective full power years for --

MR. ELLIOT: Forty-eight effective full power is 60 years.

MEMBER LEITCH: -- 60 years.

MR. ELLIOT: Eighty percent, 60 years.

MEMBER LEITCH: Yes. So the reason we're not requiring inspection of the circumferential welds is basically even at 60 years, or 48 effective full power years, they have an extremely low probability of failure.

MR. ELLIOT: Yes.

MEMBER LEITCH: And plus the fact there's a requirement to do some additional operator training to --

MR. ELLIOT: Yes, that's part of -- we found out that there are certain events that are key to this that could cause -- that are significant. As long as they have operator training to preclude those events, that's like a defense in depth.

MEMBER LEITCH: Are these welds particularly difficult to inspect?

MR. ELLIOT: Yes. They're --

MEMBER LEITCH: More difficult than the axial welds or --

MR. ELLIOT: It's a matter of location. I mean, the axial welds are hard, too. It's -- you need special equipment for the axial welds also.

MEMBER LEITCH: Okay. Thank you.

MEMBER UHRIG: One question. You alluded to the 32 years or 48 years.

MR. ELLIOT: Effective full power.

MEMBER UHRIG: Effective full power years. And given the increased performance in the last few years of the plants, it's likely that one of these limits is going to be exceeded before the license expires. Are you -- how do you -- it's the license that controls, not the 48 --

MR. ELLIOT: What really controls here is not the 48 effective full power years or the 32, whatever. It is neutron fluence. That's what we're really using here. So as long as the neutron fluence estimate they use for the evaluation, whether it's 32 or 48 or whatever, is not exceeded by the end of the license, then they're adequate.

MEMBER UHRIG: Okay.

MR. ELLIOT: And as long as they monitor the neutron fluence, which is what they do, and they stay within their limit, whatever they said is in their application, they're going to meet the criteria.

MR. DOZIER: Any further questions for Chapter IV or -- Dr. Bonaca, I think you had mentioned some -- maybe some SRP questions for Section 3.1.

CHAIRMAN BONACA: We had some questions, yes. If I remember -- well, there were some areas which were eliminated from the previous draft, like I can give some examples of one I notice. One was under -- in management division. That's probably for the next presentation, right?

MR. DOZIER: Yes.

CHAIRMAN BONACA: Okay. So I'll wait for that. We talked about the complexity of performing inspections on welds. And any lessons learned from the disassemble experience on those nozzles?

MR. ELLIOT: Well, it says that we used to be very concerned about Inconel 600. Now we're really concerned about the welds.

(Laughter.)

In fact, much more concerned about the welds. And that's reflected here.

CHAIRMAN BONACA: Well, I'm more concerned about the inspections, actually. I mean

--

MR. ELLIOT: Right.

CHAIRMAN BONACA: -- it says that, you know, here you have full inspections and --

MR. ELLIOT: Right.

CHAIRMAN BONACA: -- you see nothing, and then you have a crack, and then you inspect again and you find --

MR. ELLIOT: Right.

CHAIRMAN BONACA: Which it seems to me the whole aging and, in general, license renewal is predicated on inspecting, seeing, and fixing. And so that's why I asked the question I guess.

MR. ELLIOT: Yes. I mean, whatever we work out in the current term for the Inconel 182, I mean, will carry forward into the license renewal term for inspection.

CHAIRMAN BONACA: Okay. Thank you.

MR. ELLIOT: Okay. Thank you very much.

MEMBER LEITCH: Excuse me. I had another question. I guess -- excuse me for jumping around here, but this concerns the generic safety issue, and I guess the issue is basically there's a concern that the effects of the reactor coolant environment on the fatigue life of components were not adequately addressed in the code of record. I'm referring here to the -- to page 4.3-2 of the SER.

And I guess my comment is that it seems like 40 years is at the margin, and I'm wondering how we can justify 60 years. Is that --

MR. ELLIOT: Okay. First, I'm not the fatigue expert. The fatigue expert is John Fair, and he can answer this question a lot better. But what I will say is that -- that as far as GALL is concerned, fatigue is a TLAA and it has to be evaluated by each plant. And that's how we handle it for GALL, because we are concerned that they could exceed the limit between -- during the operating term.

MR. CHOPRA: I just wanted to add one -- that GALL requires them to address for all Class I components to address the effect of environment on fatigue.

MR. KUO: This is P.T. Kuo, License Renewal and Standardization Branch again. The fatigue issue will be addressed in Chapter IV of the GALL Report. That is the TLAA, and you will see some generic programs in Chapter X of GALL.

MEMBER LEITCH: In Chapter which?

MR. KUO: Chapter X.

MEMBER LEITCH: Chapter X.

MR. KUO: Yes.

MEMBER LEITCH: And we're going to discuss that a little later today?

MR. KUO: Right.

MEMBER LEITCH: Okay. Thank you.

MR. KUO: You're welcome.

MR. DOZIER: Thank you.

MR. KLEEH: Good morning. My name is Edmund Kleeh, and I'm representing the License Renewal Branch. On my right is Mr. James Davis, and on my left is Mr. Crockett Petney, and we also have Chris Parchuski, all from the NRR, Division of Engineering.

I would like to present the first four changes or items on this slide, which indicate the flavor of the changes between the August and current versions of GALL for Chapter V.

The first item is that water chemistry adequately manages transgranular stress corrosion cracking in the containment spray and safety injection systems of a PWR. Stress corrosion cracking for stainless steel components exposed to borated water can occur at temperatures below 200 degrees Fahrenheit only if containments like sulphites, sulphates, and chlorides are present in the water.

Stress corrosion cracking does not occur if water chemistry controls the level of those containments below stated levels.

You have previously addressed the change in the SRP Section 3.2.2.2. There was a renumbering of that section of the SRP, and the particular section that you're talking about was deleted because there was no further evaluation of stress corrosion cracking in regard to the safety injection tanks and the refueling water tanks, because the one-time inspection was no longer required.

CHAIRMAN BONACA: Okay. I understand. Okay. So it's the elimination of those chapters. That's what I imagined, but I wasn't clear there. So the elimination was due to the fact that the concern is gone; you don't have to address it specifically anymore.

MR. KUO: Right.

CHAIRMAN BONACA: That's why you don't have that.

MR. KUO: Right.

MR. LEE: This is Sam Lee. That's what we meant when we changed the GALL Report. We just made the conforming changes in the SRP. So when you see the SRP, some of the things have disappeared, because they have disappeared from GALL.

CHAIRMAN BONACA: Yes. What about the other issue of those headings where there is a full description of the program, but then in parentheses there is written program no longer --

MR. LEE: You'll hear that. We're going to discuss that later.

MEMBER LEITCH: Does the water chemistry program, in addition to prescribing steady state limits, also discuss actions for excursions, say, unexpected chloride intrusion or --

MR. KLEEH: What I would think would happen here is that the water chemistry is a program -- is an existing program. So the plant -- the licensee would address that under Appendix -- or 10 CFR 50, Appendix B, for any corrective actions that had to be taken. It's an existing program, so it will be addressed in that manner.

MEMBER LEITCH: Okay.

MR. KLEEH: The next item is that general corrosion causes loss of material for carbon steel components in air but not for stainless steel components exposed to water systems. Pitting and crevice corrosion of carbon steel require an aqueous environment, with their aggressiveness dependent on local chemistry conditions like oxygen levels and component configuration.

And also, general corrosion is a thinning of a metal surface due to chemical attack on aggressive environment, but stainless steel components are not susceptible to it unless containments are present. This was just a conforming change that we made to GALL Chapter V.

The third item is that filters are considered short-lived components. They are typically replaced based on performance conditioning monitoring, which indicates the end of each of their qualified lives. They may excluded on a plant-specific basis from aging management review under 10 CFR Part 5421.

And not to further elaborate on it, but this was also -- there was also a deletion here in SRP.

And the last item is management of external surfaces of carbon steel components is plant-specific. Only service Level I coatings are in scope of the aging management program for monitoring and maintenance of coatings. The intended function of a component is not affected by the degradation of its service Level II and III coatings.

Are there any questions on the items that I've covered?

MEMBER FORD: I have a question. You made some very definitive statements on the first two bullets as to when you are going to or not get localized corrosion, stress corrosion, pitting, etcetera. Unfortunately, we know from history that you are always bitten in the future by such an occurrence. You've changed something in material or the environment which you did not anticipate.

How are those unanticipated changes covered in this whole process? And, again, I'm talking from lack of knowledge.

MR. KLEEH: I'll let James Davis answer that question.

MR. DAVIS: That, again, goes into your Appendix B, Corrective Action Program.

MEMBER FORD: Okay.

MR. DAVIS: So you deal with it as an --

MEMBER FORD: So the whole process is compliant enough that you can take into account these unanticipated things in the future.

MR. DAVIS: Yes, that's the purpose of the Appendix B program is when you have an unusual occurrence, then you take corrective action.

MEMBER FORD: Okay.

MR. DAVIS: You analyze the situation, determine why it occurred, and then you correct it with your corrective action program.

MR. GRIMES: This is Chris Grimes. I'd like to add to that that the requirements for the renewed license also provide that the -- this revised licensing basis, for which there is significant industry sensitivity to the extent of the commitments for these aging management programs, it provides the boundaries upon which Appendix B operates because if the design has changed, or if the environment has changed, or if the assumptions associated with the effectiveness of the aging management programs somehow are changed in the future, then the renewed license demands that those changes be addressed in terms of their impact on the licensing basis.

So if we're bitten somehow in the future, it would be our expectation that the licensing basis would be maintained by these departures being addressed with respect to the effectiveness of aging management.

MR. DAVIS: Event-driven occurrences are included from this license renewal and from GALL. So if it's some event that occurs, you don't consider it in GALL, like a spill or something like that.

MEMBER FORD: Well, I wasn't talking about things like spills or other things like that. I was talking about major systemic problems, like we didn't know that core cracking would occur until it occurred.

MR. DAVIS: That's right.

MEMBER FORD: And now that -- in the hind events, we know why it occurred, but we didn't know at time zero.

MR. KLEEH: That concludes the presentation on these first four items. The next items on this slide and the one on the following slide will be presented by Kimberley Rico.

MS. RICO: Hi. My name is Kimberley Rico. I'm with the License Renewal Branch. The fifth bullet on the screen is an issue raised by NEI concerning biofouling and the buildup of deposits. And it -- the issue of whether flow was an active function, and we determined that biofouling affects both flow performance and pressure boundary integrity. But flow performance is considered an active function covered under the current licensing basis and should not be included within the scope of license renewal.

However, biofouling causes loss of material, which affects the pressure boundary, and this passive function requires aging management. So however -- in order not to contradict the license renewal issue Number 98-105, which states that the heat transfer function for heat exchangers is within the scope of license renewal. So biofouling was kept in for the heat exchanger tubes for buildup of deposits.

The last bullet on the screen is we added an alternative AMP to the Chapter XI for the buried piping. NEI was concerned with the current program that we had, followed the NACE standards, and we didn't want the NACE standards which aren't currently required to become the standard, that we wanted to give them an alternative program.

And that was one of the purposes of GALL was that eventually it would be multiple AMPs for certain aging effects. And so we created a new AMP -- M34 and buried piping tanks and inspection.

MEMBER LEITCH: On that biofouling issue, just -- I'm still thinking about that a little bit. You said that you did include biofouling as an aging management program?

MS. RICO: Yes. We kept biofouling as an aging mechanism, but we -- the effect is loss of material.

MEMBER LEITCH: Not heat transfer.

MS. RICO: Well, in the heat exchanger tubes we kept buildup of deposit, the restriction of flow, as the aging effect mechanism for the -- only the heat exchanger tubes.

MEMBER LEITCH: Okay. But does that -- did you think about plants that are now experiencing asiatic clams in their cooling water systems? There's growing concern about asiatic clams.

MR. DAVIS: The zebra mussels probably.

MEMBER LEITCH: The zebra mussels, yes.

MR. DAVIS: Generic Letter 89-13 addresses service water fouling, and in that one of the ways they suggest that you control or monitor fouling is by measuring the efficiency of your heat exchangers. And you can tell very quickly if you're having a problem either from fouling or from zebra mussels.

MR. BARTON: That's covered by existing programs, right?

MR. DAVIS: That's an existing program.

MEMBER LEITCH: Okay. So that's excluded from the aging management, then.

MR. GRIMES: This is Chris Grimes. And I hope you won't think I'm overly trite, but we did have some difficulty trying to draw this fine distinction between what are active functions and what are passive functions. And quite candidly, the performance monitoring -- those things that get to flow and heat exchanger efficiency, they are much more palatable if you think of them in terms of the active system demands and performance and system reliability.

And so for our purpose we focused on aging effects. Heat transfer is not an aging effect. Heat transfer is more related to system performance that is challenged on a fairly frequent basis. But we couldn't extend that logic to the -- so far as to say that crud buildup doesn't have some impact on loss of material, which is an aging effect. So that was -- that's the focus of GALL. And it is a rather subtle and fine distinction, and it's not really easy to articulate.

MEMBER LEITCH: Yes. Another concern that I had in that area, the plant, as you think out in terms of the forebay and dredging considerations, and all that type of thing which, you know, that -- that is -- like silt building up in the intake is a function that develops over a long period of time. And I don't know whether that would be an active or a passive type of thing. I guess that's one of those things that's kind of on the cusp as well.

MR. GRIMES: That's correct. And we would -- you know, if the reviewers look at the -- at this distinction, and they test it with operating experience. And to the extent that we have delved into the area of the impacts of zebra mussels and other impacts on system performance, we still have to step back and say, yes, but to what extent are these things -- aging effects -- age related? And I think that we've been fairly sensitive to making that fine distinction.

And we still have to -- we still have the system performance tests and the active features that provide protection in the future in the event that we find some long-term impact going on that needs to be addressed.

MEMBER LEITCH: Yes. Thanks.

MEMBER SHACK: Just coming back to this last bullet again, in the earlier version of GALL you had the NACE program as an acceptable aging management program.

MR. DAVIS: That's right.

MEMBER SHACK: What you did then was create another new -- I mean, a plant could have always come in with a plant-specific alternative. You just created a new generic management program, presumably based on some fairly typical plans, is that --

MR. DAVIS: What we did was we basically did what Calvert Cliffs and Hatch and ANO and Turkey Point proposed, and that is when they go in to do maintenance they're going to dig up the pipe and they'll examine the coatings at this point. Whereas, when I originally wrote it, I put the NACE standards of cathodic protection and coating. Nobody really does that, and they don't want to take credit for the rectifiers, because they're not -- they weren't purchase safety-related. So that causes a problem for them.

So we -- rather than fight about it, we agreed with NEI that we would offer either alternative. In the case of Oconee, they have 11-

foot diameter pipes, and they actually are going to inspect from the inside of the pipe. And that's about 80 percent of their buried pipe is 11-foot diameter pipe. So that wasn't put into GALL because we thought that was an unusual occurrence. But they can also propose any other program that they want when they come in.

CHAIRMAN BONACA: This is AM34. That's the one he quoted. Okay.

MS. RICO: And the last change to GALL was the addition of a selective leaching program. Some materials were added that NEI had asked for that are used in plants, and selective leaching was identified as the aging mechanism. And we created selective leaching, which was modeled off of Oconee.

And those were all the significant changes that were made to V, VII, and VIII.

Now, for the NEI continued dialogue items, the first one is concerned with bolting, and NEI feels that the aging effect and mechanism of crack initiation and growth due to cyclic loading and stress corrosion cracking for carbon steel closure bolting and high pressure or high temperature systems is not necessary. And I'll let Jim Davis further --

MR. DAVIS: It's the issue of the 150 yield strength. If it's up over 150 yield strength, those bolts will crack in air. And we've raised this with every utility so far, and they want us to take that out of GALL. But we're not going to.

(Laughter.)

MR. BARTON: End of dialogue.

(Laughter.)

The decision has been made.

MR. GRIMES: This is Chris Grimes. I want to emphasize that dialogue will continue.

(Laughter.)

MS. RICO: And the second item is concerned with additional requirements above the NFPA commitments. And I'll let Tanya Eaton from the Plant Systems Branch just briefly go over what these two additional requirements are.

MS. EATON: Hi. I'm Tanya Eaton. Basically, the concern that we had was that there was a requirement in GALL for fire protection systems that inspections should be performed to monitor through internal inspections. NFPA does not have requirements that currently require licensees or anybody that has a fire suppression system to go in and look at the pipe and to trend changes over time to the diameter which could affect the wall thickness and eventually affect the pressure differences in the system.

And so in order to meet the requirements of GALL you have to go beyond what's currently in the NFPA codes.

MR. BARTON: So where are you on this one?

MS. EATON: We're still -- I don't know if NEI -- what NEI's position is. We haven't spoken to them in a while. So it's my understanding that we are just going to continue dialogue.

MR. BARTON: Okay.

CHAIRMAN BONACA: That's in one of the open issues of Hatch, still open somewhat. Well, that's more because of the particular area of the fire protection, not the specific issue.

MR. GRIMES: That's correct.

CHAIRMAN BONACA: Okay.

MR. GRIMES: Arkansas and Hatch were both challenged by fire protection scoping issues.

CHAIRMAN BONACA: Yes.

MR. GRIMES: But the issue that Tanya described is basically our expectations about monitoring programs that would be relied on for aging management with respect to the pressure boundary which is -- as Tanya explained, our expectation goes beyond what NFPA currently requires, or NFPA code currently requires.

CHAIRMAN BONACA: Okay.

MS. RICO: Are there any further questions?

MR. BARTON: Yes. Chapter VII -- are you covering VII?

MS. RICO: Yes.

MR. BARTON: D.2 in VII, compressed air systems. If you look at the scope in that section it does not cover the pressurized air receivers, which are usually carbon steel tanks and corrode and get full of moisture and operators forget to bow them down, and la-di-da, la-di-da. Where are they covered with respect to age managing and corrosion?

MS. RICO: I'm not sure on that one.

MR. DAVIS: I think if there's moist air in there it's covered.

MR. BARTON: It's not covered in D.2. So where is it covered?

MR. DAVIS: Okay. I'll have to look. I'm not sure.

MR. GRIMES: We'll find that, because

I'm sure that the -- I remember the question coming up about the treatment of receivers, but I can't recall specifically where they're --

MR. BARTON: Okay. I didn't see it in the current documents in D.

MR. LEE: Yes. We will check that. One of the things that we have is GALL is not a scoping document. So if it is not in GALL, then the applicant had to address it on a plant-specific basis. It was in fact within the scope, last we knew, for that plant.

MR. GRIMES: This is Chris Grimes.

MR. BARTON: I'm not comfortable with that answer.

MR. GRIMES: This is Chris Grimes. Sam's explanation is that GALL tries to treat all systems, structures, and components in a very broad way.

MR. BARTON: Right.

MR. GRIMES: And so my expectation is that somewhere that's an explanation on the treatment of receivers in an air-handling system.

MR. BARTON: Okay.

MR. GRIMES: Correct? And a compressed air system. And so even though it might be difficult to find, we would expect that somewhere there's an explanation and we'll research that.

MR. BARTON: Thank you, Chris.

Chapter VIII, steam and power conversion systems. In 8.E, you talk about a condensate system and you refer to condensate storage tanks, and material mentioned in that section only deals with carbon steel condensate storage tanks. My question is: what about plants that have aluminum condensate storage tanks? Where are they covered?

I know you've got to care about aluminum storage tanks because I have personal experience that the bottoms rot out. And I don't see that covered any place.

MR. DAVIS: I don't think we covered that, but I could check into that, too.

MR. BARTON: Well, I think you need to look at that.

CHAIRMAN BONACA: That's an important point.

MR. GRIMES: I know we can find receivers, but we may have to confess that aluminum storage tanks would be treated on a plant-specific basis until we've got some further experience with them.

MR. BARTON: I know one place where you've got some real experience with them.

MS. RICO: And then, as for the SRP, your comment earlier about Section 3.3 on the -- in parentheses at the beginning of I think it's 3.3.2.6 and 8, the program no longer is in use. That was -- I had tried to keep the numbering system the same.

So like when you encountered earlier when something -- a program went missing from one version to the next, that was kind of my way of making it so that you knew what happened to this program, that it just didn't disappear off the face of the earth. But we will end up just taking those out and just renumbering them. But that explains why that is in there.

CHAIRMAN BONACA: Okay. Just pursuing again the issue that John Barton brought up. You may have, in fact, some components out there which are not covered by the current guidance. Aluminum storage tanks appear to be some of those.

In those cases, you will have an expectation that there will be a plant-specific program addressing the material, the environment, and the aging effects.

MR. GRIMES: That's correct.

CHAIRMAN BONACA: Okay.

MR. GRIMES: We tried to treat -- GALL attempted to catalog everything we've been able to find so far. And I'm -- I'm sure you'll be able to think of other examples of unique component environment configurations that perhaps we haven't treated, and they simply didn't come up in the process of our cataloguing. That does not relieve the applicant from the responsibility of capturing them in scope and then treating the applicable aging effects.

CHAIRMAN BONACA: I imagine that at a later time will be included in GALL as lessons learned?

MR. GRIMES: That's correct. As a matter of fact, it's the -- industry has stressed the importance of their expectation that as future lessons are learned that there will be an opportunity to further improve the guidance.

CHAIRMAN BONACA: Yes. I have a general question about GALL. I can ask it anytime, so I'll ask it now. Which is, you know, GALL provides a real baseline and really gives a lot of comfort when you look at it, because although things may have been missed, but there is a significant meeting of the industry and the NRC and the whole experiences brought there.

And I'm still surprised at some of the applications, including the one we are going to see tomorrow, and the SCRs contain very little reference to GALL. I'm sure GALL has been extensively used to make judgments, and, you know, I was surprised that, for example, in the SCR we are going to review tomorrow there is very little reference to GALL.

And I just -- with respect to time, there will be more of that because, again, a reference to GALL is something that says -- like it is there and is acceptable and will be helpful.

MR. GRIMES: The simplest explanation is that we have a pact, and that pact is that so long as GALL is still evolving, and it does not represent an approved tool, then it will be used carefully by both the industry and the NRC. And so the lack of approval on the document means that we use very carefully, and we do not reference it -- either the applicants or the NRC -- until it has reached a stage of maturity and approval that we can say it is now an official agency document that can be referenced.

The fundamental objective of this

demonstration project that the industry has undertaken is to find ways to maximize the utility of GALL as a reference in order to simplify the process. The staff is similarly motivated to be able to reference GALL as a device that represents an official position relative to these matters.

And we're here today to seek your endorsement, in your capacity as an advisory committee to the Commission, to get the Commission to put a blessing on it that makes it an official document that can be referenced.

CHAIRMAN BONACA: And I understand and that's great, because it lessens my concern. I think with the time I will expect and hope that there will be much more reference, you know, when it is a finalized document. But, still, right now -- for example, I notice many requests for additional information where you went back and forth, and then finally the answer was, "Well, we did this because that's in GALL." And the staff responded by saying, "Ah, great. So we accept it."

I mean, so still now, already now, GALL represents a significant baselining for discussion and agreement. And so, okay, I understand it is not final yet. Is this going to be -- is this supposed to be the last draft we get before it is approved in the final form?

MR. GRIMES: We're going to talk about that at the conclusion of meeting.

CHAIRMAN BONACA: Okay. Because I'm beginning to wonder now. We don't --

MR. GRIMES: We would like this to be the last draft before we go to the Commission for approval to proceed and use it as an official position. But as you've pointed out, there's still some room for further improvements, and I hope that at the conclusion of the meeting we can convince you that, as we've tried to convince the industry, that the dialogue will continue and opportunities for future improvements will be there for subsequent revisions and additions.

We would like this to be the final draft, so that we can take this guidance to the Commission for approval.

CHAIRMAN BONACA: How does the industry feel about that? Because I see a lot of issues here which are continued dialogue items.

MR. GRIMES: I think that the -- well, I'll let the industry speak for itself when they come up to talk about their contribution with

Revision 3 to NEI 95-10. But I think that the industry is as anxious as we are to take advantage of what's been accomplished so far, which we think is fairly substantial.

If you'll, you know, keep in perspective that we're here explaining a resolution of what we consider to be some of the key controversies that came up in the comments. But we've incorporated the results of about 1,000 comments for which we've very carefully gone through and documented in the companion NUREG report how we've treated each of the comments.

CHAIRMAN BONACA: Thank you.

MS. RICO: Now S.K. Mitra will come up and discuss Chapter VI.

MR. LEE: I guess before S.K. comes up, Dr. Leitch before had a question on the fatigue, environmental effects on fatigue. I have John Fair from the NRR staff. He can answer your question if you still have a question on that. This is, I guess, SRP 4.3.

MEMBER LEITCH: Yes, that's where my question was. I guess my question specifically related to the verbiage on -- I'm referring to the SRP now, page 4.3-2 and 4.3-3, speaking about the resolution of the generic safety issue and the statement that the effects of reactor coolant environment on the fatigue life of components were not adequately addressed in the code of record; particularly, the concluding paragraph indicates the potential for an increase in the frequency of pipe leaks as plant continues to operate.

That is speaking now about the conclusion of paragraph 4.3.1.2. Thus, the staff concluded that licensees are to address the effects of coolant environment on component fatigue life as aging management programs are formulated in support of license renewal.

MR. GRIMES: This is Chris Grimes. I'd like to introduce John's explanation by making -- closing the circle in terms of the -- the associated generic safety issue is GSI 190. It was the issue that was intended to extend from GSI 168 on fatigue environmental effects for 40 years.

And what you read was the conclusion of GSI 190, and actually I think it's also important to recognize that even though the industry did not specifically identify this as a potential appeal issue warranting further dialogue, I think it is their expectation that this is an issue that has an ongoing dialogue that will continue in the future and may result in future changes to this guidance.

But with that, I'll let John explain the details.

MR. FAIR: Yes. I'm sorry. I'm John Fair with NRR. I missed the crux of the question you had on this.

MEMBER LEITCH: Well, it just left me with an unsettled feeling. I guess someplace in here, I'm not sure I can find the sentence right now, but it seems like -- I had the impression that 40 years was kind of at the margin. And on that basis, I was wondering how we could proceed with 60 years.

MR. FAIR: Okay. Originally, this issue was looked at for both 40 and 60 years, and we had an evaluation of a sample of components at a number of powerplants. And what we found, that in most plants we could do an evaluation, remove conservatism with the new environmental curves and show they were okay for most of the locations.

But in addition to the evaluation of these locations, we also had an auxiliary risk assessment, and it showed that the risk was not significant. And, therefore, we couldn't justify the backfit to the current operating plants.

So the basis -- the real basis of why we didn't have a problem with current operating plants was, one, we did an evaluation of high fatigue usage factors at most of these -- at a sample of plants, showed most of the locations were acceptable even considering environment for the 40 years.

There are some cases we couldn't show it was good for 40 years, but we suspect that with more detailed information, which the licensee has available to them, they could probably show these other locations were okay for 40 years.

And, in addition, we had the risk assessment showing it was not risk-significant enough to warrant a backfit. When we made the conclusion for 60 years, we said there's a likelihood that we'd have more problems at 60 years, obviously, with 20 years additional time. It would be more difficult to show that these locations were acceptable.

And we did a follow-on risk assessment in this GSI 190, and that follow-on risk assessment showed that there was an increase in leakage potential for these locations, even though the risk was not high. And on that basis, we concluded we should do something for license renewal because of the potential for increased leakages.

So it was basically we couldn't justify a backfit to the current operating plants based on the risk assessment and the evaluation we had performed. So --

MR. GRIMES: I would like -- if I could, I need to correct a misstatement I made before, that the precedent to GSI 190 was GSI 166, not 168. And I'd like to add that although we cannot backfit the design of all the fatigue analysis, we're approaching this from the standpoint of the environment is an aging -- is applicable to the aging effects associated with the fatigue analysis.

Therefore, we believe that it's within the scope of the renewed license to address how that affect is going to be treated. And John prepared the guidance for the Generic Aging Lessons Learned Report that explains our expectation on how that will be treated.

MEMBER LEITCH: Okay. I guess -- is that found -- that most of the locations would have a CUF of less than the ASME code limit of one for 40 years. I guess that's the troubling statement, I guess, that I -- I'm trying to find the right sentence here. Just bear with me a second here.

I guess at one point here it says, "However, because the staff was less certain that sufficient excessive conservatisms in the original fatigue calculations could be removed to account for an additional 20 years of operation for renewal, the staff recommended in SECY" -- number such -- "that samples should be evaluated considering environmental effects for license renewal."

So I guess maybe I'm just not sure what you have done as far as this issue is concerned. Is additional inspection required or --

MR. FAIR: No. In license renewal for the plants that have gone through license renewal thus far, they have taken the locations that we originally studied --

MEMBER LEITCH: Okay.

MR. FAIR: -- the six locations, and they've done their own assessment considering environmental effects. And in most cases -- again, in most cases, not all cases, they are able to show there's not a problem. For the cases where there's a concern, which right now it looks like mostly a concern on the surge line, they're going to do some monitoring in the extended period of operation.

MEMBER LEITCH: Okay. Okay. I think that answers my question. Thank you.

MR. KUO: If I may add, the fatigue program that I was talking about earlier in Chapter X is in Chapter X, M1. The program is M1.

MEMBER LEITCH: M1?

MR. KUO: Yes.

MEMBER LEITCH: Thank you.

MR. KUO: You're welcome.

MR. MITRA: I'm S.K. Mitra again, Project Manager, License Renewal. With me today, on my right, is Bob Lofaro from Brookhaven National Lab; and on my left, Mr. Jit Vora from Office of Research; and Paul Shemanski from NRR.

Today's topic is Chapter VI, Electrical, and we are going to talk about the changes from the August version due to the public comments.

The first bullet is consolidated boric acid corrosion programs. The borated water leakage surveillance for a non-acute electrical connectors program, E.4. Used to be 11.E.4. Deleted from Chapter XI to eliminate the redundancy with the boric acid corrosion program in Chapter XI, Intent, which is now reference for electrical improvement also.

This is based on industry suggestions. So we took that 11.E.4 out from programs and reference to 11.M.10, which is --

MR. BARTON: Reference to 11 what?

MR. MITRA: 11.M.10.

MR. BARTON: M.10?

MR. MITRA: Yes. That's boric acid corrosion program.

MR. BARTON: Yes.

MR. MITRA: Next bullet is we incorporated examples of specific insulation tests for medium voltage cables. Aging management program in 11.E.3, for medium voltage cable exposed to significant moisture and significant warpage, was modified to include example of acceptable monitoring tests to provide an indication of the condition of conductor insulation.

Based on comment, ACRS has three changes, and there will be a new paragraph in 11.E.3, which will give the specific test. It says the specific type of test performed will be determined prior to the initial test, and this will be a proven test for detecting the duration of insulation system due to weighting, such as power factor, discharge, or polarization index, as described in EPRI TR203834-B1-2. Or other testing that is state of the art at the time of the test is performed.

MEMBER UHRIG: This, then, is very different than the -- this is not the same kind of test -- accelerated testing that was done for the low voltage cables.

MR. MITRA: No.

MEMBER UHRIG: This is just for normal usage.

MR. MITRA: Used for medium voltage.

MEMBER UHRIG: Yes. Medium voltage is for normal usage --

MR. MITRA: Yes.

MEMBER UHRIG: -- throughout the 60 years.

MR. MITRA: Right. But --

MR. LOFARO: That's correct.

MR. MITRA: The last bullet is we added a sentence for first inspection/test of cables to be completed prior to the period of extended operation. And this requirement was added to the aging management program 11.E.1, E.2, and E.3, to the detection of aging effects, to make sure a 10-year inspection or test frequency will provide at least two data points during 20 years period, which can be used to characterize that degradation rate. This was also added to be consistent with the requirement in the SRP.

CHAIRMAN BONACA: This is typically -- these are known EQ cables, right?

MR. MITRA: Yes.

MEMBER UHRIG: There are the medium voltage cables?

MR. MITRA: Any cable.

MEMBER UHRIG: Any cable.

MR. MITRA: Yes.

MEMBER UHRIG: Any cable, low, medium, or high.

MR. MITRA: Yes. And previously in GALL we didn't have this requirement saying that it had to be done at the completion of the period of extended operation. So it could have been done in 50 years and only one inspection, and that would have been all data points, more than one. So this was added at 40. Any time before 40 is here, and then there will be one more.

MEMBER UHRIG: You have not specified any specific test. That's just the measure test for --

MR. MITRA: Any specific tests?

MR. SHEMANSKI: Would you repeat that, please?

MEMBER UHRIG: Well, it says just -- first inspection/test. You have not indicated the type of test. Is this negotiated with the utility at the time, or is this something that is -- they propose and you approve? Or is this something that is currently in use? What type of test are you talking about here? is really my -- I guess the question.

MR. SHEMANSKI: Basically, what we're looking for is a state-of-the-art test. We don't want to define the test right now, or at least the utilities, so that -- they would prefer to wait until the actual test is going to be performed and see what is the best test available at that point in time.

They were concerned about locking into a particular test right now, committing to a particular test, and if they chose not to do that test then they would have to come in for a license amendment type change. So what we agreed to was that just prior to the conduct of the test the utility would come in and discuss it with us, and

NRC would then have the opportunity to agree or disagree with the type of test to be conducted.

MEMBER UHRIG: Also, assume that there would be a discussion of the criteria for acceptance or --

MR. SHEMANSKI: Yes. At that point, that would give us an opportunity to discuss the acceptance criteria that would be involved for that particular test.

MEMBER LEITCH: Just back to the first bullet, boric acid corrosion programs -- I'm looking at M.10, boric acid corrosion, and it doesn't leap off the page, to me at least, that it's referring to electrical equipment. It says the program covers any carbon steel, alloy steel structures and components which have borated -- one which borated reactor water may leak.

So where is -- I mean, it says "components," and I guess you could infer from that electrical.

MR. MITRA: Yes.

MEMBER LEITCH: And these seem to --

MR. MITRA: Specifically, it was mentioned and, regretfully, it has not showed up in your version. But I was told that it was incorporated in a later version.

MR. LOFARO: Yes. This is Bob Lofaro from Brookhaven. Subsequent to this March version that you have reviewed, we did add some words to program M.10 to specifically call out the inspection of electrical components.

MEMBER LEITCH: Okay. That's good. It's probably inferred here, but it's not real clear right here. Thank you.

MR. MITRA: Are there any other questions? Thank you.

Next presenter is David Solorio.

MR. SOLORIO: Hi. My name is Dave Solorio, and to my right here is Omesh Chopra from the Argonne National Lab. I'm going to talk to you about three things today. First -- the first couple will go real quickly. I'm going to talk about Reg. Guide 1.188, and then I'm going to talk about NEI 95-10, and then I'm going to put up a slide here that talks about one-time inspections that you all asked for.

Reg. Guide 1.188 proposes to endorse NEI 95-10, Rev. 3, dated March 1st, without exception, because 95-10 provides acceptable methods for complying with the requirements of the license renewal rule.

Two changes were made to the reg. guide in response to public comments. First, guidance for submitting electronic submittals was added, and a note was added to clarify that if color drawings are used no essential information should be lost from printing them out in black and white, so -- for the benefit of the public who may not have access to color equipment.

MEMBER SHACK: Let me just ask a question. I was sort of -- you know, I was reading the BWRVIP POP Guide Reports, which I assume will be sometime referenced in the license renewal document. And there's a proprietary version and a non-proprietary version, and by the time you get to the non-proprietary version, which is what the public is going to see, there's nothing there.

I mean, even the list of inspections that are proposed is proprietary and disappears. Is there some judgment here as to, you know, what's a reasonable amount of information to be provided to the public when this is done?

MR. SOLORIO: Well, the NRC -- not in the reg. guide -- but the NRC does have a process for providing -- what's the right word? Proprietary information.

I guess it would have to be handled on a case-by-case basis, and it would be up to the project managers and the NRC managers to determine, you know, what appropriate information needed to be seen by the public, so that they had a fair shot of looking at what we're looking at. We have a process, and we would follow that process.

I really don't have any more --

MR. GRIMES: This is Chris Grimes. I was involved extensively in the dialogue with the -- with EPRI and the BWR Owners Group to try and get them to provide us with more than a cover page and a table of contents in the non-proprietary version. There are standards, and there is a test on the proprietary -- proprietary nature, but it's not always clear.

MEMBER SHACK: Well, the one that disturbed me the most was the table which actually outlined the inspections that would be done, which would seem to me the thing that, you know, the public might well want to know.

MR. GRIMES: And we listened long and hard to the explanation about how the BWR Owners Group and EPRI considered that to be marketable material. And it is. And notwithstanding our desire to be able to disclose those details in public, the standard that we apply is whether or not there is a -- you know, a financial gain to be made in terms of its marketability. And --

MEMBER SHACK: That is the crucial test, then, is is it marketable material?

MR. GRIMES: That's correct. And I can recall when I -- when similar questions came up on Westinghouse topical reports many, many years ago, we were able to convince Westinghouse that "F equals MA" was not a marketable quantity for them. And sometimes it gets that ludicrous, but it -- but the test is that -- it gives the owner of the report an opportunity to protect their commercial materials. That's its intent.

That's why we have provisions for proprietary material and protection of confidential business information. And it does make our job much more difficult in terms of the transparency to the public.

CHAIRMAN BONACA: Doesn't it also involve, in fact, a decision on the part of the staff on whether or not the right of the public weights the marketable value of the application?

MR. GRIMES: That's correct. But you will find, particularly I think in the BWRVIP, safety evaluation that we -- we've worked very hard to present safety evaluation findings that describe enough of the contents of the material in terms of what we relied on to come to a reasonable assurance finding, without disclosing the details that the -- that the owners groups and EPRI want to market.

And I would also add that I'm -- I believe that there is presently a rule change underway for 2.790. That's 10 CFR 2.790, which embodies the requirement for proprietary withholding, that attempts to improve it, but it still will demand that the Commission offer an opportunity for that commercial business information to be protected.

That's not unique to the NRC either. All federal agencies are confronted with providing for the protection of confidential business information.

MEMBER SHACK: I mean, it just seems to me there is some conflict with, you know -- I mean, I don't see how the public could look at that proprietary version of that document and learn anything.

MR. GRIMES: Well, the non-proprietary version.

MEMBER SHACK: The non-proprietary version.

MR. GRIMES: But there is -- there are processes by which interested members of the public can view proprietary material by -- through legal means, and that is to make, you know, some kind of contractual arrangement, so that they will not disclose that marketable material.

So if there is an interested public organization -- and as a matter of fact, I believe that Commissioner McGaffigan referred to it when the issue came up during the regulatory information conference when Ed Limon, you know, referred to his concerns about the availability of research information related to aging effects.

And there are ways that public interest groups can view the details, so long as they agree to the -- maintaining the confidence of the material that's being marketed. Okay?

MR. SOLORIO: My next transparency talks about NEI 95-10. As you're aware, Revision 2 was published back in August. You probably -- most of you probably saw it then. The staff reviewed

Revision 2 and identified a number of items that needed to be changed to ensure consistency with the standard review plan and GALL.

The staff met with NEI in February to discuss these items, and NEI revised 95-10 and submitted Rev. 3 in March of this year. On this slide I've categorized -- or on this transparency I've categorized the nature of the changes into three areas.

First, there are what I would call consistency changes. For example, the staff requests that the table of contents in 95-10 agree with the statement of contents in the SRP to ensure a consistent format for future license renewal applications. Another example was that the staff requested NEI 95-10 include a discussion on top 10 program elements for an aging management program, similar as provided in the standard review plan.

There was some additional guidance for the timing with which an applicant should address USIs and GSIs, in accordance with NUREG-0933. And, finally, a conforming change to address changes to the regulation involving the accident source term, 50.67.

I also want to mention that in March --

in their March 1st letter transmitting Rev. 3, NEI indicated to support the schedule to provide this document, along with the other documents the staff has provided to the ACRS by March 1st. They provided 95-10 without the benefit of industry review. Therefore, there was a possibility there could be changes.

In addition, there were a few items such as the severe accident mitigation guidelines that didn't get added to Revision 3 due to timing, but NEI intends to add that. NEI has informed me that they will be resubmitting Revision 3 very shortly, and when NEI does that the staff will review it to ensure our endorsement remains unchanged.

My next transparency here is in response to what I understand was a request by the subcommittee to see the one-time inspections for Calvert, Oconee, and GALL.

CHAIRMAN BONACA: Let me just explain to -- for the -- I made the request because we have seen the one-time inspections, and we saw a large number for Oconee, for example -- for Calvert Cliffs, actually. And they've gone down in number substantially to the point where Arkansas had very few.

Now, that doesn't mean the issues have been all gone away, but there is other ways in which they have been accommodated. So, second, if I look at the Arkansas application and Hatch, the one-time inspection really represents the bulk of the new programs being presented -- I mean, in large part. And it's --

MR. SOLORIO: I'm not real familiar with Arkansas and Hatch, but --

CHAIRMAN BONACA: Well, that's at least what I see from them. And so they are important because earlier they represent that. So it would be good for us to understand, you know, where these one-time inspections are, why they have been decreasing with time, if you have any insight on that that would be very useful.

MR. SOLORIO: Well, just to tackle that right away, GALL frequently now requires a plant-specific aging management program be required. So that could mean a licensee might have a one-time inspection or a licensee might have an existing program. As long as there is something, that's what GALL is asking -- asking for.

So that could explain a big difference perhaps why you see a lot less for these other more recent applicants. Again, I'm not real sure about their particulars, but --

CHAIRMAN BONACA: Yes. One of the reasons may be that Oconee was presented -- one of the earlier applications, I don't remember which one -- no, actually, Calvert Cliffs -- was much more focused on component by component, system by system, so there were a lot of programs there, many more numerically, while for Oconee they were grouped into, you know, generic programs. So there are less in those.

But I think it would be good for us as we go forth in our review to understand the situation with the one-time inspections.

MR. SOLORIO: Okay. In this first column here, what I've tried to do is represent how these systems would be grouped in GALL. So that's why you see the groupings. That's what they are there. And then, to the right, I go across trying to label the individual systems.

I also want to caution anyone near license renewal that we're not saying that all of these systems are only inspected one time for aging. In fact, the majority of the cases there's an existing aging management program also looking at these systems. It's just a particular aspect that they chose to do a one-time inspection for.

I also want to add that GALL has consistently applied the lessons learned of Calvert and Oconee regarding one-time inspections. In fact, for these two plants, one-time inspections were incorporated into GALL, when appropriate, as a starting point back in '99.

In developing GALL we also had the experience of the national laboratories in helping us capture these one-time inspections and gained from their experience. And staff associated with the first license renewal reviews were involved in reviewing these one-time inspections that were incorporated into GALL.

GALL also had the benefit of two public -- two rounds of public comments, and the frequent outcome of public's participation in the GALL now specifies a plant-specific aging management program be proposed where Calvert or Oconee might have done a one-time inspection, to provide flexibility in case a licensee is already doing something as an existing program. That's really all we need.

A plant-specific aging management program could be a one-time inspection or an ongoing program. At a glance, there appear to be differences in the number of one-time inspections here on this viewgraph between GALL, Calvert, and Oconee. But there are a number of reasons to explain these differences.

First, there are plant-specific reasons, like Oconee has several features which were a little too unique to be included in GALL, and obviously were not applicable to Calvert, like the dam emergency power source and the safe shutdown facility structure, kind of some of the stuff I put down here.

MR. GRIMES: If I could, I'd like to clarify that dam emergency power supports as a hydroelectric dam.

(Laughter.)

It's spelled a little differently.

(Laughter.)

MR. SOLORIO: I apologize. Maybe the Oconee project manager would want to make that point.

Second, in many cases Calvert proposed one-time inspections without being asked by the staff. I mean, it was just part of their application when it walked in the door.

Third, different names are used for some of the systems performing the same functions, like I know you'll never guess this, but LPSW and HPSW at Oconee mean fire protection.

Now I'd like to go over a few examples on this viewgraph to explain a little more detail what I have here. Starting at the top with the reactor coolant system-SBP -- that's small-bore piping -- all three require a one-time inspection. Moving on to reactor vessel internals -- can you all hear me okay? I'm not sure if I'm -- this mike is doing funny things.

For reactor vessel internals, because of component design, the staff required a one-time inspection for certain components at Calvert but did not for Oconee because of differences in component design. GALL requires a plant-specific evaluation of certain reactor vessel internals.

For steam generators, Calvert proposed a comprehensive program that included inspections of steam generator tube supports. Oconee, having a different steam generator design, having an existing steam generator program also, but proposed one-time inspections for some of its supports due to gamma radiation concerns. GALL requires a plant-specific evaluation.

Moving on to the pressurizer, Calvert is conducting a one-time inspection of susceptible cladding locations, and so is Oconee. GALL requires a plant-specific evaluation.

Those are all of the examples I have to go over, but, of course, you can ask more questions. But I want to conclude by saying GALL has consistently applied the lessons learned at Calvert and Oconee to adequately cover the subject of one-time inspections. While there appear to be some differences between Calvert, Oconee, and GALL, the differences were due to a plant-specific nature.

MR. GRIMES: I would like to add to that the most recent experience that we had with Arkansas I think emphasized the plant uniquenesses and the variability, because even on the first item where we were consistent between Calvert, Oconee, and GALL, on small-bore piping, for Arkansas it was inherent in their risk-informed in-service inspection program. And so it does not appear as a one-time inspection or even a separate issue. It was embodied in our conclusions relative to aging effects for the affected piping.

So as we went back and reflected on

this, I derived considerable comfort from the relative consistency we see across this, because it seems to be easily explained in terms of the plant-specific differences and also the different approaches that the individual utilities took to address specific aspects of applicable aging effects.

MR. SOLORIO: And just for anyone who might not have noticed, on the next page I have a legend there so you can make sense of all of that, because there's a lot.

CHAIRMAN BONACA: Yes. I wasn't able to read it all, but that's okay. One of the reasons why I asked that question was because we discussed, you know, for other applications and for Arkansas. I have some questions regarding the project, and the projects that -- you know, I am not familiar about the other plants. I think that will be valuable information to convey to reviewers, because the -- you learn a lot about other applications.

And then, for example, your logic for excluding this mobile piping from Arkansas as a one-time inspection escaped me. For the first time now I understood that. So that is important information that I think is good to keep in mind as we go forth in reviews.

MR. SOLORIO: But the explanation that Chris gave you for Arkansas I'm sure would be included in their SER. It's just probably hidden. One of the things I found in going through Oconee's was it was very hard to find an Oconee system like the Calvert system, or an Oconee system like a GALL system, because Oconee had -- you know, they don't call their CVCS CVCS. They call it something else. So that does make it difficult.

MR. GRIMES: We're challenged to try and come up with generic ways to explain license renewal in a plant-specific environment. There again, that's something that's not unique to license renewal. I think every safety evaluation is challenged to try and describe a safety evaluation basis for an individual plant in plain language. We're still learning how to do that.

CHAIRMAN BONACA: I just have a question regarding this table, the last one that you took out. You put it away so quickly. There's nothing wrong with it, right?

MR. SOLORIO: Oh, no, no.

CHAIRMAN BONACA: I just wanted to ask you a question.

MR. BARTON: What's a depressing air system? Is that one that needs psychiatric help or what?

(Laughter.)

MR. SOLORIO: It has to do with their -- I'm not sure what the right term -- their emergency power source, which is the dam. And I don't know any more particulars, but it's for that system, for the --

MR. BARTON: It's called a depressing air system?

MR. SOLORIO: Depressing air.

MR. BARTON: Okay.

CHAIRMAN BONACA: It's depressing for the people who read it. But anyway --

(Laughter.)

What about the -- why some of them are in bold letters and some are --

MR. SOLORIO: So you've got differences between A, B -- you know, when a new -- when I start a new letter, I do bold so I can quickly look through it and figure out where A or B was or --

CHAIRMAN BONACA: Okay. Thank you. Any other questions for Mr. Solorio?

MR. SOLORIO: Thanks.

CHAIRMAN BONACA: Thank you.

MR. GRIMES: And I am compelled to point out that license renewal is right on time again. We are right on schedule.

CHAIRMAN BONACA: This is remarkable.

MR. GRIMES: That completes the staff's presentation. But before I conclude, the next agenda item is for NEI to describe the work that they've done to revise NEI 95-10.

MR. WALTERS: Good morning. My name is Doug Walters with Nuclear Energy Institute. I do have copies of my presentation. I'm not sure I have enough for people in the audience, but I wanted to chat with you today about the changes we're making to NEI 95-10, Rev. 3. Of course, it is the guidance for implementing the license renewal rule.

A couple of key elements to the guidance. First is I put up here including a reference to the GALL Report. Let me just spend a minute on that. We haven't completed all that work. As has been mentioned in previous presentations, we have a demonstration program that's underway. We have the Class -- we call it the Class of 2002, the applicants we expect to submit in 2002, working on a project that encompasses how they think they would use GALL in preparing their application.

Our schedule for that is to get some information to the staff by the end of April, and then have some dialogue with them, ultimately moving towards some agreements I think by -- in the June timeframe. And then at some point thereafter we would go back and update our guidance as we think we need to to reflect what comes out of that demonstration program.

So there are a number of changes actually that were identified that we need to make to NEI 95-10 that we deferred to this demonstration program.

The other key element of our guidance, though, is the standard application format and content, and that's in Chapter VI. It follows the format and content, or certainly the format in terms of table of contents of the standard review plan, and that's kind of where we see all this heading is that an application would probably reflect what you see in those tables in the standard review plan. And so we've got the standard application and format in our guidance.

A third key element, I believe, is what we call Appendix -- it's Appendix B to our document, but it's a table of components and commodity groups that are subject to an aging management review, and that's a good tool certainly for doing the screening once you've done scoping.

MR. BARTON: Can I ask you a question on Appendix B?

MR. WALTERS: Yes.

MR. BARTON: Going down the list of categories --

MR. WALTERS: Yes.

MR. BARTON: -- under "Structures," you have an intake canal. How do I inspect the Delaware River?

MR. WALTERS: How do I what?

MR. BARTON: What do I do with the Delaware River?

MR. WALTERS: I don't know.

MR. BARTON: That's my intake canal. What's included in the scope of this? You know, Cooper is on the Missouri River. What's the component that I do something with here?

MR. WALTERS: It's a structure, and it's -- I mean, in my way of thinking, it's the intake structure that sits at the river or whatever it is, where you --

MR. BARTON: So you're talking about the intake structure.

MR. WALTERS: Yes.

MR. BARTON: How about the -- what's included in the intake structure?

MR. GRIMES: Let me attempt to explain. Our expectation is each plant knows what it relies on in the way of the structural elements, in order to achieve the intended function, and so the guidance that we've given to the staff is to focus on intended function.

If they've got a pipe that extends out into the middle of the river that's important to be able to draw water from a particular place at the point of the intake, then that would be revealed in the definition of the structure that's relied on to achieve the function.

I appreciate the question because --

MR. BARTON: I mean, it's so generic, Chris, that you -- you know, intake canal, you know, does it include a tunnel? Does it include the discharge portion of the structure?

MR. GRIMES: It may. The answer is it may.

MR. BARTON: It may.

MR. GRIMES: And what we -- and what we struggle with is if we're too specific and too precise in trying to define the boundaries, then what we do is we abrogate the responsibility for the individual plant to go through and identify where -- what the boundaries are.

At South Texas, they've got a very elaborate canal system. I would expect them to go out and, you know, go all the way to the end of the structure that's associated with being able to draw on the heat sink. But there we felt that we did not -- we didn't want to be so specific as to relieve the individual applicants from exercising their responsibility to find the extent of the structure.

And that's the -- the constant struggle that we had was give them enough guidance to know what the right thing to do is, but don't give them so much that you -- you know, you've gotten too focused and missed the point.

MR. BARTON: Okay. I understand what --

MR. WALTERS: Good explanation. And I would add to that that I think you need to look at the guidance in total. We do have language in Section 4 that talks about establishing the boundaries, and the expectation is that even though you identify it as intake structure you've got to go back and do that evaluation boundary review and identify what you mean by the intake structure.

MR. BARTON: Okay.

MR. WALTERS: Revision 3, I'll be brief on this. This is Revision 3 as we submitted it in -- I guess we submitted it in February. Again, we included this reference to GALL. We did add the PRA summary report and the EOPs to the table of potential information sources, but I will tell you we don't agree with that. We think those are beyond design basis, shouldn't be on the table, but the fact that the staff was going to include them in their guidance, it just made sense I guess for us to go ahead and include it.

We modified the table that Mr. Barton was just referring to. We've added -- I think in the electrical area, we've made some minor adjustments, and we have incorporated selected references. What that means is that you may be aware that over the last probably two or three years we've been working with the staff on a number of issues; fuses comes to mind.

And what we did is we actually created an Appendix C to the document, and we've included the letters from the staff back to the industry, so that the user of the document doesn't, you know, get confused if you will about, well, what was the staff position on that particular issue? And we've only included a couple of those, the ones that we thought were most significant, like fuses and consumables.

CHAIRMAN BONACA: Let me just make a comment about bullet number two. In part, we contributed to that, and we didn't intend to create any change to the rule.

MR. WALTERS: I understand.

CHAIRMAN BONACA: If that was the case, we recommended that. But I thought it was more in terms of -- well, I'll give you an example. We questioned for Arkansas the fact that the reactor vessel level measurement system is not in the scope.

Now, they presented some reasons which had to do with the fact that it is not used in any accident analysis, and so, therefore, it wasn't part of that. And also, this is under the Appendix B program. We accepted that answer.

But you may have an EOP that depends very importantly for some reason on that piece of instrumentation. And I think that it's only prudent for the applicant to look at it and see if it sees that, you know, clearly that -- the reactor vessel level measurement system cannot have any other function than a safety function. It is not defined as such maybe in 50.54.

But the applicant may consider it important enough because it relies so uniquely on that for some reason, okay, that the UP points out as an element that they would like to keep in. It doesn't change the rule, but I think --

MR. WALTERS: I understand.

CHAIRMAN BONACA: -- it's only prudent. That was the only intent. And, in fact, I think the -- even the table right now in the SRP is non-prescriptive. It says simply document that should be reviewed for --

MR. WALTERS: Correct.

CHAIRMAN BONACA: So --

MR. WALTERS: I agree. Mr. Solorio alluded to the fact that we may have additional changes, and I've identified at least the ones we -- we would intend to submit as -- as enhancements, if you will, to Revision 3.

He talked about the drawings. This is an issue of licensees typically send in colored -- marked up drawings in color. They need to be -- the color scheme needs to be such that if a member of the public wants to print it in black and white you don't lose the meaning on the drawings. So we've got guidance to address that issue.

We're looking at guidance to reflect when an aging effect really requires management, but I think, frankly, with what we're doing in the area of GALL this may go away. This was something that the industry felt they wanted to do, we needed to do, to be clear on when an aging effect requires management.

You've heard the words either it's plausible, significant, whatever. We wanted to try to put together some guidance to further define what those terms mean.

We included the SAMGs as potential information sources, and I would add that for the SAMGs or for that table in general, the 3.1-1 table that's got the potential information sources, we did put some text up front in Section 3 that reflects how we think that table ought to be used. And it kind of gets to your point, Chairman.

And, again, we've added some additional selected references. In this particular case, it's only one and it was the letter that we got from the staff on the use of FERC maintenance and inspection programs on dams, as an aging management program for dams.

In conclusion, on 95-10, we think certainly there would be changes needed in the future to reflect the lessons learned from this -- the GALL demonstration, and certainly our goal is to continue to have the NRC endorse it without exception.

And that's all I really had on 95-10. I don't know if there's -- if you have any questions.

MR. BARTON: Yes. On your table 6.2-1, other plant-specific TLAAs --

MR. WALTERS: Yes.

MR. BARTON: -- you've got Appendix B and Appendix C as optional. Why optional? Is there a reason for why that's not --

MR. WALTERS: Appendix B I think is the programs appendix.

MR. BARTON: Right.

MR. WALTERS: And we're probably going to change that to not be optional. We're probably -- based on the -- that's one that is in the category of deferred until GALL demonstration is completed, because we need a repository for where we describe programs.

MR. BARTON: Right.

MR. WALTERS: But if it's credited in GALL, where does that show up? Should it be in the appendix, or is it up front where you talk about the component and the aging and you just say, "I have a program, boric acid corrosion, for example, and it meets the description of the program in GALL." So that's one that's deferred.

MR. BARTON: Okay. The other one is commodity groups.

MR. WALTERS: That's Appendix C.

MR. BARTON: Appendix C, yes.

MR. WALTERS: Right. Same issue. We need to see how we use commodities in the -- when we do the GALL work.

MR. BARTON: So it may or may not be optional.

MR. WALTERS: It may or may not be optional. It may come out all together.

MR. BARTON: Okay.

MR. GRIMES: Doug, if I could -- this is Chris Grimes. If I could ask, I think it might be helpful for the subcommittee if you were to describe what you consider to be the success expectation of the demonstration project.

MR. WALTERS: Okay. Well, what we expect is a couple of things, and let me say that there's one thing we don't expect. I think the work that a licensee is required to do per the rule to prepare and submit an application is not going to change significantly. It's still appropriate for the licensee to go back and look at components, materials, environments, do the aging management reviews.

The benefit, though, of GALL is when we get into the programs, and we look at existing programs that manage aging. And what we envision GALL to provide is the one-time evaluation by the staff of that program, and then we can say, you know, does it need to be looked at again?

And so it's a packaging issue, I think, in part for us. Once we do all this work on site, how can we now package it so that we're not describing the boric acid corrosion program every time we use it.

And I think for us success will be that we see an application that's kind of formatted like the SRP tables, and that if it's a program that's evaluated in GALL and no further evaluation is necessary, that's all we need to say. We don't go into any detail on the program.

Success will be understanding what level of detail we need to go into if it's a new program. Success will be understanding the level of detail we need to go into if it's a program that's evaluated in GALL. But maybe the way I implement it at my plant doesn't quite match the evaluation in GALL, and how do I write that up.

I think the biggest test or the success for us will be how quickly whatever we come up with gets through the review process by the staff and how many RAIs do we get. And so -- and as you may be aware, we're working with the staff in the RAI area. We've done some cataloging of the RAIs that were issued for ANO and Hatch, and we are going to continue to do that with subsequent reviews to see, you know, how are we doing, what are they accomplishing. Well, we have different categories, etcetera, etcetera, but I won't get into that.

But I think the -- you know, what we're looking for is preparing an application that gets through a review in a reasonable time with minimal RAIs. And I want to emphasize when I say that that that doesn't mean we're looking to reduce what we need to do as an industry, or as an individual licensee, to prepare the application. It's just that we now have these lessons learned, and we ought to be able to package the application in a way that gets through the process in a fairly timely manner.

CHAIRMAN BONACA: On the other hand, I agree with everything you said, but my -- I feel almost an urge to have the finalization of this document so we can begin to see some more standard formats coming in. And, essentially, that minimizes demonstration phase because if you commit to a GALL program, I mean, then you have no further need of explaining it.

But, for example, the issue of only listing in an application the results of the scoping/screening, rather than scoping as we saw for the first applications and then the screening and the outcome, that, to me, is one that generates RAIs rather than eliminate RAIs, because there is no way that the license -- the reviewer can effectively do his job without understanding where you started from.

So isn't it counterproductive not to have the initial list of the scoping as the first applicants did, and then the screening process by which you -- you don't even have to have an outcome. I mean, that goes into the FSAR addendum anyway.

MR. WALTERS: Well, our position on that is -- and I think it was stated -- the rule requires the licensee to provide the methodology. The discussion we've had -- the ongoing discussion with the staff is review the methodology, be comfortable with the methodology, and then the resulting list should not be too much of an issue.

There's no question that the applicant will have the list, but what we -- you know, we'd like to do is have the staff focus on the methodology. And once they're comfortable with that -- in fact, that's what they did on Calvert Cliffs. I mean, they looked at the methodology. They even wrote an SER. And so the resulting list you would I think conclude is probably the right list.

But we'll continue to work with the staff on that. I recognize that scoping is a bit of an issue, and I think -- I probably should know this. I believe what we've got in our guidance now is a suggestion that you, in fact, provide the list.

CHAIRMAN BONACA: I think -- you know, I think if the licensees can get over it, I mean, I think in the long run -- because, I mean, there are so many ways to skin the cat at the beginning when you do the scopings. The methodology is generally going to be acceptable.

If you look at the application we're going to see tomorrow, it's acceptable, but it doesn't provide the level of detail we saw for Arkansas, for example, where before Arkansas they had a quality program that was already founded on the questions of 50.54.

So in there you had an easy match, and you could progress through. For Hatch you couldn't do that. So it leaves, still, the reviewer in a quandary, and it forces the licensee to answer a lot of questions. And most of all it leaves a third party, like the ACRS, with a question that says, since there are so many questions, so many exceptions when the answer comes, you know, are we really confident about adequate assurance that the scoping is correct?

I mean, I'm sure that the work is okay, but you are left with a --

MR. WALTERS: I understand.

CHAIRMAN BONACA: -- sample it by yourself as a -- and I view myself as a member of the public in that sense.

MR. WALTERS: I understand. And, like I said, I think we'll -- you know, we'll continue to work with the staff, but the fact is that the rule doesn't require it, and we ought to be focusing -- I mean, it seems to me that -- and I'm not convinced that the number of RAIs would be reduced. If you get the whole list, it's still the negative review or proving the negative that is the test.

So you provide the whole list. Now, why did you include these five systems that -- so I'm not convinced that -- and, frankly, I don't -- I'm not sure that we ought to be saying a good test here is the number of RAIs. But the rule doesn't require it. We're trying to get the staff to focus on the methodology, and we think that the list that flows from the methodology should provide reasonable assurance that everything was caught.

MEMBER LEITCH: Doug, could you say another word or two about the demonstration project that is scheduled? Who are the participants? What are you trying to do there?

MR. WALTERS: Yes. The schedule is -- well, let me start with the participants are -- really, it's the Class of '02. And I don't have that list in front of me. I'm sorry.

MEMBER LEITCH: But it's those that are in the --

MR. WALTERS: They are participating now -- some are participating in more -- in more of the activities than others. But our goal is to make sure that that -- that the Class of '02 is satisfied with where we're headed, because the -- I think the agreement we have with the staff is that's really the -- where GALL will be applied is on those applications.

What we've done is we've taken a -- we made up a list of systems, structures, and components, and then programs, and we're going to work the combination of those in a number of different ways. One, we'll look at programs that are already evaluated in GALL where -- and let me caveat this by saying all this work is -- is real in the sense that, you know, the participants are using their programs. This is what they intend to put in their application. I mean, this is application work in progress.

So we'll look at a program that's evaluated in GALL where the applicant thinks, yes, I match the evaluation that's in GALL, and we'll write an application section. There will be other programs where the applicant feels that the program evaluation -- their program is the same program that's evaluated in GALL, but maybe there's kind of a mismatch in terms of how they implemented their program and the evaluation in GALL.

For example, GALL might say you have a monitoring and trending provision in that program, and this particular applicant does not have that. We're going to show how we would write that up. We feel like we would need to address that particular attribute for that particular plant.

Then, the third thing would be a new program or an inspection, not in GALL. We think we need to do it. We'd show how we would write that up. So, in essence, what we plan to give to the staff by the end of April are application sections that show these three -- these three scenarios, if you will.

What we need to work out with the staff is there are a lot of other things we're going to have available. For example, how do you treat an aging effect that's identified in Gall that you don't think you have or doesn't apply to your plant? How do you treat an aging effect that's not in GALL that you think is in your plant?

And we talked about that. I mean, we have an obligation to -- you know, to put those in the application. So we're going to try to test all of those different possible scenarios, give that to the staff, and then I'm not sure that we've -- we've come to agreement on whether they would actually sit down and write RAIs, which would be helpful, or whether we'll have some dialogue up front and then repackage the demo work, send it back in and then get RAIs.

But at the end of the day what we expect to walk away with is an understanding of what an application looks like using GALL and the -- and I would say actually using the SRP, because the SRP is the document that the staff will use. And we've had this discussion with the staff, that GALL is not a scoping document, etcetera, etcetera.

So we will use GALL, but it's really, you know, the SRP and GALL that we're looking at. And at the end of the day, what we hope to end up with is an understanding of how an application looks using, you know, GALL and the SRP. And then, you know, the applicants go off and finish their work and submit the applications that, you know, reflect whatever we come up with in talking to the staff.

So --

MR. GRIMES: This is Chris Grimes. If I could add to that and clarify, first of all, with respect to -- Doug commented that the Class of '02 is the first group for which GALL is going to apply. We intend to use GALL for the Class of '01, but the Class of '01 -- the plants that are coming in in June and July, their applications are essentially complete. They're going through peer reviews. They're prepping -- they're packaging the shipments to send them in.

That does not mean that there is less urgency in terms of keeping to the aggressive schedule to complete GALL, SRP, and reg. guide for the Class of '01. The Class of '02 is in the process right now of figuring out how to package the application. So they are the first customers of the maximum benefits of this guidance.

My expectation is that at the conclusion of whatever we agree is an appropriate demonstration effort, that we will not only be able to identify ways to improve the guidance on the contents of the application, but we would also be able to provide guidance in the standard review plan and in the inspection guidance that explains how to treat these commitments in an application relative to conformance with the GALL Report.

So I would expect to be able to expand on the guidance to the staff in terms of what is -- what does it mean when they say, "We meet the GALL Report"? How far does that go? How is that supposed to be tested in a safety evaluation?

And then, also, we need to provide collateral explanations to the inspectors in terms of how to inspect the validity of the contents of the application in terms of how GALL is referenced. So I would expect it to complete -- a complete success for the demonstration project will be revisions that we would bring to the committee and say, "This is what we're going to do to enhance the guidance to make sure that we will all get the maximum benefit out of this catalogue."

MEMBER LEITCH: But isn't what you're developing essentially a more finely divided pseudo GALL Report? In other words, what I'm saying is suppose that half the plants in the Class of '02 have some deviation from the GALL Report. Then, I guess wouldn't you really like to see a GALL section that applies to that half of the plants, and say, "This is an acceptable approach"?

MR. WALTERS: Sure. We would. I don't know -- I think we would, and I think that's certainly something that may come out of the demo. But certainly we would be looking for, I guess as the Class of '01 and '02 go through the process --

MEMBER LEITCH: I mean, if there's just one plant that's an outlier, that --

MR. WALTERS: That's different. Right.

MEMBER LEITCH: -- do it on a plant-specific basis. But perhaps you identify --

MR. WALTERS: That's right.

MEMBER LEITCH: -- the plants --

MR. WALTERS: And I think we've understood that from day one on this, that I think the staff acknowledged that. And as we go through the process, we might find that we missed something, or, hey, everybody is taking credit for this program. We don't have that in GALL. Maybe we need to put that in GALL.

So we will be looking for those. Yes, that's a very good point.

MR. LEE: This is Sam Lee. I guess one of the presentations you heard earlier today was on the buried piping program. That's a good example where we have one program in GALL, but it turns out the -- I guess the first couple applicants, they actually developed something quite different. Okay? But it's quite generic, so we say, "Okay. That looks like a generic program. That's acceptable to staff." We actually added that in GALL.

And so I -- I foresee this process will continue. As we learn more, we will put more programs together.

MEMBER LEITCH: That's good. Thank you.

CHAIRMAN BONACA: I'd like maybe a judgment. Are we ready to finalize GALL and the SRP? I understand there is still some negotiation going on, but that will go on forever it seems to me.

(Laughter.)

MR. WALTERS: Yes. I believe we are ready. We're focusing a lot on open issues, which, you know, we identified five and there may be some others. But the flip side of that is there's an awful lot that's been agreed upon. We're anxious to get -- you know, get moving on using GALL. We're going to have issues that come up -- the small-bore pipe issue, for example. We need to continue to work on that.

But, yes, we're ready to go. We think

it's the right thing to do at this point. And let me just say that I think while we do have differences -- and we both -- you know, the industry feels pretty strongly about some of these open issues, very strongly, probably more from a process standpoint or a regulatory standpoint than a technical standpoint.

However, I think that the process we used -- you know, the staff developing GALL, the opportunity for the industry to get together, the frequent meetings we've had, has been a big success in our view. It's worked very well. You know, we've had good meetings with the staff. We've gotten a lot of good insights from them, from the labs that they used.

And so I think, you know, based on all of that, we're ready to move. I think we're very comfortable with where we are.

CHAIRMAN BONACA: Is it your -- you said that you will comment on that, too.

MR. GRIMES: That's correct. If this is the appropriate time, I would say that I agree entirely with what Mr. Walters has characterized as where we are in the process. We afforded -- we know that the industry feels very strongly about the specific issues that are identified for future dialogue.

We feel very strongly, too, and we afforded the industry an opportunity to say let's stop the process right here and take these issues through appeal. And the industry agreed that this was something for which -- this isn't make it or break it; we'll keep talking.

And so we -- and I also want to echo what Doug explained as there has been a substantial amount of agreement in terms of the resolution of comments, clarification of treatment of aging effects for which we expect to see substantial benefits in the future reviews, and we all want to start seeing those benefits as soon as we possibly can.

The sooner that the Commission approves the improved renewal guidance -- and at this point I also want to mention -- but we recognize that there are other places where we could probably improve the guidance even further. I do not want you to leave the impression that we're bringing to you a product that's good enough not to be noticed as bad.

This is a product that we believe might not be world class yet, but it certainly represents an excellent level of effort for which we can remove some more repetition, we can clarify where some of the unplugged pieces might have gone.

We covered a lot of ground with this material, and we think it's ripe for the ACRS to endorse this product for Commission approval with the same recognition that the industry has that there is still some future fine-tuning that will improve its utility and its readability and its transparency to the public.

And we'll continue to work on those lofty expectations, with an expectation that we'll be able to get there in a few years, as additional lessons are learned, and as additional feedback is provided to add to some of the detail. But we believe that the product that we have right now is good to go, and we request your endorsement.

CHAIRMAN BONACA: And I would expect that, you know, the implementation of these documents in a final form, when they're used in the field it will also help resolve some of the open issues, because, I mean, we will be testing. And without it, it's going to be open forever, because the issues are not going to be completely closed.

MR. WALTERS: One of the lessons we

learned, you know, early on when we changed the rule, we had a lot of good discussions with the staff, and they were philosophical in nature, "Here's how the rule should work." But the reality is it's not until you get a Calvert Cliffs to actually put pen to paper, and you submit it and people can exercise the process that you really, you know, identify where you need to perhaps make changes. And that's where I think we are with these guidance documents.

We've done a lot of talking. We've had a lot of good interactions. We now need to get on with the business of actually implementing it and applying them. Let's see how it goes, and then, you know, make changes as we think we need to.

CHAIRMAN BONACA: Good.

MR. GRIMES: Dr. Bonaca, I also want to point out that we've received a lot of good feedback during the meeting today as well. And there are some questions for which we owe you answers, and there are some commitments that I'm prepared to make in terms of things that we're going to put on the list for continued dialogue with the industry about future improvements to this guidance.

But we've got a fairly substantial

package here that I'm ready to take to the publisher, and we have had an extensive consistency review with both of the labs participating, in order to make sure that we've gotten as much of the editorial improvement included without doing any damage. That is, we didn't allow the latitude for folks to go in and try and do any fine-tuning during that consistency review.

But we will continue to respond to particular questions and to gather material for the next round when we go for the first revision in this guidance -- in these guidance documents.

MR. BARTON: Okay. Chris, what's your date to go to Commission with this?

MR. GRIMES: It's scheduled to be delivered to the EDO on April 23rd for delivery to the Commission by April 30th.

MR. BARTON: Okay.

MR. GRIMES: The Commission meeting is scheduled for June 16th, I believe. 14th. The 16th is a Saturday. I keep trying to get them to move it to the 16th.

CHAIRMAN BONACA: Okay. Any more questions for Mr. Walters?

MR. WALTERS: Thank you. Thank you very

much.

CHAIRMAN BONACA: Before we take a recess for lunch, in the afternoon we have the review of the BWRVIPs. But I would like to go around the table now and get -- see if there are any comments from members right now about the letter we will write. I think we should write a report on this issue.

My judgment is that we should encourage finalization of these documents at this time. I think that, you know, we already voiced in a previous letter recognition of the fact that there has been a significant effort here. This was a remarkable compendium of information in GALL, has been restructured and has been refocused, but hasn't certainly been degraded as improved probably.

The other thing that I think is remarkable, as we noted, was the level of collaboration between the industry and the staff that has made these documents quite effective. And it shows the importance that we begin to see application that makes reference to this baseline documentation which has been so substantial. And right now it's moot in the application.

So, you know, I will propose that we

will have their recommendation in a letter, and I will appreciate from members other insights on whatever else you need to see in the letter.

John, maybe you have some thoughts?

MR. BARTON: Well, Mario, from my review, I think you are going to continue to have dialogue I think until you see more applications come in. You may have to change the -- I can see where you will have to change --

CHAIRMAN BONACA: At some point.

MR. BARTON: -- the document. But I think, you know, from the work that's been done to date, I don't have any problem supporting where they -- to go forward with where they are.

MEMBER FORD: I'm coming from a lack of experience, Mario, but my main concern was the document would not be so cast in concrete that it couldn't take into account unforseen degradation. Now I understand that that is taken into account.

CHAIRMAN BONACA: Yes, it is.

MEMBER FORD: So from my lack of experience, yes, I would endorse it.

MEMBER KRESS: I would endorse it, too, Mario. I think it's going to be a continuous process of slight iterations, but I think it's at the point where we can let those take care of themselves.

CHAIRMAN BONACA: Yes, I think so.

Graham?

MEMBER LEITCH: I guess we are speaking now specifically about GALL, are we, as contrasted with the SRP and the --

CHAIRMAN BONACA: Well, the whole thing.

MEMBER LEITCH: The whole thing. Well, let me, first of all, say I have no problem endorsing GALL. It is, you know, one of those documents that's 99 percent -- maybe even a higher percentage than that -- satisfactory. And there is a few little things that are going on that still need further dialogue, and that will always be the case I think.

I mean, that will be going on for some considerable period of time. So I think it's -- the time is to endorse this and get on with it.

I do also think there are some -- if there are issues of disagreement, there are some caveats at the beginning of GALL, what GALL is and what GALL is not, that helps clarify that issue. I mean, GALL doesn't purport to be all-encompassing. There could --

CHAIRMAN BONACA: Or the only solution.

MEMBER LEITCH: -- be systems not included in GALL. Conversely, there could be systems in GALL that are not required. And it also speaks about the plant has to ensure that programs that they actually have complies with the -- is in line with the program in GALL.

So with all those upfront discussions of what GALL really is, I have no problem with endorsing it.

Similarly, I'm not sure if we're talking about the standard review plan. I guess it's, similarly, in draft form, is it not? And I think -- I guess -- yes, it is still a draft, and I think we probably need to get on with approving that draft.

And then, the last document that I believe is still in draft form is the Reg. Guide 1.188, which endorses the NEI. But I think from what I heard there is still some -- some changes proposed in the NEI document. I think the reg. guide -- I think this has to get to a point where we say, "This is" -- that is, the NEI document has to say, "This is Revision X," and then this document, the reg. guide, has to say, "We endorse Revision X."

Because I think there are still some

minor discrepancies between these two things. So I think the staff has to be clear with this reg. guide exactly what revision is being endorsed. But I think that should be pursued promptly. I don't see any reason why that can't happen right away.

MR. GRIMES: And I'd like to clarify, it is our intent to take this -- the draft regulatory guide, in its present form with its changes, along with NEI 95-10, Revision 3, in its final form. And Doug explained that they're looking at some final changes before they give us the package that we would refer to.

And Dave Solorio pointed out, we'll look at that final version to verify that they didn't make any changes that would undue our ability to endorse it without comment. But then, that whole package, along with the draft standard review plan and the draft SRP, is the package that we would intend to present to the Commission the end of April.

MEMBER LEITCH: Right. Okay.

MR. GRIMES: And we will inform you if there are any substantive changes beyond just trying to identify any typographical errors or missed connections, or things. But we don't intend on changing the substance any more than what we've described to you today.

MR. BARTON: You said the SRP and the standard review plan. Do you also mean the GALL?

MR. GRIMES: That's correct. The package consists of the regulatory guide and its connection to NEI 95-10, Revision 3, the standard review plan. And the standard review plan incorporates, by reference, GALL.

MR. BARTON: Right. Okay.

MR. GRIMES: And then, to complete the package as it's presented to the Commission, there is the NUREG report that explains the resolution of all the public comment, so that is folded in, but it is not guidance. It's part of the package.

CHAIRMAN BONACA: Bob?

MEMBER UHRIG: I support this.

CHAIRMAN BONACA: Bill?

MEMBER SHACK: No. I'm sure, you know, we'll continue to approve it, even on the small-bore piping. I like the ANO solution better than the staff's solution, and I hope everybody will take it as a precedent.

CHAIRMAN BONACA: But the process allows that right now, so --

MEMBER SHACK: But as Chris said, I mean, you really can't use this until it becomes an official document and --

CHAIRMAN BONACA: Yes. And I think we should stress the fact that what we review today, it would be -- certainly make the reviewer's job much easier if there was a more substantial referencing to establish documents of guidance, and they are missing right now.

The other thing that we -- in the interim letter we wrote, we also wrote that it would be important to update these documents frequently. They sure don't reflect experience. So there is already opportunity for incorporating changes.

Before we recess, I would like to ask one more question. First of all, are there any other issues that you would like to see reflected in the letter?

MR. GRIMES: I have a question, Dr. Bonaca. And is there anything in particular you want us to prepare to present to the full committee?

CHAIRMAN BONACA: Yes, I -- yes. We foreclose that, however, because that may be an issue. I raised the issue of scoping because it's one that I've been reviewing specifically, and I'm still somewhat concerned about, you know, the lack of transparency in some reviews when -- when -- I mean, the early applications were transparent because there was a scoping process. All the components were there. Then, there was a screening going in saying, "Well, what are the functions?" Well, the function is not required, and it doesn't belong in license renewal. And you see the outcome.

Right now, what is going to be agreed to is only the outcome, which is going to be leaving the reviewer in -- not the staff, because they have the benefit of being able to go and audit -- it's going to leave certainly a reviewer like ACRS unable to make a judgment. I mean, we have to purely make a judgment based on process and staff statements.

So do you feel that that's an issue we should bring up or not?

MEMBER SHACK: It sounds as though they made it a legal issue. You know, again, I kind of surrender when they -- when they hit me with the OGC, I give up.

(Laughter.)

CHAIRMAN BONACA: Well, I mean, still, we've got to express an opinion, you know, because I think ultimately we want to make sure that these processes by which you are licensing these plants are transparent the public. And, you know, I -- again, I view ourselves as the public in a certain way. We are coming at the end of the process. We are less informed than the staff and the applicant, and we're trying to make sense out of what is being done. So --

MEMBER SHACK: Well, it certainly sounds as though we ought to encourage them to include it.

CHAIRMAN BONACA: Well, that would be the only way would be purely that, you know, we like it better one way or the other, simply not forcing away. I mean, what is being proposed is acceptable. I realize it meets the requirements of the rule.

MEMBER KRESS: I viewed our role as auditing the process, to see that the process would result in an acceptable product. So, personally, I think it's all right to do it. You know, we've already looked at the process, and we know that the staff is diligent about following such a process. So I really don't see that it needs to be that apparent.

CHAIRMAN BONACA: Let me try -- if I put anything in, I'll just put in a paragraph, and then I'll let you guys make a judgment, and then we can decide then. It certainly will be only in terms of expressing an opinion rather than giving a recommendation at this stage.

MR. BARTON: That's a good suggestion.

CHAIRMAN BONACA: All right. Now, regarding the meeting next week, I think that we don't want to go through the specifics, but it will be interesting to have a categorization by a generic type of changes. For example, some of them were repackaging. Some of them -- and we don't need to hear about the repackaging issues.

I mean, some of them were increase focus. Okay? Some of them were minimal acceptable programs. It will be interesting to understand, you know, the category of changes and a judgment of whether you see there has been any erosion of programs or not. I guess the judgment would be that there isn't, so -- but just the categorization of those, it would be interesting to hear for the committee. And then we'll decide how much time there is for this portion here.

The other thing that -- I can maybe provide some examples, give one example for each category, so we understand what the process of the change was.

The other thing that I thought personally, and then we'll go around the table and see what other thoughts there are here, it would be to -- to talk about the one-time inspections. I know that some of the other members -- for example, Dr. Powers -- was interested in those, and I think it's important that we get an understanding of that.

And since we are going to have a presentation on Hatch on the same morning, it would be interesting to see, you know, specifically the one-time inspection for Hatch spelled out, so we can have a correlation between what we see in the morning --

MEMBER SHACK: Why don't we toss in ANO and complete --

CHAIRMAN BONACA: Well, see, but that's -- then we have an understanding how -- we understood, for example, the issue of small-bore piping.

MEMBER SHACK: But ANO is a very interesting contrast. I mean --

CHAIRMAN BONACA: Sure. I mean, but it raises questions, and there are good reasons. But I think that it would be good for the whole committee to hear it and to see the reasons why we're going from so many to so little. It doesn't mean that we are not doing it. It means that something else is taking care of that, particularly the ISI for the small-bore piping, which is risk-informed.

Any other issues you feel that we should --

MEMBER SHACK: Well, I think they ought to discuss the open issues.

CHAIRMAN BONACA: Yes.

MEMBER SHACK: Clarify those and flag those out. Again, there has to be some emphasis on the perspective here. You know, you have open issues, but, you know, really, you have resolved so much.

CHAIRMAN BONACA: And, of course, you want to communicate your recommendation that we recommend finalization of the documents.

Anything else? If not, then we'll take a recess for lunch. We'll meet again at 20 after 1:00.

(Whereupon, at 12:21 p.m., the proceedings in the foregoing matter went off the record for a lunch break.)

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

(1:18 p.m.)

CHAIRMAN BONACA: We are resuming now with the BWRVIP reports and their applicability to license renewal. With that, I pass it to Mr. Carpenter.

MR. CARPENTER: Yes, sir. I'm Gene Carpenter. I'm with the Materials and Chemical Engineering Branch, and I'll be talking to you today about the BWRVIP reviews for license renewal.

The agenda that I'll be following is an overview of the BWRVIP program, which will be basically given by Robin Dyle of the Southern Nuclear/BWRVIP Assessment Chairman. Then I'll be talking about the staff's review of the BWRVIP reports with some overview of the current operating period, the generic aging management plan that we have looked at, the reports supporting the BWRVIP generic aging management program, and I'll be giving some specific examples of those, and then I'll be going to the conclusions.

Staff's perspective -- BWRVIP is a voluntary industry initiative that began in 1994 to address the Generic Letter 94-03, core shroud cracking issues. As you may recall, we briefed the

ACRS on this some years ago about this issue and talked to you about it at that time.

Since then, it has grown to address all BWR internal components, reactor vessel, and Class I piping. It also covers the current operating term and the extended operating period, and it is proactively addressing aging degradation issues that are beyond regulatory requirements.

The staff has been reviewing the BWRVIP submittals, and that includes some 15 inspection flaw evaluation guidelines, which I'll be going over in some detail today; 13 repair and replacement design criteria guidelines; four crack growth and mitigation guidelines; 22 other supporting reports; and 12 license renewal appendices.

Now, point of information -- although there are 15 inspection flaw evaluation guidelines, three of them are subsumed into two others, so that is -- that takes care of that, and then with the 12 license renewal appendices it makes up the aging management program.

The staff expects to finish the reviews of these documents listed by the end of this year, and this is, of course, dependent upon timeliness and technical review adequacies.

Now, presentation is by Mr. Dyle. He's going to go over some of this. He's, as I said, the Technical Chair of the Assessment Committee.

Robin?

MR. DYLE: Thank you. I appreciate the opportunity to be here. As Gene said, my name is Robin Dyle. I'm from Southern Nuclear, and I'm currently the Assessment Chairman -- Assessment Committee Chairman.

Now I have a little bit about the organization. I consulted with Dr. Shack last week to try to understand --

MEMBER SHACK: He happened to be in Oregon.

(Laughter.)

MR. DYLE: We were -- I apologize. We were at Argonne last week, and I --

MEMBER SHACK: For rest and recreation.

MR. DYLE: Yes. And the question I asked was, who on ACRS heard our presentation seven years ago, and he basically said three people. So as Gene and I talked about how to describe this and the information we thought you might need, there is some programmatic information. And what I'd like to do is explain how the program was put together, the things that went into it, so that you understand, then, the depth and the breadth of the program and how the licensees are using it.

What I am using here is a boiled-down version of a six-hour class that we teach for the licensees. So some of these slides I will simply go through, but they're there for completeness, so that you can have them to refer to later.

Please stop me as I go on with any questions you have.

CHAIRMAN BONACA: Yes. At some point, whenever it's convenient, it would be probably good for us to have, if you have a little schematic -- and I think you do have it -- a representation --

MR. DYLE: Yes.

CHAIRMAN BONACA: -- to give us just a brief schematic of the BWR internals, the function that some of these perform, like the shroud, and --

MR. DYLE: Top guide.

CHAIRMAN BONACA: Yes. And then the location of cracks that have been experienced to date, and also -- the other thing which is important to understand is not all kinds of cracks will cause safety consequences.

MR. DYLE: Right.

CHAIRMAN BONACA: A few, however, have safety implications, and you could point to us which ones really -- you know, briefly, just so that we get an overview --

MR. DYLE: Okay.

CHAIRMAN BONACA: -- and I would see it as a cap to the whole package of the BWRVIP.

MR. DYLE: Okay.

CHAIRMAN BONACA: It will help us.

MR. DYLE: When I get to the point of doing the detailed discussion, I'll -- if I forget, stop and remind me and see if there's anything else that I failed to address.

CHAIRMAN BONACA: Okay.

MR. DYLE: Because I'm going to try to do a broad overview, and then I've got several components that we talk about in more detail, so you can see how the program is put together.

I'd also like to mention that Mr. Bob Carter is here sitting at the table. He is the EPRI task manager who has handled this program from an assessment standpoint since we began this effort. And we've got some of the I&E documents. Should you ask a question that we don't have in the presentation, we'll have that available.

As I mentioned, the purpose of the presentation is to give you kind of an overview of where the VIP came from, look at the scope of the program and how and why we selected the components we did, because all the internals are not in there, and there's a reason for that.

We need to identify the attributes that ought to be part of, you know, what a plant does to make sure they do the things that are appropriate, and this would apply to license renewal. And then we'll talk about some of the guidelines.

And the detailed review that I have planned based on input from Gene was the flaw evaluation guidelines for the shroud, the jet pump, the top guide, and then a discussion of what we've done recently on IGSCC related to piping in the recirc. loop. So that will be the presentation.

From a historical perspective, back in the 1980s, IGSCC and piping was an issue. We were concerned with it. And we recognized that it could potentially affect internals and started working on that in the owners group.

The shroud cracking that occurred in '93 and '94 provided additional evidence that we needed to address internals cracking in IGSCC. So, in

1994, the utility executives recognized that it was a big enough issue that they separated this issue from the owners group and formed the VIP as a stand-alone committee that would focus on the internals. So that was the purpose of this organization.

And here's the executive guidance that we had. We're to lead the industry toward a proactive generic solution. And what we did with that was one of the things that Bill Russell actually said he thought was a good thing we had done was we set aside the licensing arguments. We made no licensing arguments in the VIP. We did the technical thing first, described what the problem was, what the solution would be, and then after the fact tried to figure out how that fit into the licensing arena. So we were trying to do the right thing for the right reasons.

The other thing was to have options. Because we were looking at new things, we wanted a cost-effective approach. There might be one thing that one utility would want to do and another that a separate utility would like to do. But both were equally adequate in addressing the safety issue, so we tried to build that into the program.

We also served as the focal point to

interact with the staff, and that has worked well.

And the last item is that we share information among the members. We've got the program set up so that periodically all the inspection information is funnelled back to the members. It's also given to the staff, so that we can keep this program a living program. If something new happens that we didn't anticipate, that's the vehicle to find out about it and modify the program as we go forward.

From a dollar standpoint, here is the issue. If you look -- and that doesn't come out very well in the colors. I apologize. But in the early '80s, this loss of capacity due to pipe cracking was a big issue. We're talking 12, 14, 20 percent loss of capacity for the BWR fleet because of pipe cracking. We didn't want that to happen, and we've tried to manage the internals, and we think we've done so.

Here's our biggest loss of capacity related to internals cracking. So the other thing that this program did was let us manage the problem proactively, so we could continue to operate the plant safely and minimize the cost. To date, we've spent in excess of $30 million on this program of utility funds to go forward.

The next slide is a list of the domestic plants. All of the domestic plants are in the program. I won't spend a lot of time. And the next slide simply is to let you know the international members.

The benefit of this is they've done things differently. In the early days of the shroud cracking, we wanted to understand better what the weld residual stresses might be. The Japanese had actually built a shroud using their old welding procedures and then done the destructive analysis of it. So by having them be a member, we were able to share that information and build that into our approach.

So that was one of the benefits of having the international folks, and they continue to be members and provide active support.

Here is the project scope, and the scope for the VIP initially was we'll take care of the vessel and the nozzle. So from the safe end weld out, that belonged to the owners group or some other activity. We focused on where we needed to be early.

We did a safety assessment, and I'll

talk a little bit more about that in just a second, that helped us identify what needed to be done and when it needed to be done. And when it all boils out, these are the components that are included in the VIP program that are considered safety-related.

The other thing that we prepared -- and Gene mentioned those, and I did, too -- what we call I&E guidelines or inspection and flaw evaluation guidelines. There is this one, the I&E. This describes what and when to inspect, and this is done by the Assessment Committee.

You know, how is this component going to fail? Where is it going to fail? How often should I inspect it? What method should I use?

The NDE guidelines where we have the NDE experts working, they develop the qualification criteria. You know, how would you qualify a UT instrument to go down and do a shroud weld H4? So they work on that and look at the errors involved.

We develop repair guidelines because we anticipated having cracking and needs that -- where we would need to fix things. So they're done. And then mitigation hopefully offers the silver bullet for the future, to find ways to turn off the cracking through use of hydrogen water chemistry and noble metal.

Real quick, that's the organization and it's no longer current because I'm now the Technical Chairman here. But these are how we broke -- these represent the committees and the committee structure. This is how we broke the work up. And the other thing that was important was that we have an executive responsible for each section.

And you notice that we'll have an Executive Chair. Currently, Integration is open because of mergers and changes like that. We periodically have open slots. But the main thing to see is the structure, the organization, and that there is an executive leading each one of these technical committees. And that has been vital to making the program successful.

The next slide simply is a list of the Inspection Committee products or some of them, and we'll talk about a few of these. But this also gives you an overview of how we work the program together. We have the I&E guidelines, and then we have crack growth or fracture toughness reports, and they've been submitted to the staff. We've got one for stainless, one for nickel-based alloys, one for low-alloy steels. So those have been provided, and those provide additional support to the program.

Again, I'll talk about the safety assessment on the next few slides. Component configuration drawings, which we provided to the staff -- as we develop this program, we pull drawings from all available resources at GE for the as-designed structures. We save those, cut and pasted them, and put them into a document so that now each owner has a list of all the documents, has sketches that he can look to see if cracking occurs at one plant.

He can look and see what that configuration is, how it applies to his plant, and what actions he might need to take. And it's all readily available, and it's also here for the staff to use, so they can understand those same issues.

We've done some bounding assessments. This goes back as a follow-on to Generic Letter 92-01 looking at the vessel.

The effective IHSI, one of the issues that we dealt with -- and I'll talk about it when I get to the piping -- was the effectiveness of the induction heating stress improvement and how well that works in mitigating IGSCC. And it ties to the 88-01, and I'll talk about that.

Integrated surveillance -- I'll just say here that we're working on a program similar to that, I'd say, like the B&W plants have done in the past where we can get a smaller group of plants that have the right materials and integrate our overall surveillance program, so that we better understand what's going on with vessels and adjust the capsule withdrawal schedules. And that's under development right now.

The next two slides are simply a list of the I&E guidelines for these safety-related components, and I'll -- unless you have a question, I'll just go on past those.

MEMBER LEITCH: Would the nozzles be under the RPV?

MR. DYLE: Yes, sir.

MEMBER LEITCH: It seems to me there was a particular problem with the CRD return line nozzle. Was that return line eliminated in all plants? I know many of them it was.

MR. DYLE: No, sir. It was eliminated in all but two. The two BWR-2s did not cut and cap the CRD return lines. The rest of the plants did. And that's addressed in NUREG-0619 that addressed the feedwater nozzle cracking and the control rod drive return line. And then that, as it applies to license renewal, is addressed in BWRVIP 74, which is our vessel license renewal document. So that's where we brought that information forward.

MEMBER LEITCH: What are the two BWR-2s? Do you remember off hand? Is it Oyster Creek?

MR. DYLE: The BWR-2s would be Nine Mile 1 and Oyster Creek.

MEMBER LEITCH: Thanks.

MEMBER FORD: You were going at such a rate that I didn't want to stop you.

MR. DYLE: That's fine.

MEMBER FORD: Back on page 8 --

MR. DYLE: Yes, sir.

MEMBER FORD: -- you listed the components there, and I'm presuming they're going in terms of priority from the core shroud down to the RPV as the bottom priority. What was the criteria for that risk assessment?

MR. DYLE: You're a wonderful strike man. The next slide, page 14 --

MEMBER FORD: Okay.

MR. DYLE: Couldn't have timed it better. Thank you, Dr. Ford.

For years we understood that there were

some components that were safety-related and not. But when we started the VIP, we said, "Let's make sure. Let's revisit that issue. Let's go back to GE and talk about how this thing was designed and go from there."

So we said, "We're going to identify the safety-related components and separate them from the non-safety," and here's the criteria that we used when we looked at the components -- maintain a coolable geometry, rod insertion times, reactivity control, core cooling, and instrumentation availability. So all of those were considered in determining whether something was safety-related or not.

Some components, as it turned out, were not. The feedwater sparger sometimes is surprising, but it has no safety function. It disperses the water equally about the annulus, and it improves jet pump performance, but it is not relied on in any way for safe performance of the vessel or any ECCS function. So that's just an example of how we did that and how we separated those.

MEMBER KRESS: What exactly is a safety assessment, contrasted to a PRA, for example?

MR. DYLE: Oh. It was a deterministic

assessment where we looked at the failures of the components, and I have that discussed later in VIP 06. But we did a deterministic assessment, said, "What is this thing supposed to do?"

MEMBER KRESS: If it failed --

MR. DYLE: If it fails, what happens? What other systems are available? And given that those systems available, what happens if it fails? And so one of the things we found -- and we determined this when we did the core shroud initially and did the detailed safety assessment that Dr. Hackett and I presented years ago.

But when you looked at the core spray, every scenario -- or the core shroud, every scenario said, "We need the core spray." And if the core spray failed, what else did we need?

So that's part of what, then, Peter, led us to, how do we prioritize these things? And the core shroud kept coming up on top. Every time we assumed a component failed, that was it. And that's the way we approached these things.

We just said, "What happens if it fails? Where can it fail?" and did the assessment from that perspective.

Any other questions?

MEMBER FORD: But a frequency of events in the past didn't enter into this particular --

MR. DYLE: Not per se. We did look at inspection history to try to figure out what the nature of the cracking was. Core spray was one of those things that we had had lots of inspections and repeated instances of cracking. So we knew that it was also something that we needed to look at quick.

We relied on it in a lot of scenarios, and it was one that was degraded to the point early on that we found cracking. In fact, the staff wrote a bulletin on it in 1980 requiring visual inspections every outage. So we have been inspecting the core spray lines and spargers since 1980 every outage. So that's an example.

CHAIRMAN BONACA: I think the issue of frequency is important when it comes down to mitigation. In some cases, for example -- I don't know. I was looking at top guide. There is some fragile mode where you may end up with core movement, inability of inserting rods. You know, for that particular case, there is a statement that says, "If that happens, you know, there is the SLC." Granted. But SLC is not supposed to be needed more than with a certain frequency in the original design of the plant.

And so it leaves you a little bit with the question of how likely is this failure mode to occur now because of the cracking beginning to take place, which is the answer that there is mitigation. I don't think, in and of itself, it is enough.

MR. DYLE: Well, and I understand your question, and I think the answer is is when we did the safety assessment it let us know what was safety-related and what the consequences of a failure were, which we then rolled into consideration of which components do we look at first as far as developing a program, and then it also led us to decide what needed to be inspected and how often and what method.

CHAIRMAN BONACA: So that really was focusing -- okay, so there was a consideration. The main focus was the prioritization of the efforts because of the significance.

MR. DYLE: Right. One of the questions the staff asked initially when the core shroud failures and cracking started to occur was, why are the plants safe to continue to operate? And we felt this was the degree necessary to evaluate that, so we looked at all of the components.

So that's been done, and we've built that into these inspection and evaluation documents, which I guess leads into this.

As far as what's in an I&E guideline, this is it. Each one of them has a description of the component. We look at the susceptibility of the IGSCC, discussion of failure consequences of each location, and we tried to identify every location on an individual component where it might fail and said, "What happens if it does that?"

We looked at the inspection history, and then from that we develop inspection requirements and flaw evaluation methods, and it also talks about how to report the information.

MEMBER KRESS: Could you give me an example of a consequence, the third bullet?

MR. DYLE: Yes. For the shroud, one of the things we considered was if you have a 360-degree flaw at the H3 weld, and then you have a main steam line break, what's the possibility that you might actually lift the whole shroud now that it's separated?

And if that occurred, what would happen? Would you lose two-thirds core height? If a jet pump disassembles, if a jet pump beam fails, and then I eject the jet pump ram's head, then I could disassemble the jet pump, and I no longer have the ability to maintain two-thirds core height.

So we have to go put together an inspection program that would preclude those kind of things, or have a monitoring program that says we do daily surveillance to do some tests to get that kind of information.

CHAIRMAN BONACA: But many of these failure modes -- that's why I had the original question in the beginning -- end up with core movement, right?

MR. DYLE: Right. They are -- and one of the questions that was asked early on, and I'll go ahead and address it now and then I'll let the staff talk about their studies, was, what are the synergistic effects? And we struggled with that, finding a way to do that evaluation and spend enough money.

So we did our deterministic view. Then we did a probabilistic assessment that I'll -- that was very simplified. We set the conditional failure probability of each component to one and let that help tweak, if you will, the approach in VIP 06.

And then the staff, on their own, did an independent assessment of that. I believe one of the labs did the work, and I'd leave that to the staff to discuss the results of that.

As far as the description of the components -- again, we have sketches, we have locations labeled, general plant variations. So if you've looked at the -- if any of you have had a chance to look at these documents, you may see four or five configurations, so that we can adequately describe what a different plant would have to do. And it's based on the best-available design information.

The onus we put on the owners is that this is the way it was designed. If you have made modifications since then, you have to look at this document, look at the requirements, and then go forward from there. So we built that in.

Just an example of configuration sketches, not to have a detailed discussion. But the double-leaf riser brace for the jet pump, there are two different types of double leaves, so that's just an example of the detail that we put in the document so you can figure out how it applies.

Susceptibility discussion -- which locations are likely to fail. They're either through IGSCC or other mechanisms like fatigue. We considered that. What are the non-susceptible locations? In those where we determined that they weren't likely to fail because of material considerations and the way that the component is built, we didn't necessarily require inspections.

But one of the things is you don't expect cast material to suffer IGSCC. At least it would occur after you've got the wrought material that's been welded. So we use those as kind of a criteria, and then all of that goes into the inspection requirements.

And I recognize I'm going quick, but this is to get you a description of the program.

And then your question about the consequences of failure. We looked at those, what happens, what's the other system responses. Locations that could fail and have no adverse safety consequences, we said, "Well, maybe we don't need to inspect those." But we did look at those anyway to see if there's other benefits for doing the inspections.

There may be economic reasons to do that. You may want to do something. We do a lot of inspection on feedwater spargers because we want the plant to continue operating. If it fails, there's no safety consequences. But we still do inspections.

At one time, I know at Plant Hatch we had three pages in a procedure that were safety-related inspections and 51 pages that were not. That's the degree that we were doing internals inspections on non-safety components, so we do a lot of things in addition to the VIP.

The other thing we looked at was inspection history. What inspections have been performed? What was the adequacy of them? If somebody had done a VT-3, and then said there was no IGSCC, we discounted that, because a VT-3 is not going to find IGSCC. It's not going to see tight flaws.

So we tried to understand what the inspection history told us. Is it appropriate data to consider? And then we used that to help guide us.

The inspection requirements list where to inspect, what's required for a baseline, what's required for reinspection, what's the reinspection frequency. Sometimes the reinspection frequency depends on the method you use to do your baseline inspection.

For example, core spray. You do an inspection of it visually. You have to do something every outage. If you use ultrasonic, we'll let you go every other outage, because you've got a better idea of what's going on with that piping. So that's an example of how we would use that.

We also specified what kind of scope expansion needed to be done if you found cracks, where would you look, what would the response be. And then, alternatives to inspection -- is there something you could do instead of inspecting? Could you modify the component that eliminates the consequence of failure?

The easiest one to think of is what we call the core plate, which is kind of a misnomer, because it's a plate in the core but the fuel doesn't sit on it, but the inspection criteria for the bolts around the periphery, so that it can carry a seismic load.

However, we allow that if an owner goes in and installs wedges around the periphery so that even if the bolts fail the core plate can't move in a seismic event, then we say you don't need to inspect the bolts because you've put something else in there that will preclude its movement and it'll still perform its intended safety function.

MR. BARTON: Has anybody done that? Or is this a hypothetical?

MR. DYLE: Yes. Yes, they have done that. In fact, in the GE design for the shroud repair, that is integral to what they do. To my knowledge, all of the plants that have installed the shroud repair in the GE design have the wedges installed. So that's been done that way.

As far as inspection methods, here's the definition of them. The EVT-1 -- well, let me start at the bottom, and maybe this -- the CSVT-1 is the old core spray visual that was required in the Bulletin 80-13. We started using that and found in some cases it wasn't adequate, and we had renamed it MVT. We finally eliminated that because it was an interim between these two and wasn't warranted.

So what we have is an enhanced VT-1, which is a visual with a 1/2-mil wire resolution of the camera before you ever start the inspection, so you've got to be able to clearly see a 1/2-mil wire. In addition to that, there is also some criteria about what you can see about the weld. There's requirements of necessity, whether you need to clean or not. But you can do appropriate examinations.

The VT-1, you have to be able to resolve a 1/32-inch wire, and this is a standard code exam with VT-3 as a general visual for mechanical condition. And, again, that comes from ASME Section 11.

And then, ultrasonic and eddy current, and we qualify those methods based on what the component needs are. And all of the details of the methods are in VIP 03, and it's in a three-inch binder that the staff has available if you need that.

Flaw evaluation considerations -- we tried to describe the procedures that are necessary, the analysis techniques, and in some cases we provided equations. And I'll address some of that later. But where we had equations that we could use and standardize, we've developed those. In one case, we've even developed a computer code to deal with that.

What kind of assumptions do you make when you can't inspect something? One of the issues on the shroud was you go inspect the circumference, but you can't get all of it inspected. What do you assume about that region you can't inspect? So we looked at statistical studies and the behavior of the materials and said, "What is the appropriate safe thing to assume, since we couldn't inspect it and factor that into the flaw evaluation?"

NDE uncertainty -- early days of the shroud the cracking was such that we were trying to do ultrasonic examinations. We hadn't qualified the techniques, and we were even using transducers on a long pole to try to get additional information. If you've got a pole that's, you know, 60-feet long, you can get a lot of flexibility. So we accounted for that in the calculations when you do a flaw evaluation.

Also, limitations on use. You know, once you exceed a certain fluence level you just can't use some of the approaches that we've got. In the crack growth rates that we describe, here's a reference to the documents for later use if you'd like to look at those. But that's where the crack growth studies are documented. And the staff has issued initial and final SEs on that.

An example of how you would use all of this -- if you don't do an inspection, and you've qualified the technique using VIP 03 and you found a flaw -- well, you know what the uncertainty of the technique is. VIP 14 has the crack growth criteria, what you'd use for stainless in certain situations, whether you want to use the K dependency or a baseline, a base disposition curve.

VIP 20 and VIP 80 -- VIP 20 is the distributed length ligament computer program that allows you to calculate the remaining ligament and what's acceptable. Vertical cracking criteria, because the cracks are oriented different, behave different. And here is the shroud inspection guidelines. All of it goes together to do the flaw evaluation.

And then, VIP 07 is the reinspection criteria. And I think I mentioned earlier, but we've rolled 01, 63, and 07 all into VIP 76. We now have one document that addresses all of it for the shroud. But that's how you'd deal with a component like that.

We want inspection guidelines. We want the information provided to the staff. And this is what we've put in the guidelines. EPRI compiles a summary and provides it to the NRC every six months. So once we finish what we call basically an outage cycle, we accumulate all the inspection information, we provide it to all our members, and then we provide it to the staff.

We've got spreadsheets that reports that. And the biggest thing for us, it lets us look at what's going on. Is the program headed in the right direction? Do we need to make changes? Are we seeing things that are different? And go from that perspective.

And I guess the thing is is it's a current term and a renewal term issue. Some related issues in the program that I'll discuss now is the impact of hydrogen water chemistry, noble metal chemical additions, and VIP 03 repair issues, and some interaction with the code, and then license renewal.

VIP 62 -- I guess the way we'd look at it is if we're going to implement hydrogen water chemistry and noble metal, to turn off cracking, to slow down cracking, to help mitigate it, can we then, in return, get some credit for it in our inspection program? Can we inspect less often? And what this document does is go through and look at how you would justify a reduction in inspections based on the mitigation aspects of this program.

It is currently under staff review. They've issued RAIs and an initial ASE, and there are still some open items that we're looking at. How do you fully identify what an acceptable hydrogen water chemistry program is? We need to define the parameters, so that the staff has assurance that what licensees are doing is fully mitigated.

So we're trying to come up with an approach that addresses factors of improvement on crack growth, what the ECP or conductivity levels ought to be in that regard, before we can take credit for those. And we've got that built into the program.

MEMBER LEITCH: You talked about how effective is the hydrogen water chemistry deep in the vessel. In other words, there is varying degrees of hydrogen water chemistry. Some just suppress cracking high in the vessel, and when you put a full-blown program in you are able to suppress all the way down. Does that enter into --

MR. DYLE: That does enter into it. And what is identified is is the function of the electro-chemical potential and the availability at a location. So let's say you're monitoring in the recirc. loop but you want to claim credit that I'm protecting halfway up the shroud. You've got to be able to show that in the injection rates you're using, that the water chemistry parameter is such that you know that you've got the ECP at the appropriate level at that point on the shroud, or you can't take credit for it.

MEMBER LEITCH: Okay.

MR. DYLE: So that's the way it's structured. And there is the water chemistry guidelines. You can monitor ECP. We've got secondary parameters that you can use to look at how effective the program is. And as you're probably well aware, if you're using noble metal you need much less hydrogen, so you can lower the hydrogen rate. It helps with dose issues, but you still get more mitigation because it's more effective up in the core region.

VIP 03, here's just an overview of what's in it, and I've mentioned it several times, so I don't know if we need to spend a lot of time on it. But it's a description of the inspection technique.

UT, using what kind of transducers, how many megahertz, what size, what angles, whether it's a 45 RL, 60 RL, 45 sheer, all of that, a description of the vendor demonstrations that are performed on mockups. And we've got a lot of mockups at the NDE Center, and I'll go ahead and make the invitation for Bob. You're welcome any time you want to go see what the VIP has got at the NDE Center in the way of mockups and how this stuff is done. We would more than welcome you to come look at them.

We established NDE uncertainty, and we -- in some cases we include the flaw evaluations as uncertainty. It depends on the nature of it and the component. We don't worry about the uncertainty for determining reinspection intervals currently.

This thing is updated annually. We've agreed to the protocol, how we'll qualify things, so once a year all of the new techniques have been qualified, are published, and everyone who has a copy of that book gets an update on the new techniques that are available to revisions that are made.

And I believe, Gene, you have a copy of that also.

And then we tried to deal with repair. What if I have to do a repair? What if I find something that says it's a problem? The flaw evaluation says I can't operate. We have general design criteria that we developed for each component, and those are documented, and we talked about those this morning. We're in the process.

We're got SEs on most of those, and we're trying to finalize that. And it looks at the structural requirements, the material considerations, how it was fabricated, and what you're going to do in the way of inspections.

If component degradation is anticipated, you can buy contingency repair. And in the case of Plant Hatch, the way we looked at it with the shroud -- and this is just an example of how one would do this -- our management said, "We're going to have the repair on the shelf. Before we do the inspection next outage, you're going to do the repair. You're going to have the repair there in case we need it." That was 85 percent of the cost.

So we said, "Why do all this detailed inspection? We're better off eliminating the circ. weld cracking issue with the shroud, install the repair preemptively, and have less to worry about." So that's an example where one could do that.

And there's also ways to get partial cycles. You know, if you really can't go a full cycle, you can justify one cycle, so you can have time to install the repair.

This should go without saying, but we wanted to make sure of this. For the safety-related internals, anything you do has got to be done to an Appendix B program. We didn't want licensees to misinterpret the VIP program, that because we had these design criteria that's all you had to consider. No. That's just the criteria. You still have to use your Appendix B program.

If this happens to be a code component, like the shroud or attachments to the vessel, there are also code criteria that must be satisfied, and you'd document those on the appropriate code forms. And that's the way we described that.

MR. BARTON: Was there any question of our licensees if this needed to be an Appendix B program?

MR. DYLE: No.

MR. BARTON: Okay.

MR. DYLE: What our approach has been, and as I've learned through the years doing some of these owners programs, we wrote things simplistically, and sometimes an owner would say, "Well, since you didn't discuss this, does it mean I don't have to do this, or is there something different?" So we just -- we'll get rid of any ambiguity if it's safety-related to Appendix B.

And then the other thing -- early on we were asked to develop inspection criteria for repairs. We don't know how. Let's say a jet pump riser brace cracks. We don't know what that repair would look like if it's a mechanical repair, so we can't specify inspection criteria now.

So what we did is put the onus on the owner that when he has a repair developed that the -- the developer of that repair must specify those inspections necessary to assure that the repair, in conjunction with that component, will perform their intended safety function. So we've put that on there.

Interface with the code -- as I mentioned, in some cases, Section 11 has got requirements already. Now we have the VIP guidelines, and we get a safety evaluation on it. We understand that until a licensee has approval to use that document that he also has the code requirements imposed by 10 CFR 50. So there is an overlap, and before an owner can simply use the VIP criteria in lieu of the code they must come to the staff, document such, and get it approved. And that's so we don't violate what's in the law.

So we're working with that, and we're trying to develop a template that we could use for owners to send that information in.

Now, the punchline I guess is what we're here for. The I&E guidelines were developed without real consideration to time. At the point in time the shroud cracking got as bad as it did, and we did the safety assessment, one set of documents that were available for us to use were what they called the industry reports for plant-life extension or license renewal.

And it was the documentation where the industry and the staff had worked through a myriad of issues related to license renewal, what were the open items, what were the agreed-upon items, how would you address aging management programs.

So the degree to -- that it was applicable to the VIP, we looked at that. And we said if the owners are going to go for license renewal, if this is a reality, then we ought to construct this program so that we don't have to do this twice. We didn't want to submit I&E documents, have them reviewed and approved and get SE, and then turn around and have to resubmit those when a plant approached license renewal.

So what we tried to do was when we looked at the failure mechanisms, and the cracking issues, we jus said, "What's going to happen? When is it going to happen?" and deal with it. Let's not put any time limits on it. We're not trying to operate a shroud for another 20 years. It's what keeps the shroud functional for the life of the plant, however long that is.

So that's the approach we wrote, and that's what -- that's what's built into these documents.

We then approached the staff and talked to Gene and Chris Grimes and others and said, "We've got another rule out there that we've got to satisfy, how we do this." And the staff worked up their internal mechanism, and I'm not going to go into it because I'll probably mess it up, but where the technical staff could review the documents and find the technical adequacy of them, and at the same time the license renewal staff could also review them and see how they applied to the license renewal arena.

One thing that facilitated that is we had some folks go through and look at each one of these I&E documents and say -- and show in an appendix how different aspects of the document satisfied the provisions in Part 54. So we submitted to the staff a technical document, and then an appendix that says, "Here's how we satisfy the rules and the requirements of Part 54. Please review it."

In return, the staff gives us a technical SE, and then we also get an SE for license renewal. And that's how we built the program to go forward into license renewal space.

The next thing is just to look at some of the program issues.

MEMBER FORD: Excuse me. Robin, can I ask a question? We heard this morning from a representative of NEI about an NEI document 95-10.

MR. DYLE: Right.

MEMBER FORD: Is the VIP actively collaborating on that, so in the future we'll see the same sort of application from a technical point of view? Or you're talking very specifically about technical arguments?

MR. DYLE: Right.

MEMBER FORD: Quantitative technical arguments. Will that be part of the NEI approach?

MR. DYLE: I guess the more correct

answer, Peter, would be 95-10 was in front of the VIP, but where we brought this all together was in the GALL. As the GALL was being developed and we started looking at these different components, and they listed the shroud, degradation is irradiation and IGSCC, we said, "We've got a program. Here's the VIP program."

We described why it was adequate. The staff reviewed that, and I do believe that the GALL will come out and say, for instance, for the shroud, BWRVIP 76 is acceptable, and the standard review plan draft that I've seen also makes reference to those kind of things. So that's where we tie that.

95-10 doesn't yet reflect implementation of the VIP, as far as how the licensees ought to do that, and we're working on that within the VIP to try to get that specified. We're doing these training classes. We're talking to executives to try to develop additional training so that licensees do this the same way. We've done self-assessments.

Matter of fact, the third one starts today or tomorrow at one of the plants where we go in and look and say, "All right. You've had the VIP program. How are you doing with it? What problems have you encountered?" And one of the things that comes out of that, we found a couple of places where they implemented the requirements right but with great effort because we did a not-so-good job of writing it.

So we're going to revise those documents to make the requirements more clear. But as far as 95-10 goes, it's not integrated yet, and we're trying to work that direction.

Our belief is is if we get the people implementing the VIP documents right now, they just continue. The license renewal is immaterial. They never know that they crossed the 40-year mark, because this is the right kind of program for the current term and the renewal term. That's our hope and expectation.

Any other questions?

One of the things -- and this is where we need to interact with the staff some more. When we talk about a VIP program, we consider that any control process that implements this thing properly, and make sure that all the requirements are met and the plant is safe and we've maintained the integrity of the components.

I personally put together three different programs, and they were done three different ways. And when you go to a plant, some people may accomplish all of these tasks in procedures. Some may do it, as some plants do, they have an ISI program, and then they augment their ISI program with these VIP criteria.

Others have specifications that they use, so we've gotten to leave the technical requirements as they are, not be overly prescriptive on what the program should look like, but identify the things that had to be part of it. And that's another thing that's currently being assessed with these self-assessments.

Now here's what the program gets at. Make sure the inspections are done when they should be, that they use the right techniques, that they are evaluated properly, use the right people. We want to make sure the folks can do the exams. Use the correct methodology, and, where appropriate, the repairs meet the code or the VIP criteria. So that's what has to be done to implement one of these programs.

MEMBER LEITCH: Do the licensees that are part of the VIP program that you had mentioned earlier, are they -- are they automatically compliant? Can we assume that they're complying with the program? Or is that a future decision?

MR. DYLE: The way we have that set up, because as Gene mentioned I think on his first slide this is a voluntary initiative --

MEMBER LEITCH: Are they volunteering? I guess is the question.

MR. DYLE: Yes, they are. And what the executives have said repeatedly, and we've even put it in writing, is that we will implement the VIP documents as written. And I -- I'll pick one. Let's say jet pump. We provide the jet pump document, it's out, the owners review it. They've bought into it. We submit it to the staff.

We expect in a reasonable amount of time they start implementing that document. And it may be that the document comes out in February and the outage is in April, so you can't build that in. But as soon as you can, you start doing those inspections.

The staff may review those, and say, "Well, I don't particularly like that inspection. I'd rather see this." We, the VIP, will negotiate with them on that issue and try to determine the right thing. But in the meantime, we, the owners, keep implementing it the way we said we would.

At such time that we have what we call a clean safety evaluation, where the VIP members and the staff are in agreement, then we will reproduce that document with the clean SE. And at that point, the licensees are committed to implementing the document as specified in the NRC safety evaluation.

And if they're not going to, if for some reason they can't or they've got an alternate technique that they want to use, they have 45 days to notify the staff. So that's the arrangement we have worked out at this point in time.

Gene, would you --

MR. CARPENTER: At this time, every BWR licensee in the U.S. has committed to following the BWRVIP. And we have only seen a few instances where they have taken minor exceptions to the VIP documents, and that has usually been a matter of timing as opposed to actually doing the inspections.

MEMBER LEITCH: Okay. Thank you.

MR. DYLE: Any other questions? Because this is kind of a break from the programmatic. Now I'm going to look at some of the documents in a little more detail. I don't know what you all have in the way of schedule for a break or what questions, so --

CHAIRMAN BONACA: No, there is still time. I think when you get to your slide number 39 or 40 --

MR. DYLE: Yes, sir.

CHAIRMAN BONACA: -- I would appreciate it if you could do what I asked you before, which is provide us with a brief summary. The next one actually is very clear -- a summary of the function that they provide, those components, for example, the shroud, the top guide, the lower core plate, top guide, etcetera.

The location where the cracks have been -- mostly been experienced, because I think it would be interesting for us to see the location of the welds on the shroud. And the other thing that I would like to understand is I read, for example, in the BWRVIP for the top guide that all the top guide elements have already exceeded the amount of fluence for which you have become susceptible to cracking.

And so my question -- and, again, I am not a material expert, so -- is you have a certain series of intervals for inspection that you have set? Would that change with age, given that susceptibility is high and you would expect with age the number of locations where you may have cracks to increase or the frequency to increase? I just would like to have that kind of information as part of this presentation, if you could. So --

MR. CARPENTER: If I could go ahead and address that right off the bat.

CHAIRMAN BONACA: Yes.

MR. CARPENTER: Basically, what the staff has agreed to is that once you achieve a fluence level of $5E^{+20}$ neutrons per square centimeter -- it's a threshold limit -- you fall into a crack growth rate of $5E^{-5}$ inches per hour, which is about three-quarters of an inch per year crack growth rate.

When you're below that threshold fluence, for certain geometries, for certain chemistries, you would have a lessened crack growth rate, perhaps as low as $1E^{-5}$ inches per hour. So, basically, as the plants age, they will be inspecting more, not less.

CHAIRMAN BONACA: Okay. So the inspection intervals are changing with age.

MR. CARPENTER: They will be increasing.

CHAIRMAN BONACA: Or they may be increasing. So there are provisions within the guidelines to increase the inspection, depending on certain measurements like fluence, and so on.

MR. DYLE: And that's generally associated with an issue if you have a flawed component. For example, the top guide, there's nothing that says once we reach a certain interval or a certain fluence level we'll start inspecting the top guide more frequently. But we're doing the inspections at what we believe is a frequent enough interval to catch any problems before they create a serious issue. And by looking at 36 BWRs and integrating that information, as soon as we find a problem with one we can go with the other.

For example, we have one BWR that has the top web cracking. And we've been monitoring that location and looking at that, and it's got the highest fluence level. So we use that sort of to set our inspection frequency. Given what's happened at this plant, how often should we inspect to make sure we catch that? So that's how we tried to build that into the program.

And I'll try to answer the questions you asked. I'm not a systems guy. So I'm not going to be able to go into great detail about all the things that these different components do and recall all the history off the top of my head, but --

CHAIRMAN BONACA: No, no, no. I just -- you know, I think for the benefit of the whole committee, to understand where the cracks have occurred, what the experience is. The other one that I would like to point out, that's -- at least I give you my train of thought there. I spoke of the top guide, and there -- the possible failures of components which link the top guide to the shroud, and so on, have been postulated.

Only a few of those failure modes have been identified as safety-significant. One of them I think some of the pins up there --

MR. DYLE: Right.

CHAIRMAN BONACA: -- the failure of those pins may cause the core to move, so that you have normal insertion. For that particular failure mode, I would expect that you would have a commensurate provision for inspection maybe more frequent than others. That's the kind of insights I would like to have on the program.

MR. DYLE: Right. And I've got --

CHAIRMAN BONACA: To understand what the logic is behind that.

MR. DYLE: I've got some details on the top guide, but a simple answer to that -- not only does the pin have to fail, but you also have to have a main steam line break, so that you have sufficient delta P to lift the top guide above the fuel so that it can tip over and then you can't insert the rods.

CHAIRMAN BONACA: Okay.

MR. DYLE: So one of the provisions is is that if you can look at the delta P that's developed during a main steam line break, and show that the top guide will never lift because of the weight and the attachment arrangement, then there's much less safety concern. So those are the kind of considerations we built into that.

The LPCI injection -- this is limited to BWR 5s and 6s. They have special couplings. It's arranged somewhat like core spray. To the best of my remembrance -- and, Bob, correct me if I'm wrong -- we haven't seen any problems with LPCI yet, because it's installed on the newer plants, and we wouldn't expect to have any problems. But that is a means of implementing the low pressure coolant injection that we would need during certain accident scenarios.

The core spray line, which we've talked about in the accident scenario, it provides the core spray on top of the fuel. Some plants are more needful of having the spray dispersal, so that the nozzles are more significant about being maintained on the sparger itself that's inside the core, that it sprays down appropriately.

We had some discussions early on four years ago about trying to identify which plant was what, so that the plants that needed the spray distribution would inspect the nozzles and the others didn't. We finally gave up on that and said that doesn't make any sense. Everybody is going to inspect the nozzles. So there is some conservatism we built in. Instead of worrying about that evaluation, we put it in.

The core spray piping that comes from the nozzle delivers that to the sparger so it cools things. The top guide, as we talked about, keeps the fuel from shifting. It also lets the rods insert. The core plate -- here it's the same thing. We've not seen any problems at the core plate. There's been limited inspections, but the inspections to date haven't been an issue.

And, again, this doesn't really show it well, but there are bolts around the periphery, and depending on the unit and the diameter the number of bolts change. But as long as they're there, the core plate is not going to shift. We don't worry about it lifting because -- and I don't believe I have a slide to this effect. I may have a backup.

But when you look at the control rod drive housing there is a lip on it that's a half-inch above the top guide. So that even if all the bolts were to fail and then you had a main steam line break, so that you developed the delta P to try to lift, it can't lift more than a half-inch because it engages --

MR. BARTON: Are you talking about the core plate?

MR. DYLE: Right. The core plate. It would engage the bottom of -- it would engage that lip on the drive housings. So that's a --

CHAIRMAN BONACA: The topical says that you could.

MR. DYLE: It will --

CHAIRMAN BONACA: That's why I asked that question.

MR. DYLE: Now, the core plate or the top guide?

MR. BARTON: No. I think the thing you're talking about talks about the top guide.

MR. DYLE: Okay. The top guide.

CHAIRMAN BONACA: Okay.

MR. DYLE: The top guide can lift in some scenarios. The core plate is limited vertically to a half-inch. So it won't disengage.

CHAIRMAN BONACA: Correct.

MR. DYLE: And when we were developing what was the right inspection criteria, we would have loved to have justified not trying to get down here, because it's a difficult access to do. We looked at some old General Electric studies that they had done. How far can this thing move? What happens with rod insertions?

And we could postulate that the nature of the way the system behaved, that even though you had a seismic event and the core plate was going back and forth, the rods would insert maybe sporadically but eventually would go all the way in.

Again, we said, let's not argue that. Let's just go do the inspections. And, again, you either look at the bolts or you install the wedges.

The shroud you're probably well aware of. It ensures a coolable geometry. It supports the fuel. It holds the top guide and core plate in place. We have had significant cracking in multiple cases. It's been inspected extensively.

Several plants are on their third inspection using the improved criteria. We're not seeing much growth, which is good. And it's encouraging that this thing is not a rampant problem that we can't deal with. So we seem to have found --

MR. BARTON: Do we understand why we're not seeing much growth?

MR. DYLE: I probably ought to say no and defer to some other folks sitting around the table. But the --

MR. BARTON: That would be all right, too.

MR. DYLE: The simplistic answer from our looks is is that as you go through thickness in the shroud, the K distribution changes, K dies off, the growth mechanism slows down from a stress standpoint. And that's a very simplistic answer.

Bob?

MR. CARTER: And mitigation.

MR. DYLE: And mitigation is working also.

MR. BARTON: And what?

MR. CARTER: And mitigation. Hydrogen and noble --

MR. BARTON: Hydrogen. Okay.

MR. DYLE: And that's -- anything else is far beyond my expertise, and I'll defer there.

CHAIRMAN BONACA: He said hydrogen and noble metal, right? Okay.

MR. CARTER: Yes. Either separately or in combination.

MEMBER SHACK: What fraction, again, of plants - of BWRs are on hydrogen now?

MR. CARTER: A very high percentage.

MR. CARPENTER: Last week when we were at Argonne discussing this, basically the GE folks told us that it was somewhere in the neighborhood of about 33, 34 plants, which is almost all of them.

MR. DYLE: Worldwide.

MR. CARPENTER: BWRs. Now, worldwide, that's a different story, and I can't begin to answer.

MEMBER SHACK: No. We just meant the U.S.

MR. CARPENTER: Yes. Almost every one.

MR. DYLE: And a lot of them are seriously looking at noble metal as the augmentation of the hydrogen to be more effective.

The jet pump assembly, I'll go through

that in some detail. But, again, that preserves the two-thirds core height. It also lets the recirc. flow come in and distributes it below, so that's the function. But its main safety function is either to maintain two-thirds core height, or some of the threes and fours, that's the route that LPCI has injected, should you need that in an accident scenario.

That's all I see on here that's listed as safety-related. Any other specific questions before I go on? I don't want to skip over things that you're interested in.

MEMBER LEITCH: In the jet pumps, for example, have you considered fracturing -- that is, debris -- as a safety issue? Or --

MR. DYLE: We did.

MEMBER LEITCH: -- do you just look at cracking, or do you think a jet pump is -- the fracture is --

MR. DYLE: We looked at fatigue, and we looked at every weld location for the jet pump. We looked at fatigue issues. We looked at IGSCC. We looked at what happens. And when I get to that slide, we'll talk about how we classified the jet pump components high, medium, or low. That looked at the consequences of the fracture.

We did look at loose parts, in general, in VIP 06. And we addressed that, and we looked at large, medium, and small parts, and had GE do the systems analysis. This is what happens if we have a part this big, what happens if we have a part smaller that clears the recirc. pump and comes back in, can it block the flow to the fuel channels, and things of that nature. So that was considered in VIP 06.

I'm not sure that I answered your question, though.

MEMBER LEITCH: Well, I mean, you talk about the safety implications of the jet pump, for example, as being two-thirds core coverage and to provide a LPCI injection pathway. But is there also a safety function that's got to remain intact? Because if you -- if it fractures --

MR. DYLE: Right.

MEMBER LEITCH: -- it could obstruct the core coolability, could it not?

MR. DYLE: It would be hard for -- from my limited systems understanding, that if the jet pump assembly failed that it would block the core cooling. It could fail in such a way, and this is one of the issues we dealt with with the jet pump riser pipe cracking that occurred in '96 or '97 -- and I can show you that when I get to the jet pump.

But if it failed down low where the inlet flow comes in, and then in combination with a fatigue failure we lost a riser brace, you could disassemble the jet pump so then with a recirc LOCA you have a freeflow path. And you can't maintain the two-thirds core height, so we addressed it from that perspective. We tried to look at the impact of all of those possibilities.

MEMBER LEITCH: Okay.

MR. DYLE: This is probably the most familiar to you because we've talked here before about this. And this shows the shroud, and this is the general numbering scheme. Different plants -- H1, H2, and H3 are generally the same. Some plants have an H5 weld in here. Some would call this H5 and H6A. So there's different numbering sequences or schemes that you might see. But, generally, this is how the shroud is put together.

The bulk of the cracking we've seen is up in this area, in the high fluence region and up top. When we did the original shroud safety assessment, another conservatism -- you can argue that should you fail here there are no safety consequences. But we still are requiring inspections and treating it as if it is.

Similarly, for most of the plants, if you failed at H2, depending on how the top guide arrangement is, that could lift -- and unless it damaged the core spray piping, it is still not a safety-significant issue, in that you could shut the plant down and maintain coolable geometry. But we're requiring inspections all the way through.

The H7 weld was the one of significant interest early on because it's a dissimilar metal weld with a backing ring. This is generally the filled fit-up weld where things were put together.

We've seen some cracking here. The cracking at H3 is actually in this ring. There's a lot of structural margin there, and so far we haven't had too many issues concerning that. The biggest thing is here when you start evaluating flaws in this arena, and as the fluence level goes up, and we restrict ourselves in the allowable margin, we have to start inspecting more frequently.

So until we have a good handle on what the crack growth rate is of irradiated stainless, we're going to have conservative inspection schedules based on that when we do flaw evaluations.

H8 and H9, we consider these as part of the shroud support. They're handled in VIP 38, and that's simply because the shroud support ring was such a unique beast.

These are code welds, so there's ASME criteria there. What we've imposed is more restrictive than what the code has as far as the quality of the examination. But one thing we did look at -- and I don't have details on it, but there is a lot of flaw tolerance in that structure.

We postulated that if you had these legs, each one of them cracked 50 percent throughwall, or 50 percent of the legs gone, how much margin do I need in this weld for structural liability? And it's 10 percent of the ligament. So there's a lot of structural margin in there, and the details of that are in VIP 38.

And then here it shows the jet pump and the core spray piping arrangement.

MEMBER LEITCH: Isn't there an access patch in that --

MR. DYLE: Right.

MEMBER LEITCH: -- that has been troublesome?

MR. DYLE: You're correct. There are what we call access hole covers.

MEMBER LEITCH: Yes. Yes, that's what I'm talking about.

MR. DYLE: And in some plants there's two.

MEMBER LEITCH: Yes.

MR. DYLE: And there are varying designs. As we went through the generations of the GE BWRs, they came up with a top -- what they called a top hat design that eliminated having to weld and leave a crevice in that Inconel 600 which eliminated some of the cracking.

But those have been inspected for years. There has been cracking detected. They've been removed and replaced with mechanical connections to replace that. And that's one thing I didn't address in the flaw evaluation criteria.

Let's say you're going to do a shroud repair and that requires you to drill a hole in the shroud to attach some hardware. What we require people do is to go back and look and say, okay, what about the leakage if you replaced your access hole cover? We know you now don't have a leak-tight joint.

So you have to account for that leakage, any leakage that might be created with the holes you'd make in the shroud to attach the hardware, or down here, and then all of that gets rolled up to look at what that does to your fuel clad temperature limits and make sure you've got sufficient cooling flow. So we've required that as part of the program, too.

MEMBER LEITCH: Okay.

MR. DYLE: Here is the inspection history on the shroud, and I think this is some of the information that you were wanting. We've got significant cracking at horizontal welds, some in the vertical welds, and this is generally in the older plants. Less structural significance because of the nature of it.

There has been a couple of instances where the shroud repair hardware has been installed and reinspection has found some degradation in that, and we've addressed that. We've required reinspections and built that into what we're doing.

And then there was one plant that had what we called a ring segment crack, and I guess -- I'll put this back up. In this forging here, as you go around the circumference there are some places where these plates were welded together. And when I say a "ring segment weld," that's the weld that joins these different ring segments together.

MEMBER FORD: Robin, could you go back to your previous slide, 40. I'm trying to help Mario.

CHAIRMAN BONACA: The other one.

MR. DYLE: Okay.

MEMBER FORD: What about the penetration welds at the bottom of the -- through the --

MR. DYLE: Oh, the CRD welds?

MEMBER FORD: Yes. What would happen from a safety point of view if there was an excessive amount of cracking at those penetration welds? We saw some with a lot of hydrogen water chemistry -- be a devil's advocate here -- a lot of hydrogen water chemistry conditions, ECP, susceptible 182 weld. What would happen from a safety point of view if you had a lot of cracking down on those --

MR. DYLE: From the global point of view, even if you had significant cracking you can insert the rods, and with a combination of the SLC and other systems you can shut the reactor down, maintain it at a coolable situation, and it's not a safety issue from that perspective. Do we want that? Absolutely not.

But the bottom head is flaw tolerant, the low alloy steel is not very susceptible to the cracking. The studies that we've done looking at the vessel shows that if I have stress corrosion cracking -- and I'm going to stress that these are studies that more knowledgeable people than I have done -- that the cracking, once it reaches a low allow steel it just dies out. There is not the driving mechanism for it.

We have had some instances in the industry where down in the bottom head we've had some leaking CRDs that we've been able to repair by using the rolled repair, where you go in and roll and expand the joint. And generally what happens is you have a leak up in the vessel, and it runs outside of the CRD, and you see the leak. And by rolling the CRD housing back into the vessel wall you turn that off.

We also developed, as part of the repair program, a welded repair for that activity where you go in and do the same rolling situation to stop the leak, but then do machining and a reweld, so that you would structurally replace that weld that's on the ID. And we've been able to get that approved through ASME as a code case, so that's available for use, too.

You can eject the rods. We've looked at the possibility of failing and ejecting, the likelihood of growing 360 degrees and losing that. It's not going to happen. It's going to be restrained above the core plate, as long as you don't disconnect the connection. Because if it tried to drop out, it would catch on the top guide. It can only drop a half an inch as long as this whole assembly stays together.

So there's a lot of reasons that we don't believe that's a significant issue, but we still do inspections to address that.

And with hydrogen water chemistry, we've shown that we can get adequate protection down in the bottom head.

MEMBER FORD: Has there been a lot of inspections?

MR. DYLE: There's been very limited inspections. That's one of the areas where we're struggling and we're trying to get people, you know, as they have access, go do inspections, find out what's going on. Those few plants that have done it have not found problems, other than the limited leakage at Nine Mile 1.

MR. CARPENTER: But the staff is encouraging expanded inspections in those areas.

MEMBER LEITCH: There's a lot of other stuff down there besides CRDs. Have you taken a look at, like, instrument connections, core plate Delta P, lower head connections?

MR. DYLE: We did look at that from -- and the SLC -- as you're probably aware, the SLC and the core plate delta P are an integral unit.

MEMBER LEITCH: Right.

MR. DYLE: The studies we've looked at shows that if the SLC line was to crack and fail any place, we could still get the borated solution in the bottom head and shut the reactor down. It'll perform its function even if it cracks throughwall.

The only way we could envision ever having a problem with the line was if you had a seismic event that might collapse the line, and we've looked at that. In fact, that was a question that came out of this group in '95 that we answered, you know, to go look at that and show that we could get the adequate mixing in the bottom head.

The core plate delta P, if that line

fails you have an instant recognition of it by the operator because they've lost the core plate delta P, which says what happened, and they can take, you know, action to try to figure out what has occurred there.

We've got the LPRMs, and those insertions there included in the -- what we call the bottom head, or the lower plenum I&E document is the correct name. So we've addressed all of those penetrations and locations in that document and prescribed --

MEMBER LEITCH: SRMs and IRMs as well?

MR. DYLE: Correct. They're in there, the dry tube, and look at all the pressure boundary issues.

Do you remember the number? I don't remember the number on that one.

MR. CARPENTER: 48.

MR. DYLE: 48. Okay.

MR. CARPENTER: I'm sorry. 47.

MR. DYLE: 47?

MR. CARPENTER: 47.

MR. DYLE: 47. There's the shroud history.

This is a busy slide, and I -- I guess I wasn't going to put a whole lot of time on this, but it gives you an idea. When a shroud cracking occurred, what we did was go through and look at all of the shrouds and break them up based on what their materials were, how long they had been operating, and what their initial five-year -- their first five years of operation what the conductivity was.

And we classified the plants as A, B, and C, and the staff agreed to that. And this went from least likely to crack to most likely to crack. Eventually, every plant will go from A to B. We hope using mitigated technologies that no more Bs move to Cs, and that means it doesn't see cracking.

The next slide says, "Here's how you decide for a category B shroud to do inspections," and you're probably better off looking at your handout. But you go do the inspections as specified for H3 and H4, you've got to do one of those, H5, and H7. Is the cracking less than 10 percent of the inspected length?

And if the answer is yes, then we have to do -- you have to do more inspections. If the -- you know, you've got to make sure you've got enough coverage, and then you can decide what to do. If the question -- if the answer is no, you've got to make it a category C and expand scope and look at more welds. So we have some conservative criteria for those plants.

And then, this next chart is similar. It says, "Here is how you deal with the category C shroud." And one of the first things is, and it goes back to the discussion we had earlier about uninspected length. Is the inspected length of the weld greater than 50 percent of the length of the weld? In other words, did I get more than 50 percent coverage?

And if the answer is no, I've got to go do some other things to make sure that what I'm doing is acceptable. If the answer is yes, then we had a treatment of that. So we're trying to require minimum coverage, and if you didn't get that you had to do a lot more.

Similarly, there is criteria for doing the vertical weld inspections. You know, how much cracking do you find? And make decisions based on that. And, you know, I've just showed you three slides that summarize what's in 40 pages of a document. So it's -- I'm not sure that I gave it fair treatment, but that's how we set this program up.

And like I said, we've done a lot of shroud inspections and are staying on top of that. There's more inspection requirements for the vertical welds, which we've changed and added more to. And, again, is the vertical weld free of crack indentations? Yes. Then we have an inspection period. No. And then you work yourself through how much of it is, how much do you inspect, and what's the appropriate evaluations to perform.

All of this -- I should say, when we talked about the flaw evaluations, we applied code margins, so this is not -- we've got code margins in there on upset loads and things of that. So when we say yes or no, it's safe, that includes the margins that ASME would put on its normal components.

And then we set the reinspection intervals based on the amount of cracking found also using the stress that would be applied at that weld. And then we also accounted for fluence to the degree that low fluence plants can use limit load only. As fluence increases, we require people to use LEFM to evaluate their flaw carrying capability. And that's indicated in the notes at the bottom of that page.

Bob, speak up if I leave something out on this. Again, this is a summary of the flaw evaluation for the shroud. It depends on the fluence. At the end of the evaluation period -- and what we mean by that is is if I find a flaw today, I don't look at the fluence that that component is going to experience today.

I look at the fluence for the period of time I expect to operate. So if I want to operate six years, I have to estimate out what the fluence will be then and then put that number in and do the calculation on the flaw tolerance.

Use limit load for ductile behavior, LEFM and elastic-plastic for the less ductile behavior. And this is the code that I talked about, the distributed ligament length code. It's been updated a couple of times. You can also use this for LPCI, for core spray in the nature of the code.

And the last item on the shroud, here is the status of the review. And I -- I think this is accurate. And, again, VIP 01 was the initial, 07 was the reinspection, 63 was the vertical welds, and we've rolled all of those into VIP 76, submitted that, and it has a license renewal appendix. So that's one, once it's reviewed and approved, that'll include the license renewal aspects.

Any questions on the shroud?

CHAIRMAN BONACA: I have a question regarding timing. How much time do you think you still need? Is this part of the rest of the presentation? The agenda shows a full presentation later on provided by you of half an hour each.

MR. CARPENTER: Yes, sir. And I will not need a half hour each. So --

CHAIRMAN BONACA: Okay. So, because this is part of that.

MR. CARPENTER: Right.

CHAIRMAN BONACA: So maybe we should take a break now, and then continue the presentation later?

MR. DYLE: If you'd like. I have three more components to discuss like I did the shroud, so --

CHAIRMAN BONACA: So you need at least half an hour to go through it.

MR. DYLE: At least a half an hour. But then I believe that's -- what I tried to do was give a description of the program, so that when the staff talked about what they've done with it it makes sense.

CHAIRMAN BONACA: So why don't we take a break now and meet again at 10 of 3:00.

MR. DYLE: Okay.

CHAIRMAN BONACA: Okay? Good.

(Whereupon, the proceedings in the foregoing matter went off the record at 2:35 p.m. and went back on the record at 2:51 p.m.)

CHAIRMAN BONACA: We are resuming the meeting now, and continuing with the presentation.

MR. DYLE: Okay. The next component -- we're on page 50 of the handout -- is the jet pump assembly, and this is -- we've had some questions on this. What we've got -- and this is a sketch that comes out of VIP 41, which is the document. The numbers that you see next to each one of these locations are individual numbers and paragraphs that we have a discussion in the VIP document, and the appropriate need to inspect or not inspect, depending on the materials.

We have these different -- there's different configurations on how these rings are attached to the shroud support. It sometimes seems that our designer was trying to find a unique version for everything they built, because we have quite a few configurations here.

The jet pump sensing lines which measure the jet pump pressures and performance, we take those lines out. That's one of the ways we do surveillance, by seeing if we have the jet pump operating properly.

You have the jet pump inlet that comes in here, goes up, goes through what we call the ram's head. You have the jet pump hold-down beam. We've had failures there. We've had cracking, different types. If you look at VIP 41, there's a discussion of those.

And then, we accelerate the fluid through, and then we have the nozzle here that allows the fluid from the annulus to be sucked in and then taken to the bottom head. So that's how the jet pump works, and we've got a detailed discussion of that in the document.

As you ask about what's the inspection history, we've had indications on the hold-down beams. We had at least one plant where the hold-down beam failed, and that ram's head that I was talking about came off, and then they were able to detect that because when they look at the jet pump sensing lines it shows no flow through there. They understand that there's a problem. They bring the unit down and then do the appropriate repairs.

Riser brace welds -- we've had some cracking there. Riser pipe welds -- we had discussed that earlier, and that is actually where this riser pipe comes into the nozzle and is welded. We had cracking down in that region that we've inspected and found and dealt with.

Riser brace-to-yolk welds, wear at the set screws, and one of the things we do, you can look at the set screws and wedges where these brackets attach. And if you see evidence of wear on the wedges, like the jet pump has been moving, then we understand that there may be a fatigue issue that you can expand scope and do inspections from that perspective.

For the jet pump, all welds were ranked based on safety significance. And hindsight being what it is, we might have done away with medium and low, because if you look at our document -- and I've got some discussion of that -- but in the VIP 41, the medium and low get the same inspection criteria, and that was to be conservative.

Although we could have argued less inspections for the low priorities, we did something different. But the way we classified these were high was any location that if it cracked it could create an immediate failure, and the jet pump would come apart. That had to be inspected quickly. We wanted those, and we set the baseline appropriately.

Medium, it could crack and eventually lead to a jet pump disassembly, but it was a long period of time. And then, low, there was really no significance to the cracking, but there was some reasons to go look.

MEMBER LEITCH: In the document, it says that low may be -- excuse me -- low right now is treated as medium.

MR. DYLE: Right.

MEMBER LEITCH: But in the future, it may be reevaluated.

MR. DYLE: Right.

MEMBER LEITCH: Could you say what would be the criteria for that reevaluation?

MR. DYLE: Well, one of the criteria would be is if we go through and do -- the fleet has done a series of inspections, and over the next 10 or 12 years we find no evidence of indications in it or the mediums, and we better understand how the materials behave, we may change those inspections to a sampling. We may eliminate some of them, depending on the materials.

By the same token, if we start to see more indications than we expected, we may change and make it more frequent.

MEMBER LEITCH: That's one of the questions I had. The inspection frequency seems to be based upon safety significance.

MR. DYLE: Right.

MEMBER LEITCH: Rather than operating history. Is operating history factored in? In other words, if you have something that's low safety significance, but there's been a significant number of problems with it, does it ever get to be high?

MR. DYLE: It may not be high from a safety perspective, but we would inspect it more often.

MEMBER LEITCH: I mean, from an inspection frequency.

MR. DYLE: From an inspection standpoint, we would upgrade that and do the inspections more frequently if that was warranted, because we want the plants to operate. We want the plants safe. And if we did that, then we bring the document back to the staff for their review and approval. So --

MEMBER LEITCH: So the categories high,

medium, and low are really safety significance.

MR. DYLE: Safety significance.

MEMBER LEITCH: But the operating -- but the inspection frequency may be biased depending upon operating history.

MR. DYLE: Right. Operating history and safety significance combined. And what we think we've done -- and the staff has agreed with us -- is that by accelerating these high locations, they are precursors, if you will, they're more serious if they should crack, and then the same materials, and they're in the same general environment in the annulus, so they should give us some indication how the rest of the assembly would perform.

MEMBER LEITCH: Yes. Right.

MR. DYLE: So we're kind of building on the totality of the program. And part of what we argued to ourselves was is I've got -- you know, I've got 10 of these jet pumps, 20 pipes, 35 plants. Over six years I'm going to have a lot of inspection data to let me evaluate what's going on.

MEMBER LEITCH: Right.

MR. DYLE: And we believe that's conservative.

MEMBER LEITCH: Okay.

MR. DYLE: And this is -- to your question, this is the inspection flow chart on how you would do this. If the component is high safety significance, inspect 100 percent of the population in the next inspection cycle, which is defined as six years. So for a plant that's on two-year cycles, over three outages I'll inspect all of those, with at least half of them to be inspected the first outage that you implement this document.

So right up front we're wanting to get information on those quickly and try to understand what's going on. If you have flaws, you expand scope and do everything in that outage. If you have no flaws, then you use the reinspection frequency that we specified.

For the medium and low, you come down this path, and here's the inspection scope that's set up. Because they are less significant, we allow more time. But, then again, depending on what happens here, it may affect what we do with these other components. So we would move back and forth.

And then here's the reinspection frequency that's contained for the jet pump. We require more inspections on high inspections, so you inspect 50 percent of the population the next inspection cycle. So the first inspection cycle you do the whole population. The next six years you do at least half of them from a sample perspective.

And you do 25 percent of the medium and lows, and that's consistent with the sampling process that the code uses.

MEMBER LEITCH: These thermal sleeve welds that are inaccessible on the -- associated with the jet pumps. It seems as though there's an open issue there. Can you comment on what work is being done to resolve that? Is there no inspection technique available for those --

MR. DYLE: There is not yet one proven, but that's being worked on. And you're talking about where this riser attaches down in the nozzle?

MEMBER LEITCH: Right. Yes.

MR. DYLE: We're doing the inspections of all of those that we can see and get access to. And that gives us some indication of how well that's performing. For several years, some of the plants did what we call the -- the acronym we used was RENSA weld examinations, where we actually looked at where the thermal sleeve was attached to the nozzle from the OD of the nozzle.

And what you did was ultrasonically look through. But what that really characterizes is whether you have a bond there, or whether you have a crack that might be propagating out of that weld into the safe end of the nozzle. But it wouldn't look at anything below there because you couldn't get the sound in and back out from an inspection standpoint.

And those examinations have resulted in no problems to date. That's one of those that was never required by the code or anything else, but the owners did that. And I know we've got a lot of inspection data for Hatch that we looked at for years doing that. But, again, that doesn't get at the thermal sleeve itself. It looks at the weld and then the nozzle, and that's the best effort that you can do right now.

MEMBER LEITCH: Yes. Okay. Thanks.

MEMBER FORD: Robin, could I follow up on that particular point that Graham brought up? How should -- we had a similar question this morning about containment, corrosion -- inaccessible parts of the containment. What you're saying is if you don't see a crack in the areas that you can inspect, then there's a likelihood that you won't see -- that there are not cracks in an area that you cannot see.

How sound a reasoning is that?

MR. DYLE: Well, to some degree, it's the best we can do with the technology we have. So we're requiring inspections of everything we can get at and try to reach conclusions, because the materials are similar and the environment is similar.

MEMBER FORD: But the stress may not be.

MR. DYLE: But the stress may not be. The other thing is -- and this is where the monitoring comes into play again -- we're requiring this jet pump monitoring of performance. And if that weld were to crack to the degree that it would leak and degrade the flow, or affect the performance or completely go throughwall, then this jet pump no longer operates. You do your daily surveillance and it says, "I don't have flow in that jet pump. I've got a problem."

MEMBER FORD: So your risk assessment, though, for any part, you would go through that kind of risk -- the impact of that was assumptions you are making.

MR. DYLE: Yes. The document where we looked at that is VIP 28. When we looked at -- when we looked at the impact of cracking at the weld just outside of that one that's -- and what we found there is that you have IGSCC might start. And then later fatigue takes over and the flaw would grow.

And the window in which you have the opportunity that you'd have insufficient ligament to carry the load should I have an accident, which it really creates the problem, versus the thing separating and then I'm able to detect that the jet pump is not operating, was a matter of a few days. And when you looked at the risk assessment from that perspective, it was a very low number.

I don't remember what the number was, but that was -- we did that in '97, '98, somewhere in that timeframe. And the staff has reviewed that and approved that as a JCO for everybody to continue to operate until we started doing more of these inspections. So that's been considered from a risk perspective.

Flaw evaluation is just simply we use the limit load techniques, and the DLL code that I discussed earlier could be used for this component as well. And the current status is we've gotten a safety evaluation from the staff in February of this year, and there are some guidelines that need to be revised based on the comments they've made. And we've discussed those. We understand what they want, and we're in the process of doing an update to incorporate that information.

And I guess this is an example of -- someone asked earlier, and I don't remember who -- about how we implement a document. We would expect the owners to continue to implement VIP 41 as we wrote it until such time as we update the document to reflect the safety evaluation, and then that's how they would implement it. So that's the agreement we have.

The next item is the top guide. There is -- just looking down on it, and here's the side view of it, so you can see that configuration. That's typical for the 2s through the 5s. The BWR 6 has got a slightly different configuration.

I believe, Dr. Bonaca, you were talking about these pins here. These are aligner pins that you set the top guide down on. It aligns it and holds it in place, and we've evaluated what's the consequences of failures of these, can the thing move or not, and what's the appropriate inspections. And there are different configurations of those.

Another one is the hold-down assembly. You have to study -- every time I look at this, I have to stop and look at it again to try to figure out what all we've got captured here. But this is the BWR 2 through 4 hold-down device. This is the 5. This is the 6. So there are some differences. And, again, you can look at the failure of this component and say, "If all of these failed, will the top guide lift? Can it move? Can it not?" And that lets you set whether you need to inspect this top guide hold-down device or not.

Rim welds on the top guide -- and, again, this is just to give you an idea of the technical detail that's in these documents. I don't know to what degree you've had the opportunity to review them. But we've got -- here's the fabrication weld on the top plate here, and then you've got the rim weld that would be in this structure.

And different ways to hold the core plate down -- the plate down on this rim and how it sits on the bottom plate, and then this is set down at the H5 weld region. Excuse me, this is up at the H2 and H3.

I mentioned that the BWR 6 has a slightly different configuration, and this you can see -- we've got it shown here, so you can see how the H1 and H2 shroud welds are in relation to that. And it's a slightly different configuration, and it's shorter.

The inspection history and what we've seen to date, there has been a lot of VT-1s and VT-3s. And using VIP 26, there were previous GE SILs that were used, and we did inspections in relation to that.

And I guess this is a good place to make the comment, one of the things the VIP program did is we went back and revisited all of the individual SILs for a given component. If they were safety-related, we made sure we incorporated either those requirements or new requirements into the VIP document and replaced the safety-related SILs.

For those SILs that were not safety-related, but were suggestions that owners might consider, we didn't try to address that, and we left it to the owners to choose what of those they wanted to use. So that's what we've done.

As I mentioned earlier, Oyster Creek has got indications in the top guide. We have removed those samples. We've looked at them. We've looked to see if they were weld repairs.

We've also taken those samples and put

them in what we call the CIR, which is a program looking at cracking and irradiated stainless, and we're assessing the degree -- it appears that these flaws would be IASCC. We haven't determined that yet, but that's one of the things we're going to look at.

And then, based on the results of that metallurgical review, see if there's anything else we need to do. But to date, that's the only plant that's had that problem.

There's rim weld cracking and it oversees non-GE BWR, and I think that was in non-stabilized 347, if I remember right. That was --

MEMBER SHACK: There's no such statement.

MR. DYLE: That was the problem.

(Laughter.)

It was supposed to be 347, and the metallurgical results indicated it may not have been. But we have limited access to some of that information, so I -- you know, I wouldn't take that to the bank. That's --

MEMBER SHACK: Now, the Swedes replaced the top guide, right? But they did that without any indications?

MR. DYLE: There were some that replaced all that -- they have the removable internals. They're not welded in place. They were bolted, so they could remove them. So it's a different design.

MEMBER LEITCH: Talking about SILs there just a minute, there is a statement in VIP 41 concerning the jet pumps on Roman numeral XI, the executive summary. It says that the -- basically, that if you use this, you can -- that the VIP -- these guidelines can be followed in place of prior GE SILs related to safety to assure the essential safety functions of the jet pump.

MR. DYLE: Correct.

MEMBER LEITCH: It seems to me that's too sweeping a statement. There's some SILs that tell you how to read and interpret jet pump instrumentation, and recommend actions to do this. This would seem to say "forget all that."

MR. DYLE: No. If that's what it says to you, then we need to take a note to look at that, because what we mean by that is any inspection of the assembly itself we've replaced those inspections. We've either incorporated them into VIP 41 or replaced them with what we think is newer and more conservative or more appropriate inspections.

The monitoring of the jet pump performance is still required.

MEMBER LEITCH: Okay.

MR. DYLE: And we would --

MEMBER LEITCH: You have another note back on page 3-2 that says it more clearly, but I just think this statement here taken at face value is a little too broad.

MR. DYLE: And that's in the executive summary?

MEMBER LEITCH: Executive summary, Roman numeral XI, about the middle of the page.

MR. DYLE: Okay. Thank you.

Bob, we need to -- we'll just take a note to make that more clean.

MEMBER LEITCH: Yes. Thank you.

MR. DYLE: I appreciate that. Thank you.

And, you know, we think we did a real good job with these things, but obviously we're going to have things like that where we could have been more clear, and somebody reviewing it anew and looking at it from a different perspective. We've had some of that with the staff interactions.

What did you mean? We thought we knew what we meant, and they said, "What did you mean?"

This is just an example of the table, and I -- we've gone a long time, and I don't want to bore you to tears, but here are some of the examples where from a table you have the location identified, a description of it, what's applicability, which plant. For example, the grid beam, location 1 is applicable to 2 through 5s. Whereas, the aligner pins at locations 2 and 3, if you go back to the figure in the document, would only apply to the BWR 2.

And then there's a discussion of the results of the structure, what happens if it fails, and then based on that what inspection should be done. And there are several pages of this that would allow you to go through and make the decisions for your plant, for your configuration, for your operating condition, what inspections are appropriate.

MEMBER SHACK: When I was looking through this, and I look at the staff RAIs on this -- you know, there's one, for example, that comments that VT-1 really can't see stress corrosion cracks very well, and you would have to look at an enhanced

VT-1. And I didn't see a response to that.

Now, is, in fact, in -- do you use enhanced VT-1 here? Or --

MR. DYLE: What we said we would do -- this was several years ago, and it's a general policy -- we've had this discussion with the staff that we need to -- there's been discussions like this that went on over time and were pointed out.

The approach that we were going to use is any place that we were looking for tight IGSCC type flaws we would use EVT-1, because we understood that was the right mechanism to use. It was that logic that said we'll do away with the MVT or the CSVT-1. So if we're not looking for tight flaws, if we're looking for like a fatigue failure that might be more readily visible with the VT-1, we could use that. But for tight IGSCC type flaws we were going to require that to be updated for everything.

MEMBER SHACK: I saw that statement, but then it wasn't clear whether we considered this an EVT-1 or a VT-1.

MR. DYLE: Well, we will --

MEMBER SHACK: Everywhere it says VT-1 --

MR. DYLE: Every place -- our commitment

was every place that we're looking for IGSCC flaws we're going to bring it up to EVT-1.

MEMBER SHACK: Even if the document doesn't say that.

MR. DYLE: Because we've got to go back and revise these documents. The process for this will be once the staff has issued a safety evaluation that we agree with, then we will revise the document to incorporate all of those comments and other enhancements that we've seen that have been necessary, like the comment that was just made.

We will then provide that to the staff and let them see that we've incorporated those changes, and make sure we've done what we said we would do and let them buy into that. And then we would issue this document again with an A on it, and it would mean it's an approved topical, and it would include the safety evaluations and all of the reviews.

So that's the process, and that's the next step in the process with the staff, that over the next year or so -- Bob?

MR. CARTER: Yes. That one is hard to trace. And we addressed that particular issue in response to --

CHAIRMAN BONACA: Would you use the microphone, please?

MR. CARTER: Oh, certainly. We addressed that particular response or that particular issue in the response to the core spray I&E document, where we had originally some -- maybe not as stringent visual techniques. And we -- in the response back to the staff on that, we committed to perform EVT-1 for detection of IGSCC.

MEMBER SHACK: Yes. I guess we got -- it was -- you had the general statement in the letter that Robin just made, that when you were looking for tight, you know, SCC cracks you were going to use EVT-1. Some of the inspection guidelines actually call out EVT-1, and some of them still call VT-1 in situations where it's clear to me you're looking to address SCC. And all you're really saying is that those just haven't been --

MR. DYLE: Yes, that's a timing issue. We made that commitment in response to core spray after this document was already published. So we wouldn't have revised the document just to fix that. That's just one of the changes we understand we have to make and bring forward in the final approved version.

There's three more pages of the top guide inspections, and unless you have specific questions I'll go ahead, for time's sake, and skip over that.

MEMBER SHACK: Now that you've put this in the public domain, can we remove the non-proprietary from the non-proprietary version of it?

MR. DYLE: Now that I've put what? That portion of the table?

MEMBER SHACK: This table is proprietary.

MR. DYLE: Well, it's available for public today, that portion of it. We have non-proprietary versions of all these documents available, because we had to do that --

MEMBER SHACK: Right. This isn't included in the non-proprietary version.

MR. DYLE: Yes. And that's something that we constantly have to discuss and consider. It's in here. It's in the public. We're not going to make the whole document non-proprietary, no, because -- well, I'll leave it at that. I'll let the lawyers discuss it.

Flaw evaluation criteria for the top guide -- we've got considerations for the grid beams where you use LEFM to look at that, and there's equations given in the appendix. This is one of those where it was a unique component. We developed the equations and gave them to the licensees. The staff has reviewed them.

For other locations along the rim, or other things, you would use different methods. And we would use the stress analysis to determine the acceptability of it.

And here is the status of the review. I guess, Bill, to your comment, if you look at the SE data, it was in September of '99. So that was an earlier document that had been submitted.

We're going to have an accelerated program this year to try to get these things brought up to date.

That's all I was going to discuss on the internals. The last item that I have been asked to discuss was what we're doing with the IGSCC and piping, just because the VIP had done this, and that's what the next several slides are about.

We labeled it BWRVIP 75. That's where the documentation is contained.

Yes, Bill?

MEMBER SHACK: Just one -- your

evaluation really looks at the cracking of the single beam. I mean, this looks to me like a highly redundant structure. If I broke one beam --

MR. DYLE: Absolutely.

MEMBER SHACK: -- nothing is going to -- have you ever gone through a -- you know, how much would you really have to bust this thing up so that things could really begin to move?

MR. DYLE: We had some finite element studies that looked at some of that initially, and the numbers were rather large. And depending on what the seismic loads were, what the different -- the specific plant configuration was, and everything else, it was hard to get your arms around and figure out what you put generically.

So we require the inspections, and then on a plant-specific basis you would look at your flaws for your plant.

Bob?

MR. CARTER: I couldn't say it any better, really. Just the myriad of different loads, different design configurations, made it difficult to say, "What's the absolute minimum?" you know, so we didn't -- we didn't try to take that approach.

MR. DYLE: Some of this stuff you all

could present better than I could. You know the history better than I do.

But for the BWR piping, in the '60s we had some scattered incidents of IGSCC. In the '70s, we had the small diameter crack, pipe cracking, particularly in the bypass lines around the valves, that the industry started dealing with.

And I remember reading statements of large bore piping will never crack. Well, in the 1970s, large diameter piping cracked, and we've been dealing with it ever since.

In response to that, there was a concerted effort among the industry, the old BWR Owners Group pipe cracking initiative, and the staff worked for years -- Warren Hazelton and others -- developed Generic Letter 88-01 and NUREG-0313 to address the cracking issues. And that has been in place for years. What VIP 75 does is revisit that.

As I said, there was the owners group activities, BWROG-1 that lasted here, and then 2 through 88. A lot of plants did different things. Some replaced all of their piping. Some replaced parts of them, different sections. Some did local repairs and then did inspections more frequently, because what was going on in this arena was still under development.

Mitigation people used HWC early and did augmented inspections. In the end, 0313 was the technical basis document that was issued by Generic Letter 88-01. And that's been in place since then.

These categories remain today, and I will say that we didn't -- we didn't do anything with these in VIP 75. We just accepted the categories for what they were and addressed inspection criteria. But this is how the NUREG categorized things from resistant material that was pristine, pure, to stuff that hadn't been served very long and that was stress-improved, to longer service stress-improved, no stress improvement, non-resistant, and so forth. So those are the categories that have been in place actually since before '88.

And here's the control strategies that we use. We try to detect the IGSCC before the damage compromises system integrity. Obviously, that's what you want as a regulatory body. That's what we want so we can operate the plant.

Remove the defects if you can. We try to do that, because we don't want that to be a problem. We prevent initiation by introducing resistant material. Again, do the replacement, use L grade piping. Some of it is 316NG.

The structural integrity -- we've got to make sure that that's there. That's just it. That's all we're going to do. In some cases, we've used weld overlays to reinforce the material. The weld overlays also help mitigate the cracking by putting compressive stresses on the ID.

This other -- modifying the residual stress distribution, it can also be done by using stress improvement processes, whether it's IHSI, which is induction heating stress improvement, or MSIP, which is mechanical stress improvement.

And then the last item is to use the mitigation technologies of water chemistry to slow things down.

If you think back to that slide I had earlier about the capacity factor losses, that was a problem in '84. But things have been effective to slow that down, and that's no longer really an issue. We've been really effective as an industry to be able to eliminate the problem.

However, continuing to do inspections creates a dose problem, particularly in those plants that use hydrogen water chemistry. Something about the nature of that process causes the dose to go up, and that's about all I can say about it from a technology standpoint. We understand that's an issue.

So that was one of the concerns that we had. We're really saturating people with dose to do inspections.

What the VIP tried to do was we went back and looked at all of the categories and tried to figure out what would be appropriate. We looked at the service experience. We looked at the deterministic evaluations to evaluate performance. We looked at inspection results, how effective hydrogen water chemistry has been, how effect IHSI and MSIP have been.

BWRVIP 61 is a document that discusses in detail IHSI and the industry survey that we did. And then we looked at the crack growth studies. We've developed VIP 14 and other documents and said, "What do we know now about crack growth?"

And we did use some generic risk-informed studies. We didn't do a risk assessment, but the different plants that have done risk-informed ISI, and some of the pilot studies that were done to develop these code cases, we looked at those and tried to learn from them, and said, "Based on those insights, what makes sense? What is the right thing to do as we go forward?"

So we tried to incorporate all of that. And here's I guess the crux of what we've done, is these are the proposed inspection frequencies in 75 for normal water chemistry and for hydrogen water chemistry. And I guess I should also say for normal water chemistry what that is today is far superior to what it was, you know, 15 years ago.

The conductivity has been maintained very low. I think the staff evaluation was that the average conductivity for the fleet is .15 microsiemens. ECPs are being managed. We're keeping things under good control.

So even normal water chemistry is far better than what it was. And then, the use of hydrogen water chemistry would include use of noble metal. For the purposes of this document, we considered effective HWC, either hydrogen alone or hydrogen and the catalyst noble metal.

Obviously, without noble metal, we have to inject greater rates, greater amounts of hydrogen to be effective. But we've come up with tools to evaluate that.

So those are the revisions to the inspection frequencies that we think are appropriate based on inspection history and the way things are performing.

The status of VIP 75 -- you know, we think that the countermeasures that the NRC required, and the things that have been implemented, have been effective. And we think the inspection experience over the last 12 or 13 years shows that.

Some of these welds have been examined four or five times since 1988, because of the original criteria and the rate that they were required to be inspected.

We think there is -- that a revision to NUREG-0313 or the generic letter was warranted. We put that in VIP 75. And we've got some open items the staff has in the safety evaluation that we're working on resolution of. One of them is tied back to VIP 62, which I discussed earlier.

What is the appropriate level that you must reach with your hydrogen injection and your water chemistry parameters to have an effective water chemistry program? So we're working on that.

And I guess this is what you all would like to see -- me conclude.

(Laughter.)

Not my conclusions, but just for me to conclude.

We think that at the direction of our executives, in response to a problem we had, that we took ownership of our problem, we developed a technically sound program that's broad in scope, and sufficiently in-depth technically to address the concerns of the BWR internals and the associated programs.

We think we have the appropriate elements in regard to what we inspect, how often we inspect, how often we reinspect, the methods that we use, how we evaluate the flaws, the repair methodologies that we would use, the mitigated technologies that we can use to minimize the effect of IGSCC.

And all of that, because we did this for current term and renewal term to try to address all known degradation mechanisms, we think it's appropriate for use for license renewal and have provided it to the staff as such and have gotten safety evaluations for it.

So that's -- that concludes the overview of the program and a description. And unless you have other questions, I would turn it back over to Mr. Carpenter.

MEMBER SHACK: You're proposing to go to 10 percent every 10 years, which is like what the risk-informed people do, except you want to do it without actually doing the risk-informed analysis?

MR. DYLE: We don't do the detailed risk-informed analysis, but what we learned from the risk study is that the real locations of concern were on ECCS, where you had the potential for geometric discontinuities or dissimilar metal welds.

So we put in VIP 75 that you select those locations, and that you also select the locations in the piping that would be problematic, such as the piping between the dry weld and the outboard isolation valve. Because from a risk perspective, if you have a failure there, it's harder to mitigate that. So we said you are going to go look at those.

So we looked at those generic risk studies and put some deterministic criteria in for how to select the welds and addressed it from that perspective.

Any other questions? Thank you.

MEMBER SHACK: Thank you.

MR. CARPENTER: Okay. Now that Robin has given a fairly comprehensive overview, I'll continue on with what the staff has found out or has come to.

We have completed a review of almost all of the BWRVIP reports to date. There are only a few more that are left, and we are looking at those. And, basically, what we've concluded is that implementation of the BWRVIP guidelines, as modified to address the staff's comments in our various SEs, will provide an acceptable level of quality for inspection of flaw evaluation of the subject safety-related components.

And it should be stressed once more that the vast majority of the BWRVIP program deals with components that are outside the scope of the regulatory required inspections. So this is a voluntary program that is looking at more than what the staff has presently required.

We've also done -- and this goes back to an earlier question by the ACRS -- an independent review by the Office of Research -- that's NUREG-CR-6677 -- and has found that the BWRVIP program and other such comprehensive inspection programs will significantly reduce core damage frequency. And that's one that I'll provide you a copy with a little bit later.

CHAIRMAN BONACA: Reduce with respect to what?

MR. CARPENTER: I'm sorry?

CHAIRMAN BONACA: Reduces it with respect to what? I mean --

MR. CARPENTER: In respect to not having such a program. If you merely did the required inspections that are required by the rules and regulations that the NRC has --

CHAIRMAN BONACA: But it doesn't reduce with respect to the current results of the IPEs. I mean, they don't assume this kind of failure rates.

MR. CARPENTER: That is correct.

CHAIRMAN BONACA: Okay.

MR. CARPENTER: If you go in and you do this, you can find things much before you would otherwise.

MEMBER SHACK: This is the PNNL, essentially, risk-informed inspection kind of document. Is that what we're talking about here?

MR. CARPENTER: INEL. Right. And I will provide some copies to you a little bit later.

What we've done with the generic aging

management plans of the BWRVIP, we are completing the reviews of the various license renewal appendices for the 12 reports that we're looking at.

And what we are finding is that by referencing the BWRVIP aging management programs and completing the action items that are in the staff's SEs for each one of those, that there will be reasonable assurance that the applicant will adequately manage aging effects during the extended operating period.

And generic AMPs usage will significantly reduce staff review of license renewal applications, and that's one of the things that -- one of the benefits to the staff.

Robin mentioned that they've spent over $30 million on this program. The BWRVIP has told us in public meetings that by some of the inspections that they are doing they are looking to save somewhere in the neighborhood of about $100 million in inspections. This is saving staff resources, so it's a win-win for both sides.

Just to go back over real quickly again the various I&E documents -- the core spray internals, the core blade top guide, standby liquid control (SLC), shroud supports. You've also got the

VIP 41, which we'll be talking about here in a moment, 42, LPCI, the lower plenum guidelines, vessel ID attachments, the penetration guidelines.

And the reason why I'm telling you this, again, is just to reinforce that this is a fairly comprehensive program that we've been looking at.

BWRVIP 74 report, which is the BWR reactor pressure vessel one, is one that the ACRS has basically looked at before because we came to you a few years ago and talked to you about the BWRVIP 05 report, which was the shell weld inspections. And that has been subsumed by the 74.

76, which is the core shroud I&E guidelines, which I'll be talking about in a moment -- as Robin mentioned, it includes the VIP 07 and the VIP 63 documents.

And we'll also be talking about some of the additional reports, which is VIP 75, here in a moment -- which is supported by the BWRVIP 61 on induction heating stress improvement effectiveness, and the BWRVIP 78, which is the integrated surveillance program, which is supported by the '86 report.

There is also a variety of the repair and replacement design criteria, which we've already discussed, so I'll just go through this rather quickly, and also some of the mitigation reports, which deals with crack growth and how you also mitigated the VIP 62, which is the hydrogen water chemistry guidelines.

And then, you've got various other ones -- the VIP 03, which is the internals examinations, the 06, which was the safety assessment that dealt with what was the cracking.

Now, we're reviewing some of the proposed guidance in VIP 76, and, as I said, it incorporates in the BWRVIP 07 guidelines, the VIP 63 guidelines. And what it's basically proposing is that the weld inspection strategy and unrepaired shrouds, weld inspection strategy and the repaired shrouds, the inspection and evaluation reporting requirements, a demonstration of compliance for the license renewal rule.

And, again, it incorporates 07 and 63, and right now we are working with the BWRVIP to resolve some interpretation issues that we found in the -- between what we said in the 07 document, SE, and what they understood us to say.

BWRVIP 41, jet pump assemblies. We have completed the plant-specific reviews. Now we're completing the license renewal review. And, basically, what we've seen is that the VIP 41 document has -- provides component descriptions, functions, describes susceptibility factors -- again, all of the things that Robin went through earlier.

MEMBER LEITCH: A question about BWRVIP 41.

MR. CARPENTER: Yes, sir.

MEMBER LEITCH: There's a sentence in there that puzzles me a little bit. It says, "The VIP 41 report also contains an Appendix A and demonstration of compliance with the technical information requirements of the license renewal rule."

MR. CARPENTER: Yes, sir.

MEMBER LEITCH: And then it goes on to say, "Appendix A to the VIP 41 report is not evaluated in this SE report, but will be evaluated under a separate license renewal review."

MR. CARPENTER: Yes. What we've done, basically, with all of the I&E guidelines, which is what constitutes the aging management program, the generic aging management program for the BWRVIP, is the staff has taken in these reports. We've reviewed them. As necessary, we've issued a request for additional information, RAIs.

The BWRVIP has responded back to that. If there are any additional questions, we have issued an initial SE with open items, which basically allows licensees to utilize the document with these -- with plant-specific addressing of those open items, while we're still completing the review.

Once the BWRVIP has responded back to the open items, and we have reached agreement as to the review, we have issued a final SE, and that takes care of the present operating term for the BWRVIP reports. Once that is completed, then we go in and we take a look at the various license renewal appendices, which demonstrate how they meet the license renewal rule, Part 54.

MEMBER LEITCH: Okay.

MR. CARPENTER: And as long as they meet Part 54 rules, then we issue a third SE, which is license renewal SE, a generic SE.

MEMBER LEITCH: A generic SE.

MR. CARPENTER: As long as the licensee is showing that they are in compliance with that, then we don't need to look at their applications further.

MEMBER LEITCH: Okay. Okay. Thank you.

MR. CARPENTER: Certainly, sir.

One of the things that we found in the VIP 41 is that there were instances of cast-off stainless steel components in the jet pump assemblies that may be adversely affected by high fluence levels, and that is going to be looked at in future reviews. So that's going to be resolved before the license renewal term begins.

So preventive actions that are also discussed in these documents -- obviously, you maintain high water purity. That reduces stress corrosion cracking, susceptibility. And also, again, hydrogen water chemistry and noble metal chemistry additions will reduce it further.

Some of the parameters monitored and inspected -- the inspection and flaw evaluations performed in accordance with staff approved guidelines, and then you go in and, as necessary, you have examination expansion, reinspection as necessary, to take a look if you have flaws.

And if you detect aging effects, again, you look at it in accordance with the staff approved guidelines to ensure that the aging-related degradation will be detected before any loss of intended function occurs.

For monitoring and trending, the inspection schedules in accordance with the VIP guidelines ensures timely detections of cracks, and the scope of examination expansion, reexaminations, will take care of beyond baseline inspections if you do have flaws.

For acceptance criteria, degradation is evaluated in accordance with the approved VIP guidelines, staff approved guidelines I should say.

For corrective actions, you have the repair design criteria if you need to do repairs, and the staff is in the process of approving those also -- again, with some open items in those.

And, again, as far as operating experience, as Robin mentioned, you've had several instances in the past 20 years where the jet pumps have had some problems.

Staff has completed its review of the VIP 26 guidelines. The scope of the program is pretty much as Robin described earlier. So go through that.

The VIP 26 document, the aging management programs, the 10 elements are similar to what was in the VIP 41 review. So I really don't need to go through that again.

And the operating experience -- again, we've had cracking found at various locations over the years. And they have also been observed in the Swedish BWR, which I believe Dr. Shack mentioned earlier.

Going into VIP 75, the technical basis -- now, this is where we change stride here. Basically, the I&E guidelines are what constitutes the aging management program, the generic aging management program for the fleet. But the VIP 75 and some of the other documents are intended to be applicable at any time in operating life, be that year 39 or year 59.

So there is no license renewal SE that will be issued on this one. Once the final SE is issued, and we've gotten the BWRVIP 75-A document, licensees will be able to utilize it at any time.

Robin discussed some of the revisions to the extent of the frequency, and why it's based on considerations of inspections.

And, again, we went through how they are specifically applicable to inspections, but our SE is not applicable to any other welds. We need to stress that. It's only applicable to the Generic Letter 88-01/NUREG-0313 welds. So this is not going beyond the scope of that.

CHAIRMAN BONACA: Here you -- your previous slide you talked about extent and frequency for piping inspections contained in GL 88-01. That is the first time I see this issue of frequency of piping instruction. Does it imply that -- that the frequency changes with time?

MR. CARPENTER: I'm sorry, sir. Could you repeat that?

CHAIRMAN BONACA: If you go to the previous slide, the BWRVIP 75 report proposes revisions to extent and frequencies for -- plant frequencies. I mean --

MR. CARPENTER: Yes.

CHAIRMAN BONACA: -- could you comment on that? Frequencies -- what --

MR. CARPENTER: Yes. Basically, gain, the BWRVIP 75 report proposed to reduce the amount of inspections that were necessary.

CHAIRMAN BONACA: Okay.

MR. CARPENTER: And this is for the low fluence regimes. Okay? Again, once you get into the high fluence regimes where you go into less hydrogen water chemistry, you drop out of that and go into normal water chemistry, the inspection frequencies will increase. So the frequencies are being reduced because the inspection results through the years and the mitigations that have been occurring have been improving it.

Once you find that your cracking is increasing or is occurring, you expand that. So it's not that you're forever reducing. There will be a time when you will be inspecting more.

CHAIRMAN BONACA: Okay. So there is some consideration -- yes. Okay.

MR. CARPENTER: Anything else, sir? Okay.

Basically, the scope of the program was that it provided a summary of the generic letter, it discussed the use of hydrogen water chemistry to inhibit initiation and growth of IGSCC, it proposed revised inspection criteria and associated risk considerations, much as we've just discussed.

The staff issued the SE with several open items, and those included proposed inspection frequency and scope of the category A, B, C, and E welds. We didn't precisely agree with the BWRVIP on those.

We also requested more in the way of sample expansion, and we talked about reactor water coolant conductivity and what was necessary for that, what exactly constituted an effective hydrogen water chemistry and noble metal chemistry addition programs, and also just how do you identify safety-significant locations. And that's all in the SEs that we provided to you.

And we have met with the BWRVIP. Just last week we discussed this, and they're going to be coming in with a response to that SE here in the near term.

Again, the staff has the VIP 75 guidance to be acceptable except for the open items, and the revised 75 report can be used by licensees to replace inspection guidance and Generic Letter 88-01. And several licensees have already started making use of that revised guidance addressing the open items as necessary.

And we believe that this will provide reasonable assurance for integrity of the subject BWR piping welds.

In conclusion -- the reason I'm going so fast is because Robin took care of the majority of the information that we wanted to provide to you --

we have found that referencing the VIP aging management program, including the staff required action items, will provide reasonable assurance that applicants will adequately manage the aging effects during the extended operating period, and that the generic AMPs will significantly reduce staff reviews of license renewal applications.

I believe that will be borne out when you talk with the people tomorrow on Hatch regarding how much was reduced on that.

And that concludes my presentation. Any questions?

CHAIRMAN BONACA: Well, I just had question maybe for both presenters. And I just mentioned it before; I still am belaboring on this issue. You know, the oldest program says that, you know, you identify these materials which have different susceptibility to cracking.

And then for the less susceptible it will be every 10 years you perform an inspection. For the more susceptible locations, all materials you do it every six years.

You maintain a step up to 60 years, or can maintain it to 100 years I guess. It's counterintuitive to me that, as you continue to age this material, you would expect to need the same frequency of inspections. I mean, I just -- maybe my material expert colleagues here could help me with that, particularly where you have this susceptible material in a susceptible region, high fluence.

MEMBER SHACK: Well, no, this is piping inspection.

CHAIRMAN BONACA: Yes. Well --

MEMBER SHACK: So you're not accumulating any fluence in this piping.

CHAIRMAN BONACA: No. I thought that, however, there are also intervals of inspections for intervals, for example, that would also have the step-wide frequency.

MEMBER FORD: Essentially, your concern, Mario, is that -- your concern is that the assumption is that the damage is occurring literally over time.

CHAIRMAN BONACA: Yes.

MEMBER FORD: And if it's occurring exponentially with time, then having it every four years or 10 years is inappropriate.

CHAIRMAN BONACA: Well, at some point, it seems to me that because --

MEMBER SHACK: It's not only linear in timing, because it suddenly bounces up to 5 times 10 --

MEMBER FORD: But it's just because you've seen it. It's kind of up to NTE resolution on --

CHAIRMAN BONACA: The only thing is -- the rest I think is -- I'm very comfortable with the fact that there has been a very careful look at every component, every location, every environment, and it can -- you know, I think it's a very thorough effort.

It just still -- and I guess if there is an acceleration of damage being experienced, there will be some response coming at some point for that. And so --

MR. CARPENTER: Well, if I could echo what Robin said earlier, if you're looking at some of these components, and you see degradation occurring at an increased frequency, obviously, what we have been trying to do in some of these reviews is that you were going to do scope expansion and frequency expansion.

So as things -- if things, I should say, begin to crack and degrade in greater frequency over the years, the VIP program is pretty much a living program. It's not once you've done it you put it on a shelf and you're complete with it.

The staff has been working with them on this. If need be, we will be going back to the BWRVIP and saying, "We need to revisit some of these inspection frequencies and scopes."

MEMBER KRESS: That concept of increasing the frequency based on what you see puts a great deal of emphasis on the first frequency, the first inspection frequency. How was that arrived at? Did you have -- the six years, for example.

You know, if you're looking for linear extrapolation and want to be sure it doesn't go up exponentially, and you're looking at frequency of inspections to keep you away from that, you know, a whole lot rides on that first frequency that you choose. And I was just wondering how that was chosen.

MR. DYLE: If I could maybe try to help with that. Maybe the way the presentation went made it look like it was a decision on a discrete component basis, and that's really not the case.

You know, when we looked at how often should we inspect something that has, for example, 182 weld metal, we looked at all of the components. We said, "Have we seen cracking anywhere? What's the industry-wide experience? What's the behavior of this stuff?" If it should crack, how fast would it grow? If I don't find it today --

MEMBER KRESS: That's the key right there.

MR. DYLE: Right.

MEMBER KRESS: You have a model for how fast it will grow.

MR. DYLE: Right. And those were things that we took into consideration. If I look today and it cracks tomorrow and starts growing, what's a reasonable inspection frequency to look again to ensure integrity?

MEMBER KRESS: So the -- that first one -- decision on how long to wait for the next inspection depends on the crack growth model or crack initiation model. And the question I have is, is there any reason to expect those to be linear?

MR. DYLE: No, not necessarily. We tried to be conservative. If you look at some of the components -- and we did this -- and you said, "Well, if I have a crack today," and using, let's say, in VIP 14 for the crack growth rate for stainless steel that's not irradiated, you could justify an inspection frequency of 20 years.

We'd say, "Well, that's -- that doesn't make sense." So --

MEMBER KRESS: So we're -- over a short time, linear is a good enough approximation is what you're saying.

MR. DYLE: It would seem to be. And then, again, as Gene said, we called it a living program. If we find a problem in stainless that's welded -- I don't know, pick a component -- to core spray, if we find something new, we say, "All right. What's the impact on that of every other location that's got stainless material that's welded?" We need to revisit everything.

CHAIRMAN BONACA: The other key thing that comes to mind now is you have about 30 or 40 plants in the program.

MR. DYLE: That's right.

CHAIRMAN BONACA: So, really, you are having probably --

MEMBER KRESS: So you're having inspections, really, pretty often, naturally. When you look at the population --

MEMBER SHACK: Even there, when the guy

inspects his pipes, it's not as though he doesn't inspect the pipe, you know, in 10 years, and then he suddenly goes in the next outage and looks at it. You know, he's got to look at all of the welds over the 10 years. He's looking at a sample --

MEMBER KRESS: So spreading them out.

MEMBER SHACK: Right. And when you do that on a plant-wide basis, you've actually got a pretty good sample of things going on. I mean, you know, the alternative to an expansion rule is to somehow pretend you really understand this well enough.

(Laughter.)

CHAIRMAN BONACA: I hope you're --

MEMBER SHACK: I prefer the expansion rule myself.

(Laughter.)

CHAIRMAN BONACA: I hope you would. No, but I think the sheer number of plants involved in the program, and the sharing and communication of information, is sufficient, give a lot more comfort because you essentially have, on average, three or four inspections a year.

MR. DYLE: Right. And we hope that -- and maybe I wasn't clear in the beginning of the presentation. But by giving this semi-annual update of what's happened, it allows the staff to independently assess the adequacy of the program also.

So we're willing to accept that feedback, and this -- this has been a good effort where we could do what we thought was the right technical thing, and the staff comes back. We're not worrying about licensing arguments, so we hope to keep that relationship.

MR. CARPENTER: And I didn't bring a copy of what Robin was just talking about, but the semi-annual inspection and summary that the BWRVIP provides to us is approximately, you know, a quarter-inch thick. So we do have a very large database that we are accumulating, and that has been coming to us for the last four or five years now.

Any other questions?

CHAIRMAN BONACA: Any more questions for Mr. Carpenter?

MEMBER KRESS: Are we writing a letter on this?

CHAIRMAN BONACA: Well, we plan to address the review of this, you know, as part of the Hatch application. The Hatch application references these reports. So we did pretty much what we did originally for, for example, the use of the B&W topical in support of the Oconee application.

MEMBER KRESS: But we haven't reviewed these models -- plant growth and initiation, on which a lot of this relies on. Can we make judgments without reviewing those models and the database that underlies them? Or we just rely on Bill and Peter to tell us it's okay? Or --

MEMBER SHACK: The staff has written SEs.

MEMBER KRESS: Okay. Well, the staff has got an SER. Why don't we -- I mean, that doesn't --

CHAIRMAN BONACA: We have reviewed only a sample of SERs.

MEMBER SHACK: Yes. I mean, it's like our whole review of the license renewal process. I mean, we don't review every SER of every supporting document.

MEMBER KRESS: We rely on the staff's --

MEMBER SHACK: Well, I mean, you sort of try to sample I guess is what we've done.

CHAIRMAN BONACA: Yes.

MR. DURAISWAMY: That's what you did,

Tom. This time we really picked four reports. I think, Bill, you got two, and Graham got one, and John got one. So you guys, you know, found it satisfactory? Any problems?

MEMBER SHACK: Yes.

MEMBER KRESS: I did, too.

MEMBER LEITCH: Yes.

CHAIRMAN BONACA: Okay. So that's all we can do -- sample it.

MEMBER KRESS: Yes. But the whole committee has to sample it.

MR. DURAISWAMY: Well, and the next -- next BWR plan comes in, I think we will take probably about 10 reports and give one to each member.

MEMBER KRESS: Give all 10 of them to each member.

MR. DURAISWAMY: Well, we can do that, too. So -- we can do the other thing, Tom. It's going to be tough.

MEMBER KRESS: I know particularly in this area, it's -- this is a tough area.

MEMBER SHACK: Yes. I mean, you can count the number of man-years they spend on this, and then you -- you know, you go around and you try to figure out how we're going to do it.

(Laughter.)

MEMBER FORD: Could I ask a question of clarification? It relates to your crack growth disposition algorithms. Are we using 5 times 10_{-5} inches per hour?

MR. CARPENTER: We are using that for the majority of the cases, and any time you get above the threshold fluence level inside the reactor vessel for $5E^{-5}$ inches per hour is what we're using. In some cases, we have reduced the crack growth rate because the BWRVIP has been able to show that there is a case to do so.

MEMBER FORD: So this five times 10^{-5} for both higher rated and not -- it's five times --

MR. DYLE: If I could, BWRVIP 14, which is the statistical correlation, sets a new disposition line at -- I think it's $2.2E^{-5}$ for disposition purposes. And that's based on the statistical review of the data, plus with some input from GE with their verification in another way that that was an acceptable disposition curve to be used.

MEMBER KRESS: Is that the main line, or is that a 95 percentile line through the data?

MR. DYLE: 95.95.

MEMBER KRESS: 95.95. Okay.

MR. DYLE: Of the data.

MEMBER SHACK: You've got to remember, first you look at the crack growth curve, and then you have to look at the stresses. And so, you know, what they've done is sort of taken --

MEMBER KRESS: All the data.

MEMBER SHACK: -- an approximate -- you know, a conservative crack growth curve, and then what is for most cases an approximate stress-intensity value, and picked it there. You know, I think you would have to argue that it's an engineering judgment rather than a statistical model, because it's very hard to characterize the stress distributions.

You know, you can do something with the crack growth curve, but then you still have to make a judgment.

MEMBER KRESS: I thought the crack growth curve had inherent in it the stress.

MEMBER SHACK: No. It says that for a given stress intensity I get a crack growth rate. But then I have to decide what the stress intensity is at this weld at this point.

MEMBER KRESS: Oh. The data is not --

is data taken in the laboratory for a given -- where you impose an intensity and a chemical --

MEMBER SHACK: Right. Because it's the only way you can do it. I mean, because it does depend on the stress intensity. You have to have the crack growth rate depend on the stress intensity.

MEMBER KRESS: And you have a laboratory-based model.

MEMBER SHACK: Which means, then -- well, even if it wasn't a laboratory-based, it means if you did a field measurement you would have to know what the stress is in that weld.

MEMBER KRESS: Well, I --

MEMBER SHACK: So I get out stress meter --

MEMBER KRESS: Not if you put all the data on a curve and took the 95.95. That would take care of it. But if it were all field data -- that was where I was confused. It's not field data, though, you're talking about.

MEMBER SHACK: Even the field data -- you know, then, you have to decide when the crack started growing.

MEMBER KRESS: Yes. Of course, you'd

have to have the data. Yes.

MEMBER FORD: I think that this present discussion arises out of the comments that you all made. Does the ACRS write an approving letter, or whatever it is that we write, for this methodology?

MEMBER KRESS: Well, I think what we do in the case of this license renewal is to say the ACRS has looked at the staff's SER and the staff's procedure, and we approve the procedures. But we don't -- I think we keep hands off on saying we approve the license --

MR. DURAISWAMY: No, it doesn't say -- just the word "approve," yes.

MEMBER KRESS: Yes, we don't approve license renewal. We agree with the staff's --

MR. DURAISWAMY: Exactly.

MEMBER KRESS: -- has done a good job of SER, and that the procedure is okay. I think that's the way we have to deal with it, but we can't approve all of this.

MEMBER FORD: Well, I was about to follow it up with another comment on -- that there has been a fair amount of discussion within industry about the methodology used for coming up with these statistically-based algorithms, which then, in turn, depends on the quality of the data upon which they are statistically derived -- however those are derived. And there will always be arguments along those lines.

The question I'm really asking the staff is, are they happy that that disposition curve is a safe disposition curve? In other words, there have been very few data points which exceed that value of, what, 2.2 or -- steady state value of 2.2 times 10^{-5}. That is the -- as far as the safety point of view. Forget the specifics of, you know, whether you agree with the methodology.

So the question is: are the staff -- is the staff happy that this statistically-derived disposition algorithm is a safe upper-bound value?

MEMBER KRESS: I think if you read his last conclusion on the slide, you would have to say that, yes, they're happy with it.

MEMBER FORD: Yes.

MR. CARPENTER: The staff hasn't seen that. The staff has approved the BWRVIP 14 document with several caveats, which are being addressed by the BWRVIP.

MEMBER FORD: Okay.

MEMBER SHACK: So, basically, for

application to low irradiation levels, they have accepted that.

MEMBER FORD: As a conservative.

MEMBER SHACK: As conservative, right.

CHAIRMAN BONACA: The heart of the license renewal rule is that you have adequate programs to inspect passive components to assure that you can manage aging degradation.

You know, so there is -- I think that you are -- the way I see it, it addresses the issue of looking at specific locations, looking at the environment in those locations, conditions for the aging effects there may be on those components, and establishing inspections and repair techniques and approaches.

And so I think in that sense, really, it seems to be totally in agreement with the license renewal steps that you have not questioned, that really we have not explored in detail for each one of the locations, etcetera, as the correlations. And, therefore, the timing of the inspections, for example, and we haven't -- we can't comment on that, except for the specific four examples that we reviewed.

But we can conclude that the process is

really in line with the license renewal process.

MEMBER KRESS: Yes. And I think that's what we ought to -- Bill, you mentioned that the correlations were conservative for non-irradiated material. Does the database include radiated material? That seems like a pretty tough laboratory assignment to get --

MEMBER SHACK: Well, that's why it gets a lot higher when you have irradiated materials.

MEMBER KRESS: But do we have data on that?

MEMBER SHACK: You have very limited data, which is why you have to make conservative assessments.

MEMBER KRESS: I can see how it would have to be, yes.

MR. DURAISWAMY: We're trying to get --

MR. DYLE: We're trying to gather data from different -- we've leveraged our money. We've bought into different research programs, so we can obtain data, say, for Halden and other activities.

GE has worked to develop that. And as soon as we have something that is usable that we think justifies a change in rate or a better definition of the rate, we'll give that to the staff for their review. But we understand that that's something that we've got to deal with.

We're looking at fracture toughness also. There are some irradiated issues that we need to deal with and understand.

CHAIRMAN BONACA: Any other comments?

Let's talk just briefly about two things. One is, again, the way we view -- the way we view this review of the BWRVIPs. In the letter for Hatch, is there any other insight to provide here? Or shall we just treat them the way we treated the B&W topicals for the Oconee application? I would say that would be the approach that I would propose. Any other --

MEMBER LEITCH: Have you picked your two -- that is, one letter dealing with the BWRVIP program, and another letter dealing with the Hatch license renewal application that references this.

MR. DURAISWAMY: No. I think I better --

MEMBER LEITCH: Because this is going to be used much more widely than Hatch in the future, right?

MR. DURAISWAMY: Yes. But, Graham, I think in the Hatch application, you know, they're referencing, what, close to 20 reports? How many?

MR. CARPENTER: Can you tell me -- you've got something like -- well, almost every one of the I&E documents --

MR. DYLE: Yes, for the -- and you would have referenced 01, 07, 63, and then 76, which is really just one document, but there's four references. So we've referenced all the I&E documents where applicable.

An example would be core plate we didn't, because we've installed wedges. So by -- although we considered the scope of that, we looked at the core plate and said, "What does the VIP require that we do?" the answer was nothing, because we've installed the wedges. The core plate can't move should the bolts fail. So that's not specifically referenced but it was concerned.

The Hatch commitment is to implement the VIP documents as the NRC SE specifies or we'll notify the staff of changes that we need to make to do that. That's in the application, and that's the direction we're headed.

MEMBER LEITCH: But my question is, when the next BWR comes in, what do we do about that?

CHAIRMAN BONACA: See, their burden is

to demonstrate that the topical -- these topical reports are applicable to their plant, the application they propose. That's what the staff is supposed to review.

And, again, on our part, it's to assure that we feel comfortable that the staff has performed the verification. Granted, we are approving -- we're not approving -- we're using or referencing these BWRVIPs in our review of the individual applications, with no complete review on our part of all the topicals.

We really have reviewed only four, and we have reviewed the staff presentations and the SER provided by the staff. But this is not unlike other things that we do -- we do reference in our review of the applications and the SERs.

I don't know -- I know that there are a number of others that will receive separate evaluations that aren't completed -- totally completed yet. Do we have any plan to review those when they come through? I don't think so.

MR. DURAISWAMY: No. I think the next -- you know, next time, I think we've got to pick and choose, you know, some additional reports, you know, important reports. I think we can do -- when the staff has completed the safety evaluation, so you've got to do the same thing what we did this time. You know?

So Tom is willing to, you know, look at, you know, some more reports. And I think --

MEMBER SHACK: Well, for example, the important one will be the hydrogen water chemistry, because that will be fundamental to a major change in inspection frequency. And so, you know, I think when the SE for that one comes out, for example, that would be one that would -- we would want to look at.

CHAIRMAN BONACA: Yes. I think what we should plan to do probably is to reflect on that, think about it, and then make a little plan on our part on what we're going to review and under what kind of conditions. It may be that we do it for the next BWR license renewal committee that we have.

MR. ELLIOTT: Peach Bottom is only six months away, or less. They're coming in this summer, I believe.

CHAIRMAN BONACA: Okay. Now, the second issue I would like to talk about briefly is, what are we asking the staff to come and tell us about this at the next meeting next week for the full meeting? I would expect that we will have some condensed presentation as part of the Hatch application. So that's really the way we're going to address the BWRVIPs anyway.

MEMBER KRESS: What do we have, two hours?

MR. DURAISWAMY: How much time? I forgot. Yes. We get two hours for Hatch and --

MEMBER KRESS: Yes. But how much time do we have --

MR. DURAISWAMY: No, but -- yes, for the -- and the guidance documents and -- we have an hour and 10 minutes.

MEMBER KRESS: Okay.

CHAIRMAN BONACA: My suggestion is that we try to stay within the schedule. We may need less time for the guidance documents.

MR. DURAISWAMY: Yes. But they are -- all of things are included under Hatch. You know, so we can -- you know, they can address, you know, some of these things at that time.

CHAIRMAN BONACA: Okay. So we will have -- we will need a summary of the -- from the staff of this effort, the BWRVIP report that has been produced, and they are referenced in the application for Hatch, and then some summary of -- I guess I'm wrestling right now with the time available to us for that presentation, which is limited.

So what do you think will be interesting to the other three members which are not here right now?

MEMBER FORD: Could I ask, what's the expectation of the meeting next week for the Hatch? Are we expected to come up with an approval?

CHAIRMAN BONACA: No. We are going to have a report on this SER, which still has open items. So, therefore, we will have an opportunity to review it again. But this is a time when we can provide some feedback if there is feedback we want to provide.

MEMBER FORD: Okay.

CHAIRMAN BONACA: So -- yes, my suggestion is that we will probably commit to maybe half an hour of the whole presentation dedicated to the BWRVIPs with -- probably the best way would be to start with those two figures of the core and the components, so that there is an overview for the other members of what components we're talking about here. Very briefly, the kind of failure experience, the program that was implemented to address these failures.

I certainly think that the members should see, one, the population of the BWRs involved in this. The other way -- the other thing you should present is the -- the unavailability of the -- how much it has gone down since 1984, which definitely speaks of a success story for the program which has been implemented to test those.

And then, I think that I would focus purely on the four BWRVIPs that we chose, which I believe are pretty central. They were regarding internals -- you know, the --

MR. BARTON: Jet pumps and --

CHAIRMAN BONACA: -- the jet pumps, the shroud, the --

MR. BARTON: -- top guide.

CHAIRMAN BONACA: -- top guide.

MR. BARTON: And Class I piping.

CHAIRMAN BONACA: That's fine.

MEMBER SHACK: But, still, in a half an hour, you can barely do more than mention the titles.

CHAIRMAN BONACA: Well, I mean, I will be expecting only to see some conclusions as far as inspection frequency. I don't think we want to have more than that. For Oconee, when we have the -- I don't think we had almost any presentation of the B&W topical reports.

MEMBER SHACK: No, we didn't.

CHAIRMAN BONACA: We didn't. Are you suggesting we don't have it?

MEMBER SHACK: No. I guess I would focus on primarily how successful the program has been in, as you say, reducing the outages, and, you know, the sort of incidence of cracking.

CHAIRMAN BONACA: Yes.

MEMBER SHACK: And, you know, which is in a way the proof of the effectiveness of the program. Whatever you may argue about, you know, what we understand and what we don't understand, you know, we're just not getting nearly as much cracking anymore.

CHAIRMAN BONACA: And, again, focusing on the fact that the outcome of all this work really is a number of guidelines which seem to pattern exactly the -- for example, what you find in GALL for other components. Okay? So, essentially, the rate of inspection required, etcetera, etcetera, the programmatic requirements of license renewal.

MR. CARPENTER: Well, bear in mind GALL

relies heavily on the BWRVIP program for the internals, so --

CHAIRMAN BONACA: And that fits right into that.

MR. CARPENTER: Right.

CHAIRMAN BONACA: So it will be almost a presentation, you know, within that context.

MR. CARPENTER: Yes.

CHAIRMAN BONACA: You said a half an hour cannot provide much, but the -- I don't think we should spend more than half an hour on that, because there are many other issues we need to discuss.

MEMBER SHACK: No. You can't give more than half an hour.

CHAIRMAN BONACA: Maybe 20 minutes, whatever.

MEMBER KRESS: Take a look at Mr. Dyle's conclusions slide. He's got three major conclusions. The scope is all-inclusive and broad, and that it includes the appropriate elements, including inspection evaluation, repair, and mitigation. And that the program has been successful, and so forth.

If you could choose slides to illustrate those three conclusions --

MR. BARTON: We just have one slide that talks about how you looked at risk, so that will save George a 30-minute tirade on the --

MEMBER KRESS: Yes. We had less than -- we had one bullet on this.

MR. BARTON: At least one bullet on it.

MEMBER KRESS: But, anyway, you know, if you could -- if you could come up with some much shorter supporting slides for those three conclusions, it would be a good approach I think. I think, actually, you can go in here and choose some that would fit in a time period. Might be able to do it.

CHAIRMAN BONACA: Okay.

MEMBER KRESS: I think those are conclusions they'd like to know.

CHAIRMAN BONACA: Sure.

MEMBER KRESS: Things they'd like to know about.

CHAIRMAN BONACA: Okay. You'll be providing that, or somebody?

Okay. Any other comments? If there are no further comments, I think we are ready to adjourn the meeting today.

MR. DURAISWAMY: Yes. This meeting tomorrow is a different --

MEMBER KRESS: You're adjourning this meeting and you want to start a new one tomorrow.

CHAIRMAN BONACA: Okay. We'll start a new one tomorrow -- the Hatch application.

Okay. If nothing -- no comments from the public? Okay. The meeting is adjourned.

(Whereupon, at 4:15 p.m., the proceedings in the foregoing matter were adjourned.)

CERTIFICATE

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

Name of Proceeding: ACRS PLANT LICENSE RENEWAL

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.

Rebecca Davis

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

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

SUBCOMMITTEE MEETING ON PLANT LICENSE RENEWAL

MARCH 27, 2001
Date

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

SUBCOMMITTEE MEETING ON PLANT LICENSE RENEWAL

MARCH 27, 2001
Date

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
MEETING OF THE PLANT LICENSE RENEWAL SUBCOMMITTEE
LICENSE RENEWAL GUIDANCE DOCUMENTS AND SELECTED BWRVIP REPORTS
MARCH 27, 2001
ROCKVILLE, MARYLAND

- PROPOSED SCHEDULE -

	TOPIC	PRESENTER	TIME
I.	Opening Remarks	M. Bonaca, ACRS	8:30-8:35 a.m.
II.	Staff Opening Remarks	C. Grimes, NRR	8:35-8:40 a.m.
III.	Introduction and Overview	S. Lee, NRR	8:40-8:50 a.m.
IV.	Overview of Public Comments	S. Koenick, NRR	8:50-9:00 a.m.
V.	Changes to Standard Review Plan (SRP): Scoping and Screening Methodology	S.K. Mitra	9:00-9:15 a.m.
VI.	Changes to Generic Aging Lessons Learned (GALL) Report, Chapters II and III	P. Kang	9:15-9:45 a.m.
	- BREAK -		9:45-10:00 a.m.
VII.	Changes to GALL, Chapter IV	J. Dozier	10:00-10:30 a.m.
VIII.	Changes to GALL, Chapters V, VII and VIII	E. Kleeh K. Rico	10:30-11:00 a.m.
IX.	Changes to GALL, Chapter VI	S.K. Mitra	11:00-11:15 a.m.
X.	One-time Inspections, Regulatory Guide, NEI 95-10	D. Solorio	11:15-11:30 a.m.
XI.	Changes to NEI 95-10: Industry Guidance	D. Walters, NEI	11:30-12:00 noon
	- LUNCH -		12:00-1:00 p.m.
XII.	Staff Introduction Concerning BWRVIP Topical Reports Related to License Renewal	R. Dyle, BWRVIP	1:00-1:30 p.m.
XIII.	BWRVIP 76: Core Shroud Inspection	G. Carpenter, NRR	1:30-2:30 p.m.
	- BREAK -		2:30-2:45 p.m.
XIV.	BWRVIP 41: Jet Pump Assembly Inspection	G. Carpenter, NRR	2:45-3:15 p.m.

XV.	BWRVIP 26: Top Guide Inspection	G. Carpenter, NRR	3:15-3:45 p.m.
XVI.	BWRVIP 75: Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules	G. Carpenter, NRR	3:45-4:30 p.m.
XVII.	Discussion	M. Bonaca, ACRS	4:30-5:00 p.m.
XVIII.	Recess	M. Bonaca, ACRS	5:00 p.m.

NOTE: Presentation time should not exceed 50 percent of the total time allotted for specific item. The remaining 50 percent of the time is reserved for discussion.

Number of copies of the presentation materials to be provided to the ACRS - 25.

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
PLANT LICENSE RENEWAL SUBCOMMITTEE
March 27, 2001

IMPROVED LICENSE RENEWAL GUIDANCE DOCUMENTS

IMPROVED LICENSE RENEWAL GUIDANCE DOCUMENTS

- Generic Aging Lessons Learned (GALL) report (NUREG-1801)
- Standard Review Plan for License Renewal (NUREG-1800)
- Regulatory Guide for License Renewal (RG 1.188)
- Nuclear Energy Institute (NEI) industry guidance 95-10, Rev. 3

TEAM EFFORT

- Office of Nuclear Reactor Regulation
- Office of Nuclear Regulatory Research
- Argonne National Laboratory
- Brookhaven National Laboratory

AGENDA

Topic	Presenter
Introduction	Sam Lee, NRR
Public Comments	Steve Koenick, NRR
Standard Review Plan (Scoping)	S. K. Mitra, NRR
GALL, Chapters II and III (Structures)	Peter Kang, NRR
GALL, Chapter IV (Reactor Coolant System)	Jerry Dozier, NRR
GALL, Chapters V, VII, VIII (Engineered Safety Features, Auxiliary, Steam and Power)	Ed Kleeh, NRR Kimberley Rico, NRR
GALL, Chapter VI (Electrical)	S. K. Mitra, NRR
One-Time Inspections, Reg. Guide, NEI 95-10	Dave Solorio, NRR

FUTURE ACTIVITIES

- Submit documents to Commission for approval (April 30, 2001)
- Continue dialog with NEI on 5 items (small-bore piping, bolting, loose parts monitoring, IPE/IPEEE scoping, fire protection)
- Participate in NEI demonstration project to implement improved guidance documents

PUBLIC COMMENTS

- 9/25/00 public workshop
  - 115 participants

- 128 written commenters
  - 101 individuals
  - 15 public interest groups
  - 12 industry groups/utilities

- NUREG-1739, “Analysis of Public Comments on the Improved License Renewal Guidance Documents”

STANDARD REVIEW PLAN (CHAPTER 2: SCOPING)

Changes Resulting from Public Comments

- Incorporated severe accident management to source documents to consider for scoping
- Clarified the focus of the scoping review

NEI Continued Dialog Item

- IPE/IPEEE as source document to consider for scoping

GALL, CHAPTERS II AND III (STRUCTURES)

Changes Resulting from Public Comments

- Specific criteria were developed to address aging management of inaccessible areas for concrete and steel

- Use IWE with Appendix J and coatings program (if credited) for managing loss of material due to corrosion of containment steel elements

- Use a combination of water chemistry program and monitoring of the pool water level to manage SCC and crevice corrosion of stainless steel spent fuel pool liner

- Cracking of component supports (metal members) due to vibratory loads and cyclic loading was determined not to be a license renewal issue

GALL, CHAPTER IV (REACTOR COOLANT SYSTEM)

Changes Resulting from Public Comments

- Added PWR reactor vessel internals program description to resolve the neutron fluence threshold issue for reactor vessel internals

- Boric Acid Corrosion programs (GL 88-05) are fully credited to manage the effects of boric acid corrosion

- PWSCC of pressurizer Inconel 600 penetrations is adequately managed by the chemistry and ISI programs; the Inconel 182 welds are a plant specific evaluation

- Removed insignificant aging effects such as wear/loss of material for the core support pads and the guide tube cards

- Added components such as the incore neutron flux monitoring tubes and flange bolting

NEI Continued Dialog Items

- Operating experience with cracking of small-bore piping
- Management of loss of preload of reactor vessel internals bolting using the loose parts monitoring system

GALL, CHAPTERS V, VII, VIII (ENGINEERED SAFETY FEATURES, AUXILIARY SYSTEMS, STEAM AND POWER CONVERSION SYSTEM)

Changes Resulting from Public Comments

- Water chemistry program manages stress corrosion cracking in containment spray and safety injection systems

- General corrosion causes loss of material for carbon steel components in air but not for stainless steel components exposed to water systems

- Filters are considered short-lived components

- Management of external surfaces of carbon steel components is plant specific

- Biofouling could cause corrosion in untreated water systems

- Alternative to manage corrosion of buried piping

- Program to manage selective leaching of metal components in water systems

NEI Continued Dialog Items

- Operating experience with cracking in bolting

- Inspections of fire protection systems

GALL, CHAPTER VI (ELECTRICAL)

Changes Resulting from Public Comments

- Consolidated boric acid corrosion programs
- Incorporated examples of specific insulation tests for medium voltage cables
- First inspection/test of the cables to be completed prior to the period of extended operation

CHANGES TO RG 1.188 (FORMALLY DG-1104)

- Endorses NEI 95-10, Revision 3
- To address two public comments additional clarification was added to
  - Promulgate recent guidance regarding electronic submittals
  - Ensure information was not lost for graphical presentations

CHANGES TO NEI 95-10 REVISION 3 (MARCH 1, 2001)

- Consistency changes
- Additional guidance for addressing GSIs/USIs
- Conforming changes resulting from changes to accident source term

ONE-TIME INSPECTIONS

System	Calvert	Oconee	GALL
Reactor Vessel, Internals, and Reactor Coolant System	RCS-SBP, RVI, PZR	RCS-SBP, OTSG, PZR	RCS-SBP, RVI, PZR
Engineered Safety Features	CIG, SI, CS	LPI, RBS	ECCS
Auxiliary Systems	CC, SRW, SW, FP, CVCS, CA, EDG, RM, NSSS-Sampling, CR & DGB HVAC, PC-HVAC, Instru Lines, AB-HVAC	CC, SRW, LPSW/HPSW, CAS, DJW, CW, CCW, RCPMOC, DW, LWD, PS Systems: CD, DA, GA, SSFASW, SSFDW, SSFSL	CCCS, OCCS, FP, EDG, SFS, SFCC, SDC, DFO
Steam and Power Conversion	FW, MS, ES, N&H, AFW	TGCW, TSP, Cond PS Systems: ASW	FW, STS, ES, Cond, SGB, AFW

AFW - Auxiliary Feedwater
AB-HVAC - Auxiliary Building Heating and Ventilation
ASW - Auxiliary Service Water
CA - Compressed Air
CAS - Chemical Addition
CC - Component Cooling
CCW - Condenser Circulating Water
CD - Carbon Dioxide system
CIG - Containment Isolation Group
Cond - Condenser/Condensate system
CR & DGB HVAC - Control Room and Diesel Generator Building HVAC
CVCS - Chemical and Volume Control System
CW - Chilled Water
DA - Depressing Air system
DFO - Diesel Fuel Oil
DJW - Diesel Jacket Water
DW - Demineralized Water
ECCS - Emergency Core Cooling System
EDG - Emergency Diesel Generator
ES - Extraction Steam
FWS - Feedwater system
GA - Governor Air system
HPSW - High Pressure Service Water
Instru Lines - Instrument Lines
LPI - Low Pressure Injection
LPSW - Low Pressure Service Water
LWD - Liquid Waste Disposal
N&H - Nitrogen and Hydrogen system
OTSG - Once Through Steam Generator lateral supports
PC-HVAC - Primary Containment HVAC
RBS - Reactor Building Spray
RCPOC - Reactor Coolant Pump Oil Collection
RCS - Reactor Coolant System - small bore piping
RM - Radiation Monitoring
RVI - Reactor Vessel Internals
SDC - Shutdown Cooling System (Older BWR)
SFCC - Spent Fuel Cooling and Cleanup
SFS - Spent Fuel Storage
SFPC - Spent Fuel Pool Cooling
SGB - Steam Generator Blowdown
SRW - Service Water
SSFDW - SSF drinking water system
SSFDW - SSF Drinking Water
SSFSL - SSF Sanitary Lift
SSFASW - Standby Shutdown Facitlity Auxiliary Service Water
STS - Steam Turbine System
SW - Salt Water
TGCW - Turbine Generator Cooling Water
TSP - Turbine Sump Pump

BWRVIP Reports Applicability to License Renewal

ACRS Briefing
March 27, 2001

C. E. Carpenter, Jr.
Materials & Chemical Engineering Branch
Office of Nuclear Reactor Regulation

BWRVIP and License Renewal

Agenda

- Overview of BWRVIP Program
- Staff's Review of BWRVIP Reports
  - Current Operating Period
  - BWRVIP Generic Aging Management Plans
  - Reports Supporting BWRVIP Generic AMP
- Specific Examples
- Conclusions

Overview of BWRVIP Program

Staff's Perspective

- BWRVIP is a Voluntary Industry Initiative
  - Program Began in 1994 to Address GL 94-03 Core Shroud Cracking Issues
  - Program Now Addresses All BWR Internal Components, Reactor Vessel, and Class I Piping
  - Program Covers Current Operating Term and Extended Operating Period
- BWRVIP Proactively Addressing Aging Degradation Issues That are Beyond Regulatory Requirements

Overview of BWRVIP Program

Staff's Perspective (con't.)

- Staff is Reviewing BWRVIP Submittals
  - 15 Inspection & Flaw Evaluation Guidelines
  - 13 Repair / Replacement Design Criteria
  - 4 Crack Growth Mitigation Guidelines
  - 22 Other Supporting Reports
  - 12 License Renewal Appendices
- Staff Expects to Finish Reviews by 12/2001
  - This is Dependent on Timeliness and Technical Adequacy of BWRVIP Responses to Staff RAIs and SE Open Items

Overview of BWRVIP Program

Industry's Perspective

- Presentation by Robin Dyle
  - Technical Chair, Assessment Committee

Staff's Review of BWRVIP Reports

Current Operating Period

- Staff Has Completed Review of Almost All BWRVIP Reports
  - Staff Has Concluded that Implementation of BWRVIP Guidelines, as Modified to Address Staff Comments, Will Provide an Acceptable Level of Quality for Inspection and Flaw Evaluation of Subject Safety-Related Components
  - Independent RES Review (NUREG/CR-6677) Found That Comprehensive Inspection Programs Like BWRVIP Significantly Reduces Core Damage Frequency

Staff's Review of BWRVIP Reports

BWRVIP Generic Aging Management Plans

- Staff Completing Review of BWRVIP LR Appendices and Has Found That:
  - Referencing BWRVIP AMPs and Completing Action Items Will Provide Reasonable Assurance that Applicant Will Adequately Manage Aging Effects During Extended Operation Period
  - Generic AMPs Usage Will Significantly Reduce Staff Review of LR Applications

Staff's Review of BWRVIP Reports

BWRVIP Generic Inspection Guidelines & AMPs

- BWRVIP Inspection and Flaw Evaluation (I&E) Guidelines
  - BWRVIP-18, Core Spray Internals I&E Guideline
  - BWRVIP-25, Core Plate I&E Guideline
  - BWRVIP-26, Top Guide I&E Guideline
  - BWRVIP-27, Standby Liquid Control System / Core Plate ΔP I&E Guideline
  - BWRVIP-38, Shroud Support I&E Guidelines

Staff's Review of BWRVIP Reports

BWRVIP Generic Inspection Guidelines & AMPs

- BWRVIP I&E Guidelines (con't)
  - BWRVIP-41, BWR Jet Pump Assembly I&E Guidelines
  - BWRVIP-42, BWR LPCI Coupling I&E Guideline
  - BWRVIP-47, BWR Lower Plenum I&E Guideline
  - BWRVIP-48, Vessel ID Attachment Weld I&E Guideline
  - BWRVIP-49, Instrument Penetration I&E Guidelines

Staff's Review of BWRVIP Reports

BWRVIP Generic Inspection Guidelines & AMPs

- BWRVIP I&E Guidelines (con't)
  - BWRVIP-74, BWR Reactor Pressure Vessel I&E Guideline
    - Subsumes BWRVIP-05, BWR RPV Shell Weld Inspection Recommendations
  - BWRVIP-76, BWR Core Shroud I&E Guidelines
    - Subsumes BWRVIP-07, Guidelines for Reinspection of BWR Core Shrouds, and BWRVIP-63, Shroud Vertical Weld Inspection and Evaluation Guidelines, and supported by BWRVIP-80, Evaluation of Crack Growth in BWR Shroud Vertical Welds

Staff's Review of BWRVIP Reports

Reports Supporting BWRVIP Generic AMP

- Additional BWRVIP Reports
  - BWRVIP-75, Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules (NUREG-0313)
    - supported by BWRVIP-61, BWR Vessel and Internals Induction Heating Stress Improvement Effectiveness on Crack Growth in Operating Plants
  - BWRVIP-78, BWR Integrated Surveillance Program
    - Supported by BWRVIP-86, BWR ISP Implementation Plan

Staff's Review of BWRVIP Reports

Reports Always Applicable

- Repair / Replacement Design Criteria
    - Supported by BWRVIP-90, Interim Welding Guidelines for BWR Internals
  - BWRVIP-16, Internal Core Spray Piping and Sparger Replacement Design Criteria
  - BWRVIP-19, Internal Core Spray Piping and Sparger RDC
  - BWRVIP-34, Technical Basis for Circumferential Weld Overlay Repair of Vessel Internal Core Spray Piping

Staff's Review of BWRVIP Reports

Reports Always Applicable (con't.)

- Repair / Replacement Design Criteria
  - BWRVIP-44, Underwater Weld Repair of Nickel Alloy Reactor Vessel Internals
  - BWRVIP-45, Weldability of Irradiated LWR Structural Components
  - BWRVIP-50, Top Guide / Core Plate RDC
  - BWRVIP-51, Jet Pump RDC
  - BWRVIP-52, Shroud Support and Vessel Bracket RDC

Staff's Review of BWRVIP Reports

Reports Always Applicable (con't.)

- Repair / Replacement Design Criteria
  - BWRVIP-53,Standby Liquid Control Line RDC
  - BWRVIP-55,Lower Plenum RDC
  - BWRVIP-56,LPCI Coupling RDC
  - BWRVIP-57,Instrument Penetrations RDC
  - BWRVIP-58,CRD Internal Access Weld RDC

Staff's Review of BWRVIP Reports

Reports Always Applicable (con't.)

- Mitigation Reports
  - Supported by BWRVIP-29, BWR Water Chemistry Guidelines - 1996 Rev., and BWRVIP-79, BWR Water Chemistry Guidelines - 2000 Rev.
  - BWRVIP-14, Evaluation of Crack Growth in BWR Stainless Steel RPV Internals
    - supported by BWRVIP-66, Review of Test Data for Irradiated Stainless Steel Components
  - BWRVIP-59, Evaluation of Crack Growth in BWR Nickel-Base Austenitic Alloys in RPV Internals

Staff's Review of BWRVIP Reports

Reports Always Applicable (con't.)

- Mitigation Reports
  - BWRVIP-60, Evaluation of Crack Growth in BWR Low Alloy Steel RPV Internals
  - BWRVIP-62, Technical Basis for Inspection Relief for BWR Internal Components with Hydrogen Injection
    - Supported by BWRVIP-66

Staff's Review of BWRVIP Reports

Reports Always Applicable (con't.)

- Other Supporting BWRVIP Reports
  - BWRVIP-03, RPV Internals Examination Guidelines
  - BWRVIP-06, Safety Assessment of BWR Reactor Internals
    - supported by BWRVIP-09, Quantitative Safety Assessment of BWR Reactor Internals

Specific Examples

BWRVIP-76, BWR Core Shroud I&E Guidelines

- Staff is Reviewing Proposed Guidance
  - Incorporates BWRVIP-07, Guidelines for Reinspection of BWR Core Shrouds, and BWRVIP-63, Shroud Vertical Weld Inspection and Evaluation Guidelines, and supported by BWRVIP-80, Evaluation of Crack Growth in BWR Shroud Vertical Welds

Specific Examples

BWRVIP-76, BWR Core Shroud I&E Guidelines (con't.)

- Guidelines Propose:
  - Weld Inspection Strategy in Un-Repaired Shrouds
  - Weld Inspection Strategy in Repaired Shrouds
  - Inspection & Evaluation Reporting Requirements
  - Demonstration of Compliance with LR Rule
- Guidelines Incorporate Previous Staff SE Comments on BWRVIP-07 & -63
  - Staff Working with BWRVIP to Resolve Interpretation Issues

Specific Examples

BWRVIP-41, BWR Jet Pump Assembly I&E Guidelines

- Staff is Completing Review
- Specific Findings
  - Scope of Program
    - Provides Component Description and Function; Describes Susceptibility Factors; Discusses Potential Failure Locations and Safety Consequences; Describes Service Background and Inspection History; Provides Proposed Inspection Guidelines; and Describes Loadings.

Specific Examples

BWRVIP-41, Jet Pump Assembly I&E Guidelines (con't)

- Specific Findings
  - Scope of Program
    - Results of RES Program Will Be Used to Evaluate Need for Additional Inspections of CASS Jet Pump Assemblies in Renewal Period and to Modify Inspection Scope and Frequency, as Needed.
  - Preventive Actions
    - Maintaining High Water Purity Reduces SCC Susceptibility and HWC / NMCA Reduces it Further.

Specific Examples

BWRVIP-41, Jet Pump Assembly I&E Guidelines (con't)

- Specific Findings
  - Parameters Monitored or Inspected
    - Inspections and Flaw Evaluations Performed in Accordance with Staff-Approved BWRVIP Guidelines. Examination Expansion and Re-inspection Beyond Baseline Inspection Required If Flaws Are Detected.
  - Detection of Aging Effects
    - Inspections Performed in Accordance with Staff-Approved BWRVIP Guidelines Will Ensure That Aging-Related Degradation Detected Before Any Loss of Intended Function Occurs.

Specific Examples

BWRVIP-41, Jet Pump Assembly I&E Guidelines (con't)

- Specific Findings
  - Monitoring and Trending
    - Inspection Schedules in Accordance with BWRVIP Guidelines Ensures Timely Detection of Cracks. Scope of Examination Expansion and Re-inspection Beyond Baseline Inspection Required If Flaws Are Found.
  - Acceptance Criteria
    - Degradation Is Evaluated in Accordance with Approved BWRVIP Guidelines.

Specific Examples

BWRVIP-41, Jet Pump Assembly I&E Guidelines (con't)

- Specific Findings
  - Corrective Actions
    - Corrective Action Proposed in BWRVIP RDC Has Been Reviewed and Approved with Several Open Items.
  - Operating Experience
    - Instances of Cracking Have Occurred in Jet Pump Assemblies (Bulletin 80-07) Hold down Beam (IN 93-101, and Jet Pump Riser Pipe Elbows (IN 97-02).

Specific Examples

BWRVIP-26, Top Guide I&E Guideline

- Staff Has Completed Review
- Specific Findings
  - Scope of Program
    - Provides Component Description and Function; Describes Susceptibility Factors; Discusses Potential Failure Locations and Safety Consequences; Describes Service Background and Inspection History; Provides Proposed Inspection Guidelines; and Describes Loadings.

Specific Examples

BWRVIP-26, Top Guide I&E Guideline (con't)

- Specific Findings
  - AMP's 10 Elements Findings Similar to BWRVIP-41 Review
    - Operating Experience: IN 95-17 Discusses Cracking in Top Guides of U.S. and Overseas BWRs and Related Experience in Other Components Reviewed in GL 94-03 and NUREG-1544.
    - Cracking Has Also Been Observed in the Top Guide of a Swedish BWR.

Specific Examples

BWRVIP-75, Technical Basis for Revisions to GL 88-01 Inspection Schedules (NUREG-0313)

- Applicable in Extended Operating Period, But No License Renewal SE
- BWRVIP-75 Report Proposes Revisions to Extent and Frequencies for Piping Inspection Contained in GL 88-01

Conclusions

Applicability of BWRVIP to License Renewal

- Staff Completing Review of BWRVIP LR Appendices and Has Found That:
  - Referencing BWRVIP AMPs and Completing Action Items Will Provide Reasonable Assurance that Applicant Will Adequately Manage Aging Effects During Extended Operation Period
  - Generic AMPs Usage Will Significantly Reduce Staff Review of LR Applications

BWRVIP Program ACRS Presentation March 27, 2001

Robin Dyle
Southern Nuclear
Assessment Committee Chairman

Purpose

- Provide a historical review of the BWRVIP program and structure
- Identify the scope of the program and why components were selected
- Identify the attributes of the BWRVIP program that ought to be part of a plant's implementing program
- Overview of the BWRVIP guidelines
- Detailed review of BWRVIP Inspection and Flaw Evaluation Guidelines for the Shroud, Jet Pump, Top Guide and Piping

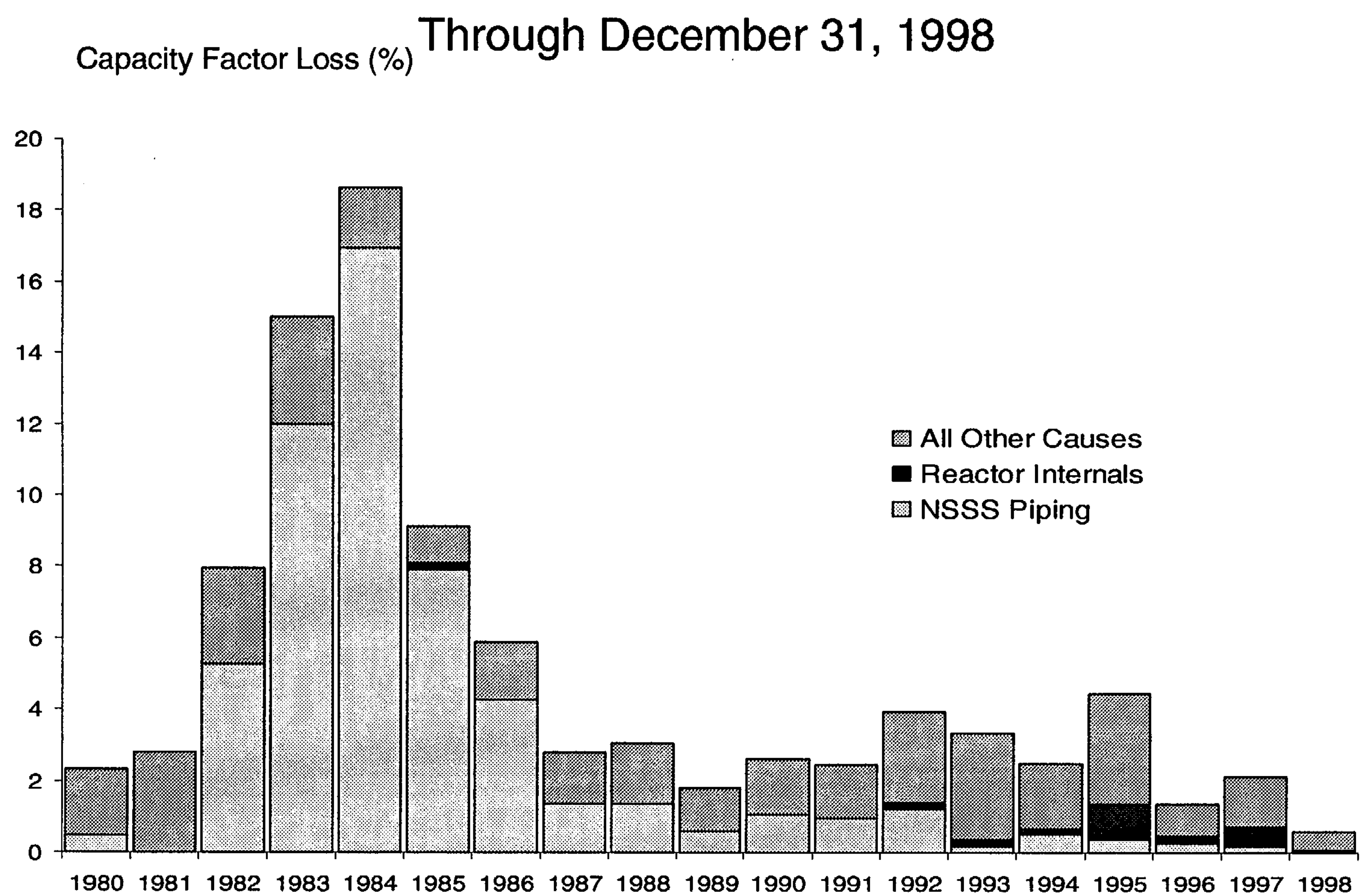
Historical Perspective

- IGSCC in austenitic piping was a major issue for BWRs in the 1980s
- Potential susceptibility of reactor internals to IGSCC was recognized by EPRI and the BWROG in the 1980s
- Shroud cracking in 1993-1994 confirmed that IGSCC of internals is a significant issue for BWRs
- BWR utility executives formed the BWRVIP in mid-1994 to proactively address BWR reactor vessel and internals material condition issues

BWRVIP Objectives

- Lead industry toward proactive generic resolution of vessel and internals material condition issues
- Identify or develop generic, cost-effective strategies from which each operating plant will select the alternative most appropriate to their needs
- Serve as a focal point for the regulatory interface with the industry in BWR vessel and internals material condition issues (including license renewal)
- Share information among members to obtain useful data from many sources

Capacity Factor Losses in BWRs



BWRVIP Domestic Plants

- Browns Ferry
- Brunswick
- CGS (WNP-2)
- Clinton
- Cooper
- Dresden
- Duane Arnold
- Fermi
- FitzPatrick
- Grand Gulf
- Hatch
- Hope Creek
- LaSalle
- Limerick
- Monticello
- Nine Mile Point
- Oyster Creek
- Peach Bottom
- Perry
- Pilgrim
- Quad Cities
- River Bend
- Susquehanna
- Vermont Yankee

BWRVIP International Members

- Chubu Electric Power Company
- Chugoku Electric Power Company
- Comision Federal de Electricidad
- Forsmark Kraftgrupp AB
- Iberdrola Generation
- Japan Atomic Power Company
- OKG Aktiebolag
- Tohoku Electric Power Company
- Tokyo Electric Power Company
- Taiwan Power Company

Project Scope

- Vessel and internal components from nozzle inward (with some exceptions)
- BWRVIP safety assessment (BWRVIP-06)
    - Identified components to be addressed
    - Prioritized when components were to be addressed

Core shroud
Shroud support
Core spray internals
Jet pump assembly
Top guide
Core plate
Lower plenum components
Vessel ID brackets
Standby liquid control
LPCI couplings
Instrument penetrations
RPV

BWRVIP guidelines

- I&E guidelines
  - What/when to inspect
  - Flaw evaluations
- NDE guidelines
  - How to implement inspection methods
- Repair guidelines
  - How to repair if necessary
- Mitigation guidelines
  - Criteria for effective HWC, NMCA, etc.

hydrogen water

noble metal ?

BWRVIP Organization

BWR Vessel and Internals Project
Organization and Technical Committee Membership

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Open
BWRVIP Liaison to EPRI Nuclear Power Council

02/23/2001

Assessment Committee Products

- Inspection and flaw evaluation (I&E) guidelines
- Crack growth and fracture toughness reports
- Safety assessment for internal components (BWRVIP-06)
- Component configuration drawings (BWRVIP-15)
- Bounding assessment for RPV integrity (BWRVIP-08/-46)
- Effect of IHSI (BWRVIP-61)
- Revision to GL 88-01 (BWRVIP-75)
- Integrated surveillance program (BWRVIP-78)

I&E Guidelines *1 of 2*

BWRVIP-01 Core Shroud

BWRVIP-05 RPV Inspection

BWRVIP-07 Core Shroud Re-inspection

BWRVIP-18 Core Spray Internals

BWRVIP-25 Core Plate

BWRVIP-26 Top Guide

BWRVIP-27 SLC System/Core Plate ΔP

BWRVIP-38 Shroud Support

BWRVIP-41 Jet Pump Assemblies

BWRVIP-42 LPCI Couplings

BWRVIP-47 Lower Plenum Components (CRD, etc)

I&E Guidelines *2 of 2*

- BWRVIP-48 Vessel ID Attachment Welds (Brackets)
- BWRVIP-49 Instrument Penetrations
- BWRVIP-63 Shroud Vertical Welds
- BWRVIP-74 RPV
- BWRVIP-76 Comprehensive Core Shroud (Combines BWRVIP-01, -07, and -63)

Why exclude some components from inspection?

- Safety assessment (BWRVIP-06) performed in 1995 supplemented by simplified PRA (BWRVIP-09)
- Assessment identified components that are necessary for safe operation and shutdown
  - Maintain coolable geometry
  - Maintain rod insertion times
  - Maintain reactivity control
  - Assure core cooling
  - Assure instrumentation availability
- Some components (e.g., feedwater spargers) are not a safety issue

Contents of I&E Guidelines

- Description of component
- Discussion of susceptibility to IGSCC
- Discussion of consequences of failure of each location
- Inspection history
- *Inspection requirements*
- *Evaluation methods*
- Reporting requirements

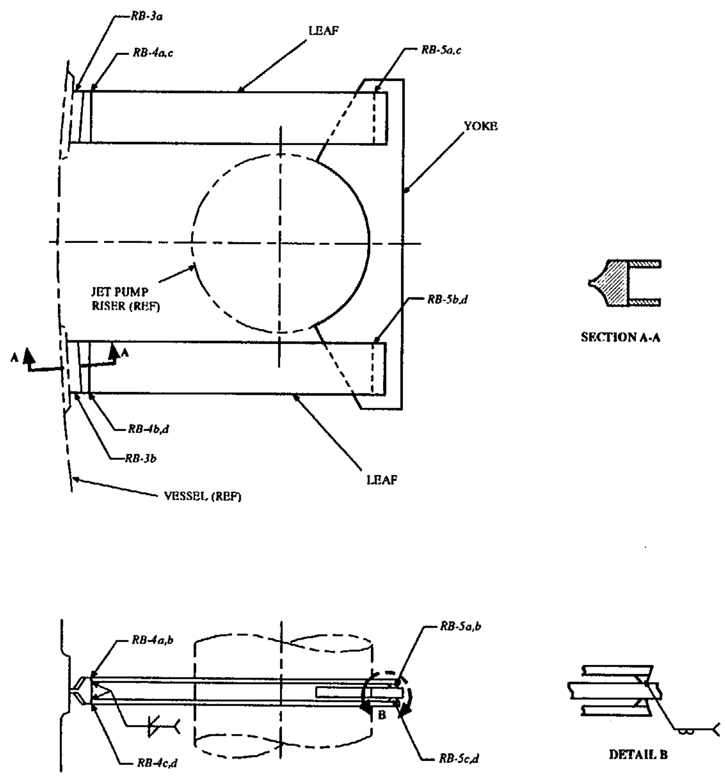
(Note: Format differs somewhat among I&E Guidelines)

Description of components

- Sketches show location of welds, bolted joints, etc.
- Locations labeled (e.g., H-4, RS-1) for identification purposes
- General plant variations shown (BWR/2 vs. BWR/6)
  - In some cases, plant specific configurations shown
- Configuration based on best available design information (BWRVIP-15)

(Note: Owners responsible for verifying configuration to determine applicability of I&E Guidelines)

Sample configuration sketch



Note 1: Triple Leaf Brace will have additional welds at RB-4 and RB-5
Note 2: This is the Primary Riser Brace at Dresden 2

Figure 2.3.1-3: Typical Secondary Double-Leaf Riser Brace

Susceptibility discussion

- Describes which locations are likely to experience degradation through IGSCC or other mechanisms, and which are not
- Non-susceptible locations do not normally require inspection
- Input to inspection requirements

Consequences of failure

- **Discussion of consequences of failure for each location and ability to perform intended function**
- **Locations not having adverse safety consequences are not required to be inspected**
  - Guidelines recommend that there may be economic reasons to inspect additional locations (review GE SILs)
  - Input to inspection requirements

Inspection history

- Review of inspections performed to date and results
- List of indications observed
- Secondary input to inspection requirements

Inspection requirements

- List of locations to inspect
- Schedule for "baseline" inspection and guidance for re-inspection
- Inspection methods (e.g., UT, EVT-1) for each location
- Scope expansion
  - Additional inspections if cracks are found
- Alternatives to inspection
  - Specific repairs or analyses to eliminate inspections

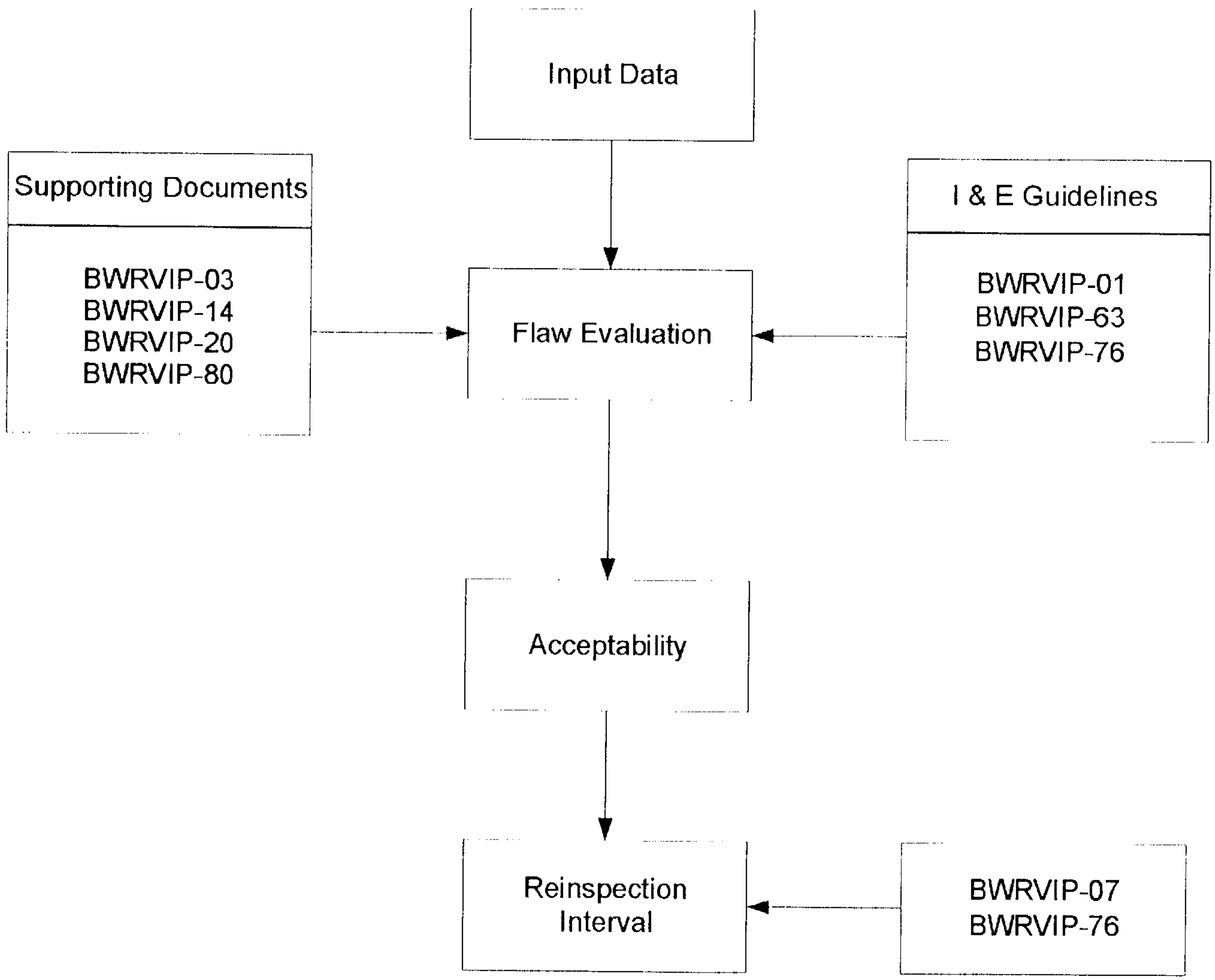
Inspection methods

- I&E Guidelines specify methods for each component
  - EVT-1: visual with 1/2-mil resolution
  - VT-1: visual with 1/32-in resolution
  - VT-3: general visual
  - UT: ultrasonic
  - ET: eddy current
- Earlier visual methods (CSVT, MVT-1) eliminated
- Details of methods found in BWRVIP-03

Flaw evaluation

- **Describes acceptable procedures for evaluation of flaws found during inspections**
  - Structural analysis techniques and, in some cases, equations
  - Assumptions regarding cracking in un-inspected regions
  - Consideration of NDE uncertainty (if applicable)
  - Leakage calculations (if applicable)
  - Limitations on use (e.g., high fluence components require special analytical techniques)
- **Crack growth rates from BWRVIP-14 (SS), -59 (nickel base), -60 (LAS), -80 (SS)**

Core shroud flaw evaluation flow chart



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Reporting of inspection data

- I&E Guidelines specify that a summary of inspection results be provided to the BWRVIP subsequent to each outage
  - EPRI compiles summaries and provides to the U.S. NRC semi-annually
- Inspection committee has developed spreadsheets for reporting inspection results
- Facilitates BWRVIP assessment of the program and will identify conditions that might warrant program revisions

Related issues

- Inspection with HWC/NMCA
- BWRVIP-03: NDE Guidelines
- Repair issues
- Interface with ASME Code
- License Renewal

Inspection with HWC/NMCA

- BWRVIP-62: Technical Basis for Inspection Relief for BWR Internal Components with Hydrogen Injection
  - Justifies reduced inspections for plants on hydrogen water chemistry
  - Currently under U.S. NRC review
  - The BWRVIP will propose component-specific reduced inspection intervals at a later date

BWRVIP-03: NDE Guidelines

- Detailed description of inspection techniques for each component
- Description of vendor demonstrations performed on mock-ups
- Establishes NDE uncertainty for each demonstration
  - Inclusion of NDE uncertainty in flaw evaluations is currently being discussed with the U.S. NRC
  - NDE uncertainty not considered for determining reinspection intervals
- Updated annually (Rev. 3 current as of 3/01)

What if I have to repair? *1 of 3*

- If flaw evaluations produce unacceptable results, repair may be necessary
- Repairs should comply with BWRVIP repair design criteria
  - Structural requirements, material considerations, fabrication requirements, inspection requirements, etc.
- If significant component degradation is anticipated, procurement of "contingency" repair hardware may be warranted
- May consider justification of operation for a partial cycle to allow time for the design and procurement of a repair

What if I have to repair? *2 of 3*

- Repair of safety-related internals within the BWRVIP scope must be in compliance with a 10CFR50, Appendix B program
  - Repairs may also be required to meet Section XI of the ASME Code, and be reported as required by Section XI (NIS-2 or OAR forms)
  - Repair of non-code, safety-related components are to be reported and documented per BWRVIP criteria

What if I have to repair? *3 of 3*

- **Inspection guidelines may be different than for un-repaired components**
  - In general, post-repair inspection requirements should be developed by the repair designer
  - Some inspection requirements for repaired shrouds are contained in I&E Guidelines (BWRVIP-07 and BWRVIP-76)

Interface with the ASME Code

- Section XI requires inspection, evaluation and repair of certain components that are also addressed by BWRVIP I&E Guidelines
- U.S. NRC approval of I&E Guidelines does not eliminate any requirements to meet ASME Code commitments
- Two sets of requirements exist (sometimes different)
- Each licensee must seek approval in order to use BWRVIP guidelines in lieu of the ASME Code via 10CFR50.55a
  - The BWRVIP is to develop a template for submittal of a technical alternative

License renewal

- I&E Guidelines technical criteria typically developed without regard to a specific operating period
- Appendices to I&E Guidelines developed to allow utilities to use guidelines for "Demonstration of Compliance with License Renewal Rule"
  - Appendices define any additional inspections or analyses that must be completed to allow applicability of I&E Guidelines beyond 40 years

CONTENTS

- Purpose
- Overview of the BWRVIP guidelines
  - General content
  - Related issues
- Program issues
- Detailed review of BWRVIP Inspection and Flaw Evaluation Guidelines for each component

BWRVIP Program Issues *1 of 2*

- A BWRVIP program is that controlled process used by a licensee to implement the requirements described in the applicable BWRVIP I&E Guidelines, along with supporting BWRVIP documents
- Can be accomplished in a variety of fashions:
  - Special ISI procedures
  - Augmented ISI programs
  - Specifications

BWRVIP Program Issues 2 *of 2*

- The program assures:
  - Inspections performed on time
  - Inspections employ the correct technique
  - Inspections are accomplished by qualified personnel and systems
  - Inspection results and flaws are evaluated properly with the correct methodology
  - Repairs meet the ASME Code or BWRVIP criteria, as applicable
- BWRVIP scope components are safety-related and therefore involve the use of a Quality Assurance program

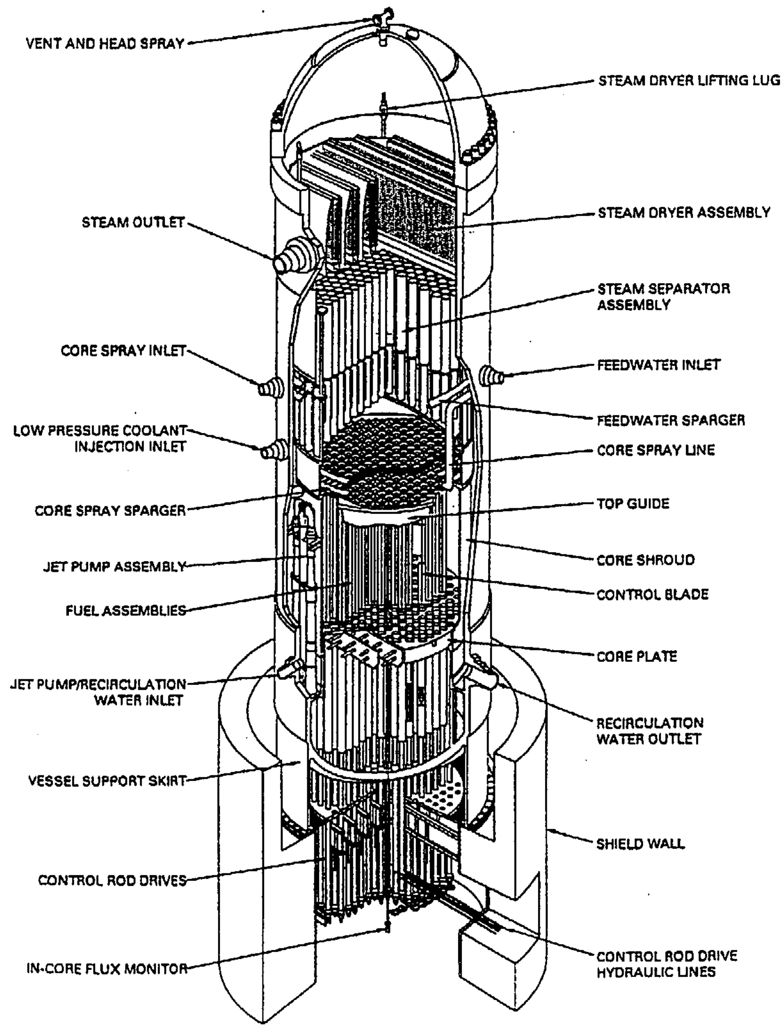
CONTENTS

- Purpose
- Overview of the BWRVIP guidelines
  - General content
  - Related issues
- Program Issues
- Detailed review of BWRVIP Inspection and Flaw Evaluation Guidelines for Shroud, Jet Pump Assembly, Top Guide and Piping

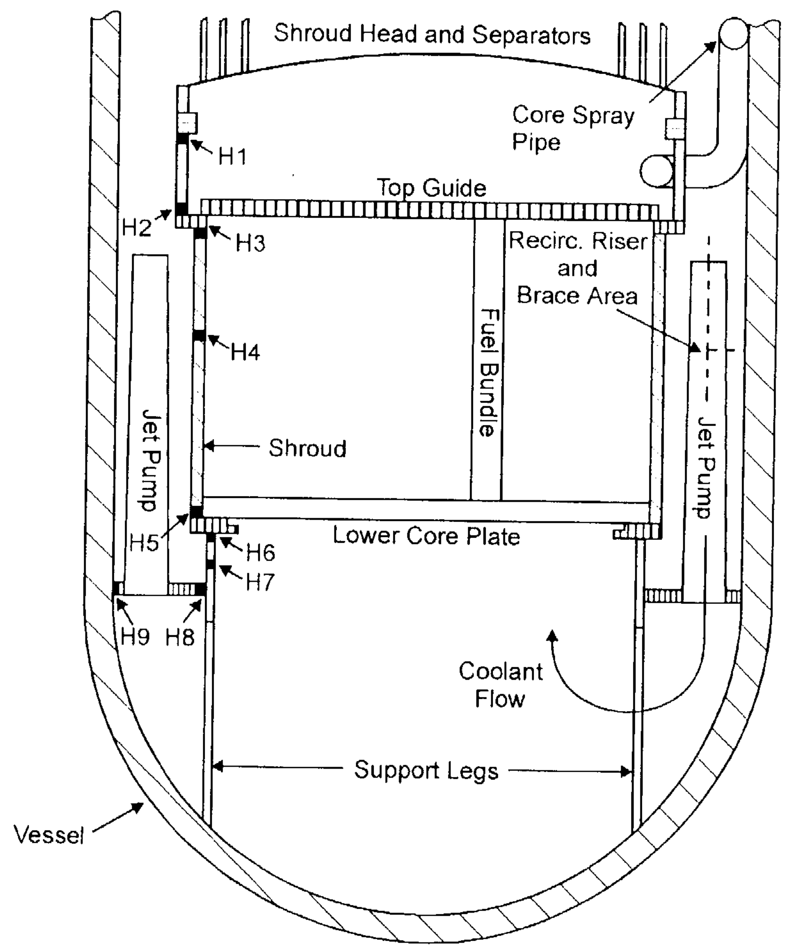
Format for Detailed Review

- Overview of component configuration sketches
- Inspection history
- Overview of inspection guidelines
  - Baseline
  - Options
  - Scope expansion
  - Re-inspection
- Overview of flaw evaluation
- Status of U.S. NRC review of guidelines (as of August 2000)

Typical Non-BWR/2 Reactor Assembly



Configuration



Inspection history

Inspections:

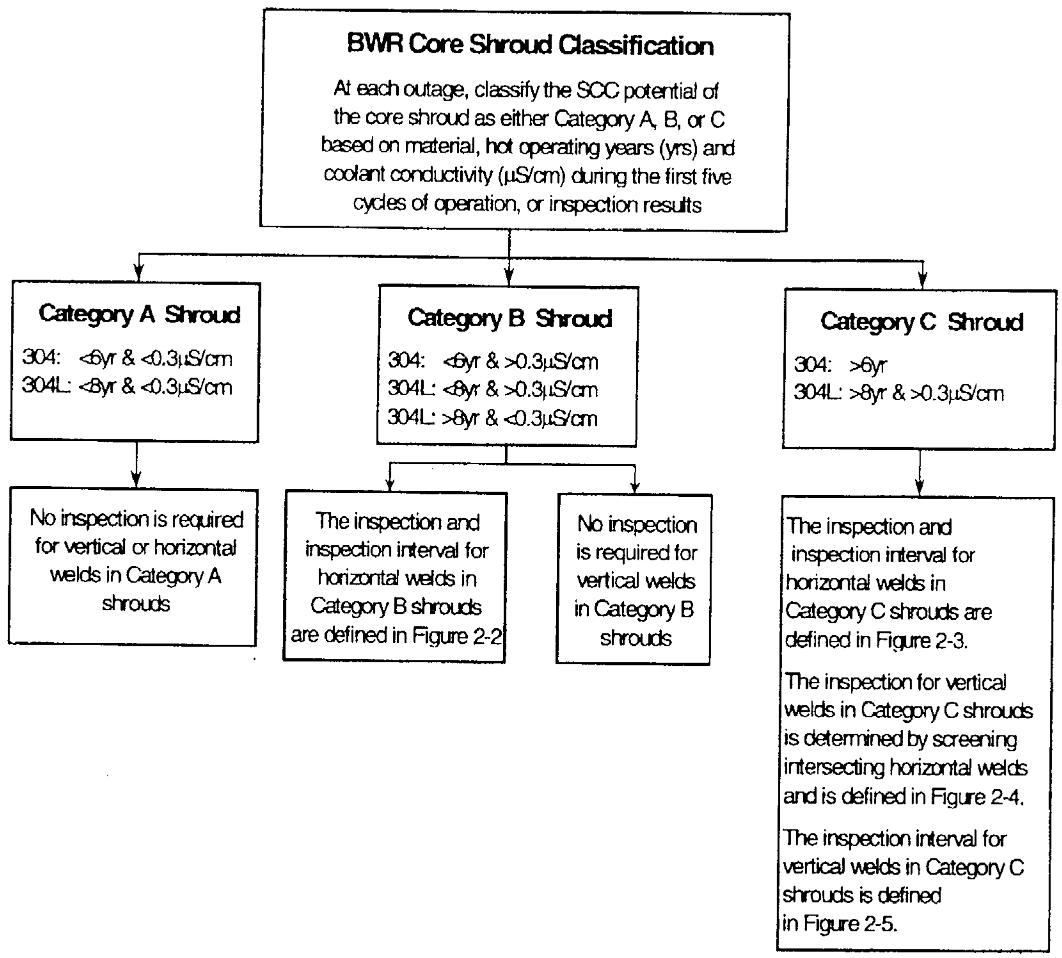
- Most plants have completed inspection of horizontal welds and repair hardware per I&E Guidelines
- Limited inspection of ring segment welds and vertical welds per I&E Guidelines

Findings:

- Significant cracking in horizontal welds
- Some cracking in vertical welds
- Some instances of degraded repair hardware
- One reported indication in ring segment weld

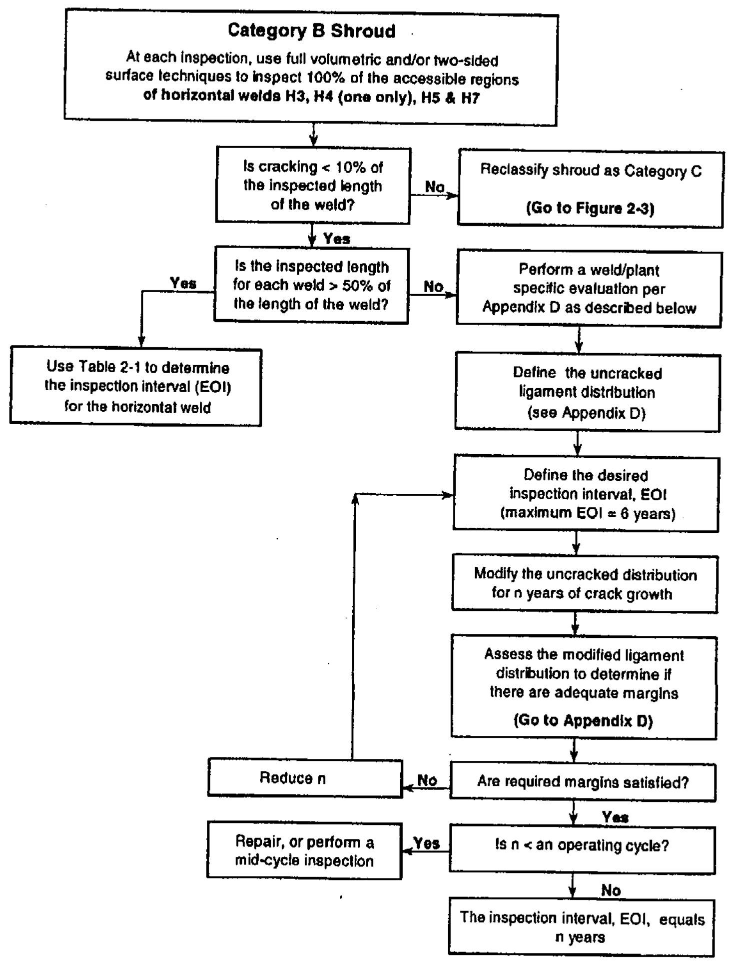
Inspection guidelines *1 of 6*

Unrepaired Core Shroud Classifications



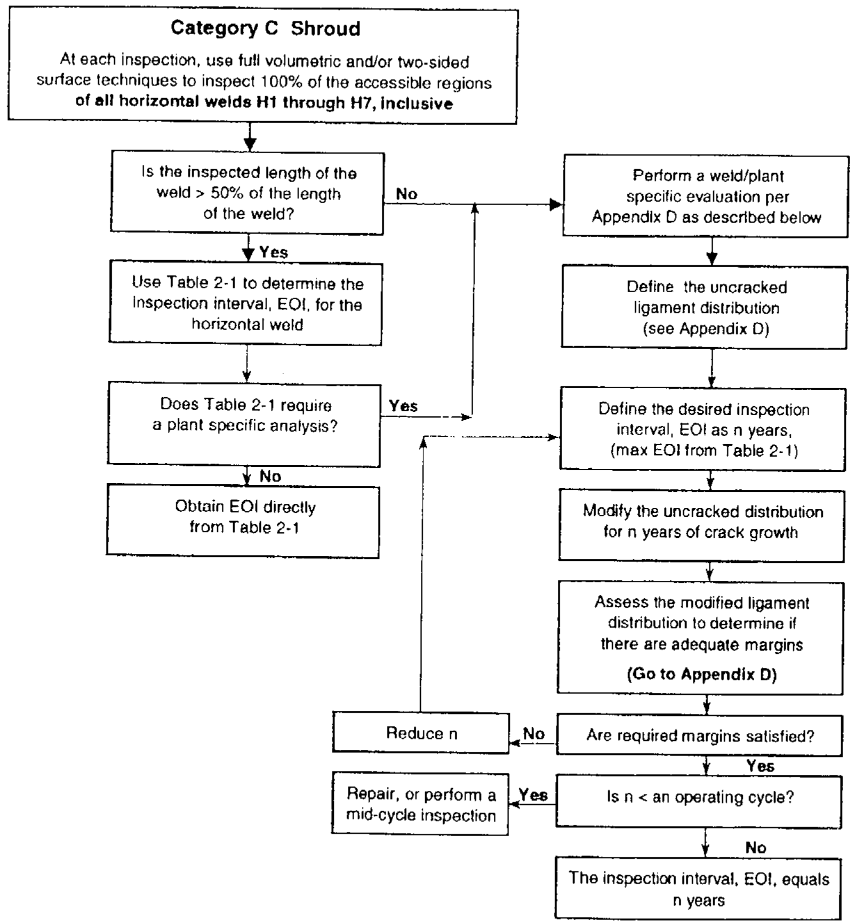
Inspection guidelines *2 of 6*

Inspection Requirements for Category B Shroud Horizontal Welds



Inspection guidelines *3 of 6*

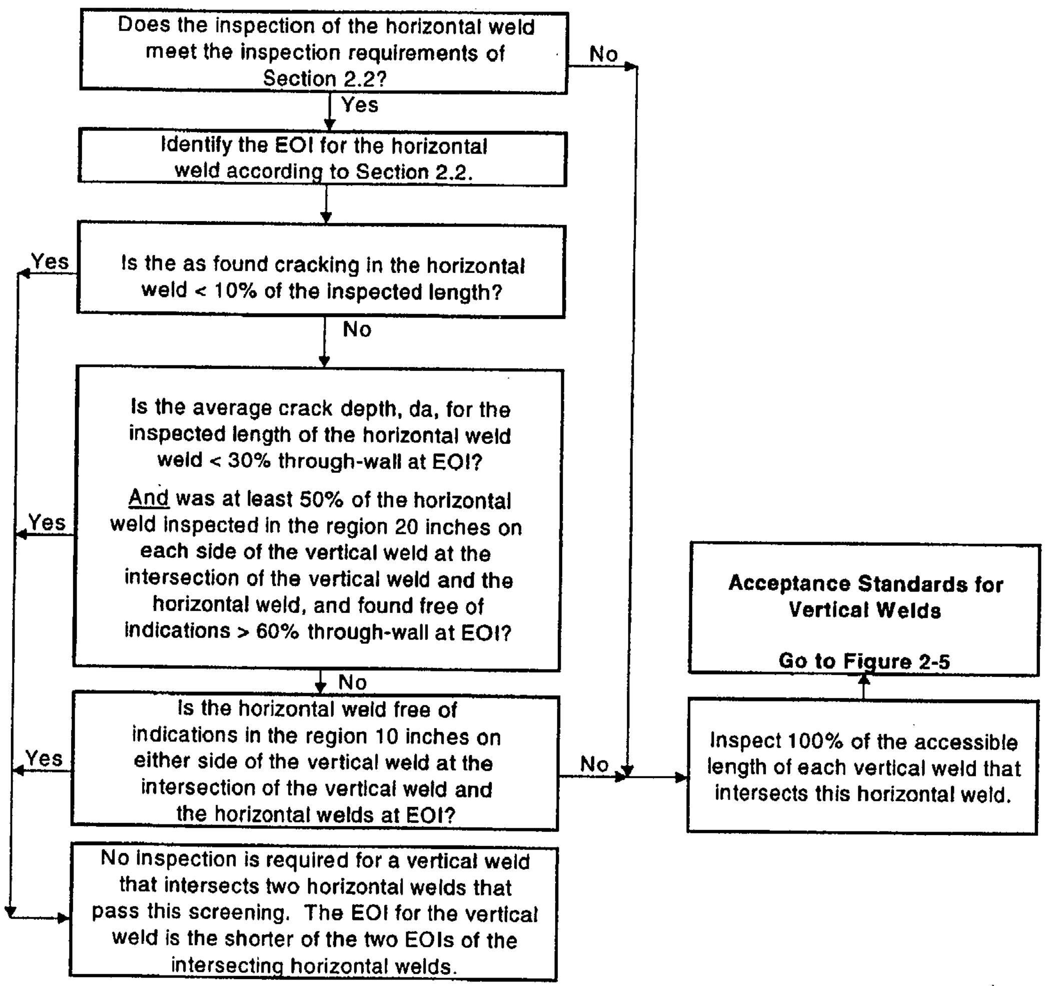
Inspection Requirements for Category C Shroud Horizontal Welds



Note: If sufficient Inspection cannot be performed to demonstrate Lmin a plant specific analysis (consistent with the approach described in Appendix D) should be performed and submitted to the NRC for review and approval.

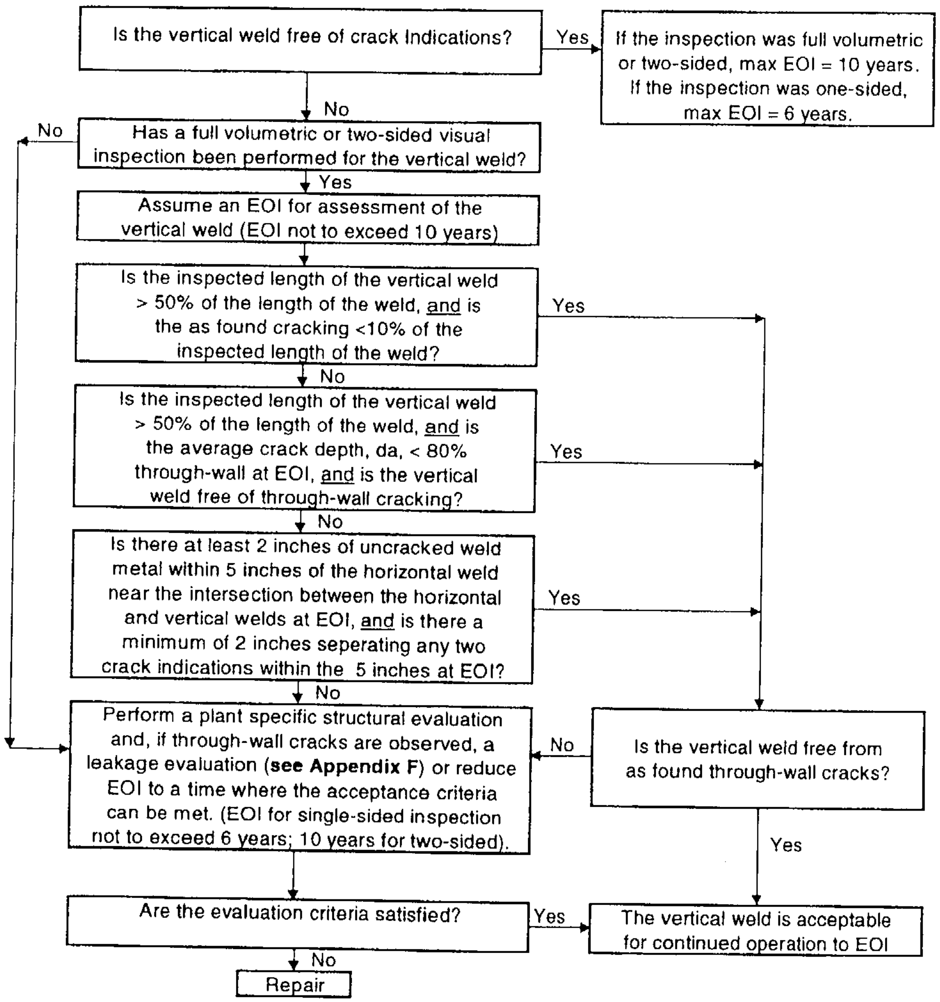
Inspection guidelines *4 of 6*

Vertical Weld Inspection Scope Based Upon Screening of Horizontal Welds



Inspection guidelines *5 of 6*

Inspection Requirements for Vertical Welds



Inspection guidelines *6 of 6*

Reinspection Intervals for Horizontal Welds

Percent Cracking[1, 2]	Stress[3] = 1 ksi		Stress[3] = 3 ksi		Stress[3] = 6 ksi	
	Limit Load	LEFM[4]	Limit Load	LEFM[4]	Limit Load	LEFM[4]
x < 10	10.0	10.0	10.0	10.0	10.0	10
10 ≤ x < 20	10.0	10.0	10.0	10.0	10.0	6.0
20 ≤ x < 25	6.0	6.0	6.0	6.0	6.0	6.0
25 ≤ x < 30	6.0	6.0	6.0	6.0	6.0	Note 6
x ≥ 30	Note 6					

Notes:

1. Length of weld inspected must be at least 50 percent of the weld circumference with either volumetric or two sided surface technique.
2. Cracking is defined as the total length of as-found cracks as a percentage of the total length inspected for each weld. Crack lengths should be rounded <u>up</u> to the next whole number.
3. Stress values are for faulted loading conditions. Interpolation between stress values is acceptable.
4. Applies to welds with cracking ≥ 10 percent where neutron fluence is greater than 3×10^{20} n/cm^2 and less than 5×10^{20} n/cm^2 (E > 1MeV). <u>For fluences exceeding 5×10^{20} n/cm^2, a plant specific analysis is required to be submitted to the NRC.</u>
5. Linear extrapolation of the reinspection intervals is permitted up to a value of 10 ksi. Values should be capped (or rounded down) at values consistent with the approach in the above table.
6. Plant specific analysis is required.

Flaw evaluation

- I&E Guidelines provide generic guidance
  - Other evaluation methods are acceptable
- Evaluation approach based upon fluence at the end-of-evaluation period
- Limit load for ductile material behavior for all components
- LEFM/EPFM for less ductile material behavior
- BWRVIP developed Distributed Ligament Length (DLL) software utilized (BWRVIP-20)
  - Can evaluate actual postulated crack profile

LEFM - Linear Elastic Fracture Mechanics
EPFM - Elastic-Plastic Fracture Mechanics

Status of U.S. NRC review

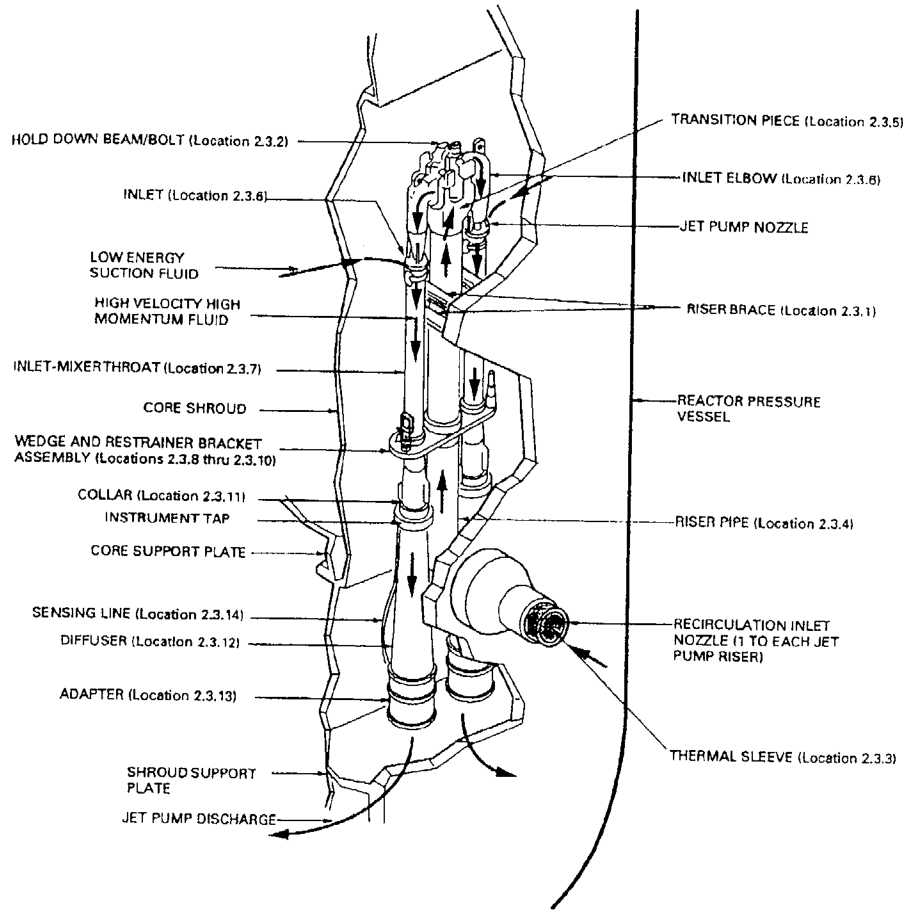
Review status:

- "BWRVIP-01", Rev.1: SE 1994
- BWRVIP-01, Rev. 2: under U.S. NRC review
- BWRVIP-07: SE 12/99
- BWRVIP-63: under U.S. NRC review
- BWRVIP-76: under U.S. NRC review

Notes:

- U.S. NRC required some revisions to BWRVIP-07; changes are incorporated in BWRVIP-76
- BWRVIP-76 to be comprehensive shroud I&E Guidelines

Configuration



Inspection history

Inspections:

- Significant inspections performed per BWRVIP-41

Findings:

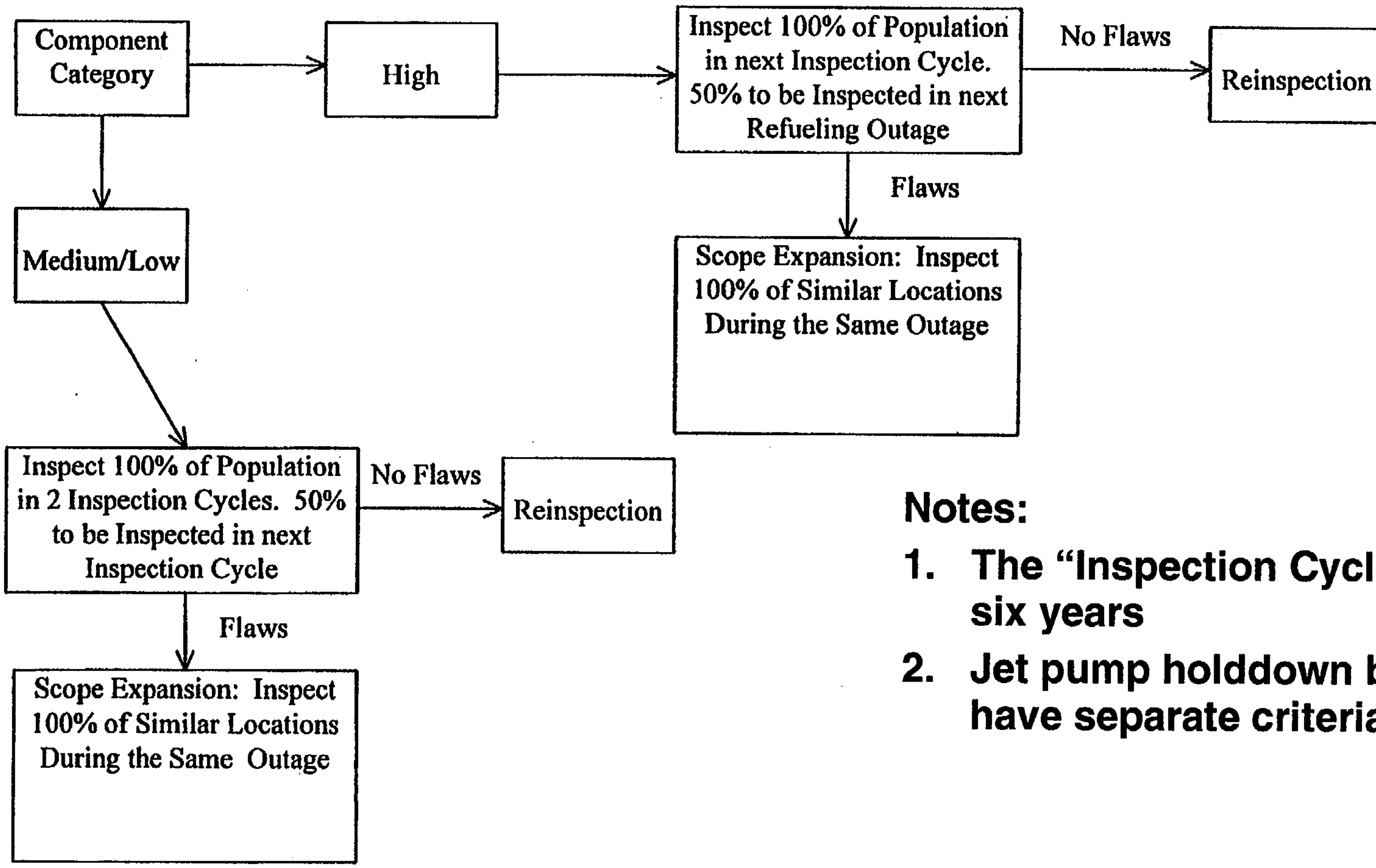
- Indications/degradation reported in:
  - Holddown beams
  - Riser brace welds
  - Riser pipe welds
  - Diffuser welds
  - Riser brace-to-yoke welds
  - Wear at set screws and wedges
  - Instrument lines
  - Set screw tack welds

Inspection guidelines *1 of 3*

- All welds ranked based upon safety significance (High/Medium/Low)
- Inspections not required for non-susceptible locations
- Inspection requirements for susceptible locations based upon ranking and the following charts
- For some components, analysis may alleviate inspection requirements

Inspection guidelines *2 of 3*

Baseline Inspection Requirements

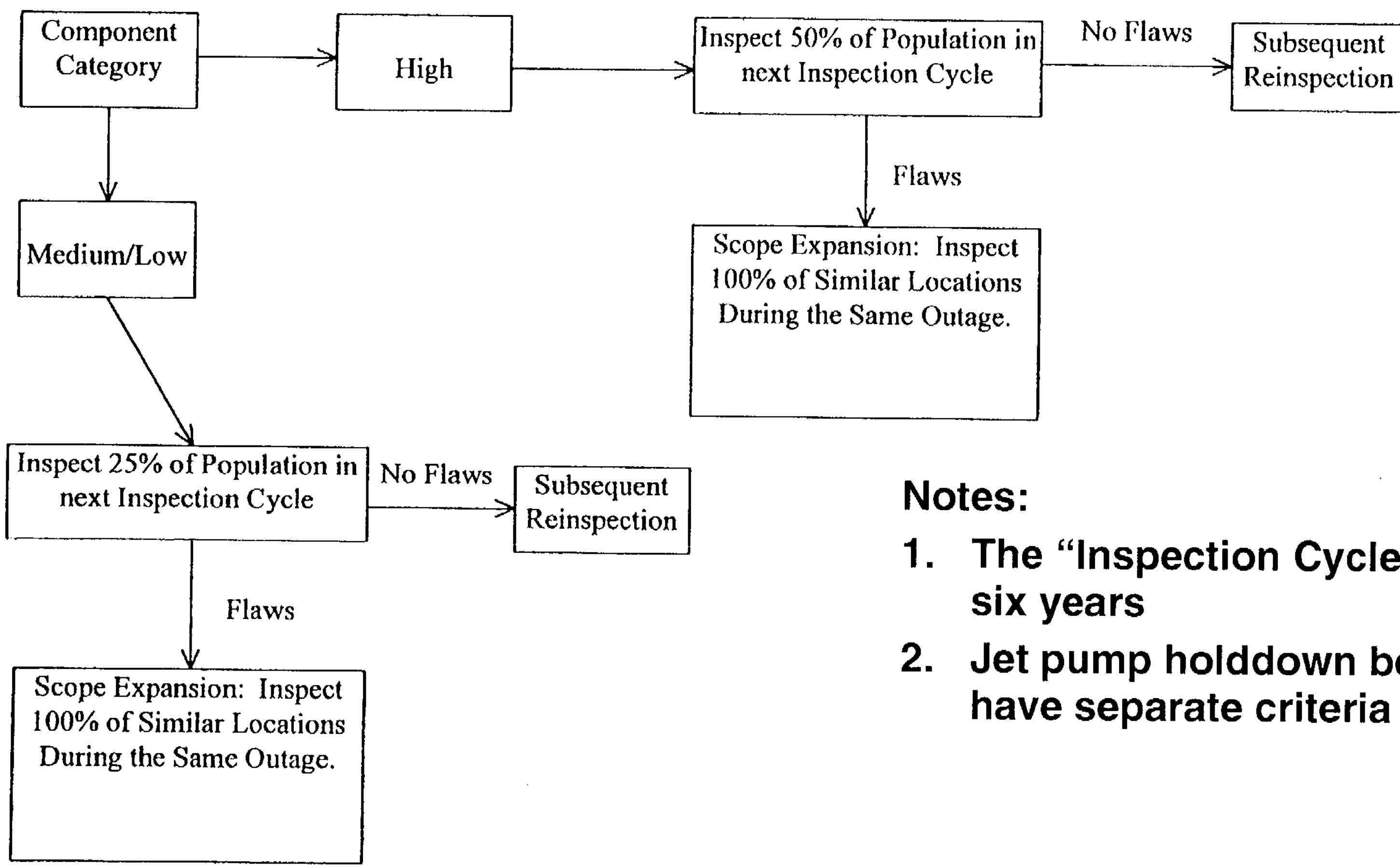


Notes:

1. **The "Inspection Cycle" is six years**
2. **Jet pump holddown beams have separate criteria**

Inspection guidelines *3 of 3*

Reinspection Requirements



Notes:

1. The "Inspection Cycle" is six years
2. Jet pump holddown beams have separate criteria

Flaw evaluation

- Limit load techniques utilized for flaw evaluation
- DLL (BWRVIP-20) can be used

Status of U.S. NRC review

Review Status:

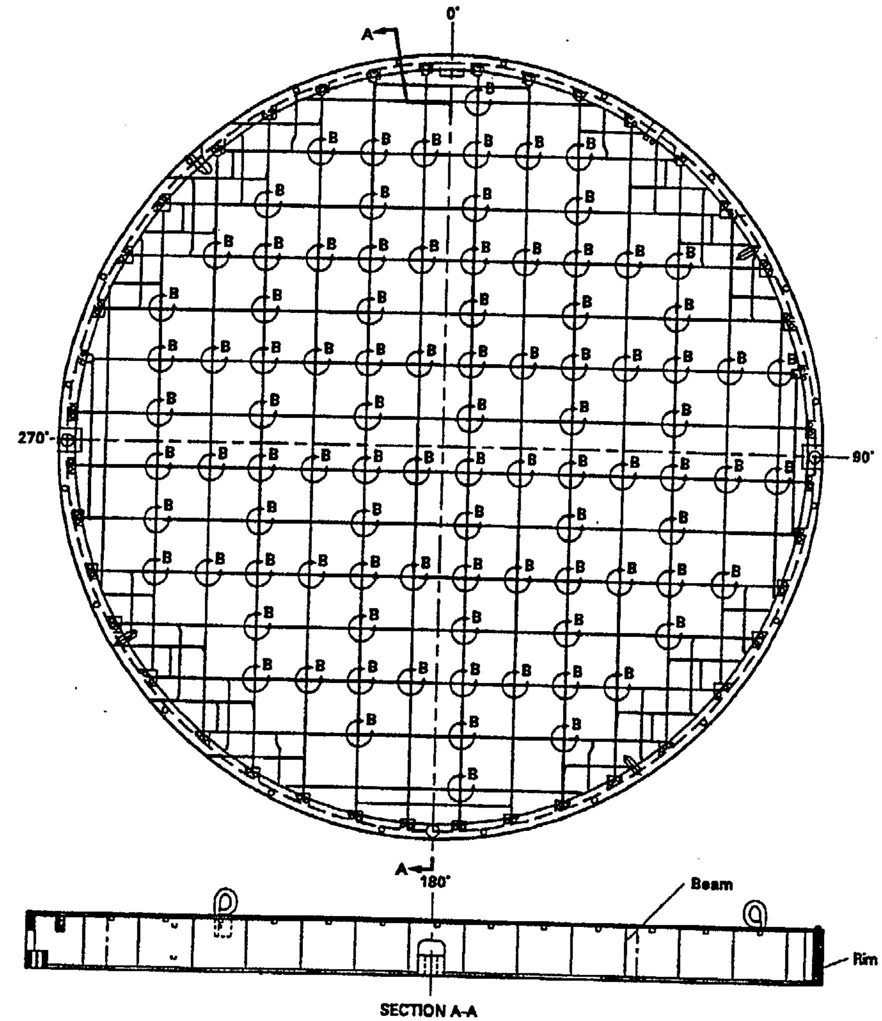
- BWRVIP-41: SE 2/01

Notes:

- Guidelines to be revised per SE

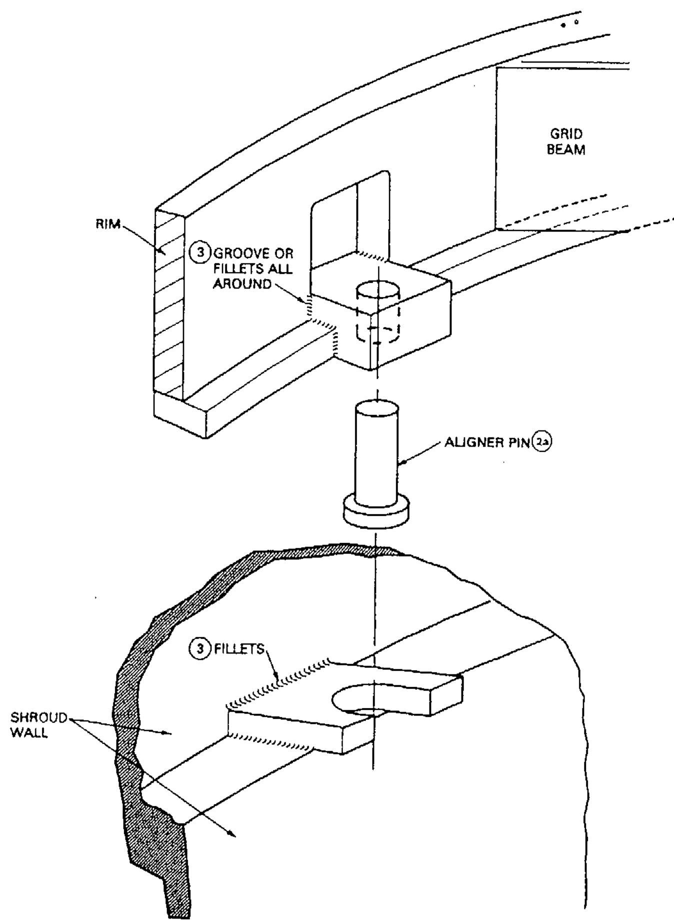
Configurations *1 of 5*

BWR/2, BWR/3, BWR/4, BWR/5 Configuration



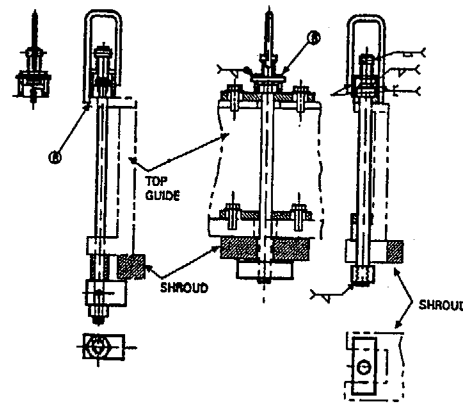
Configurations *2 of 5*

Typical Vertical Aligner Pin Assembly

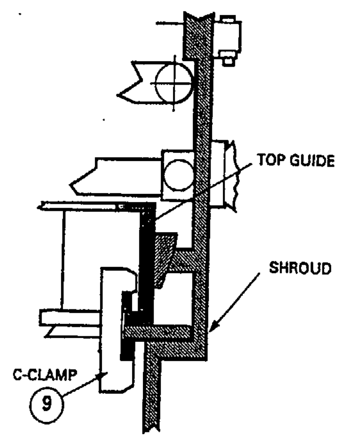


Configurations *3 of 5*

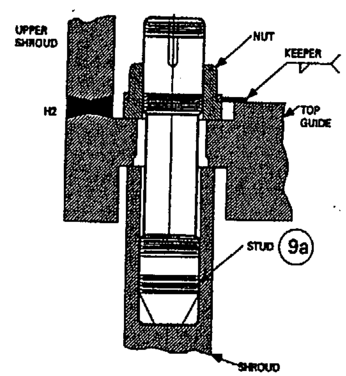
Typical Holddown Assembly



BWR/2-4 HOLD-DOWN DEVICE
(TYP 4 PLACES)



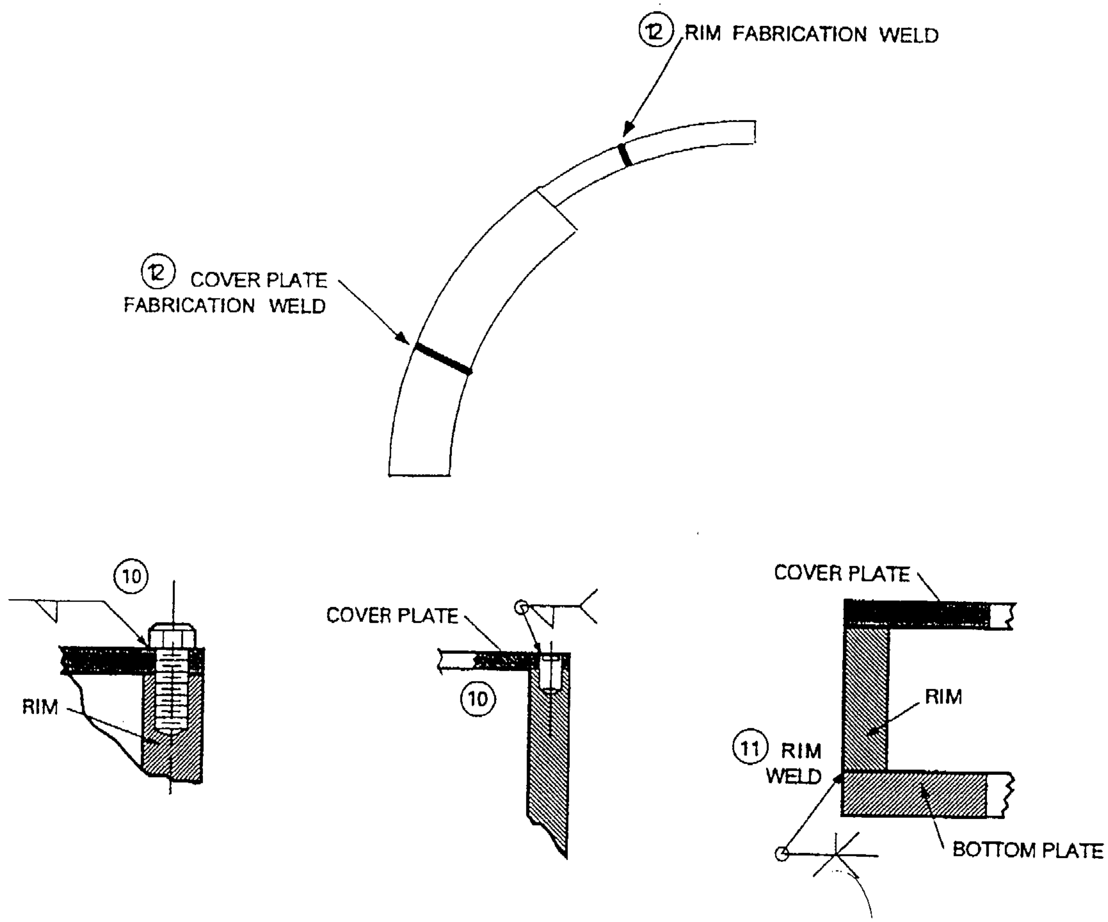
BWR/4,5 HOLD-DOWN DEVICE
(TYP 4 PLACES)



BWR/6 HOLD-DOWN DEVICE
(TYP 84-96 PLACES)

Configurations *4 of 5*

Typical Rim Pins and Rim Welds

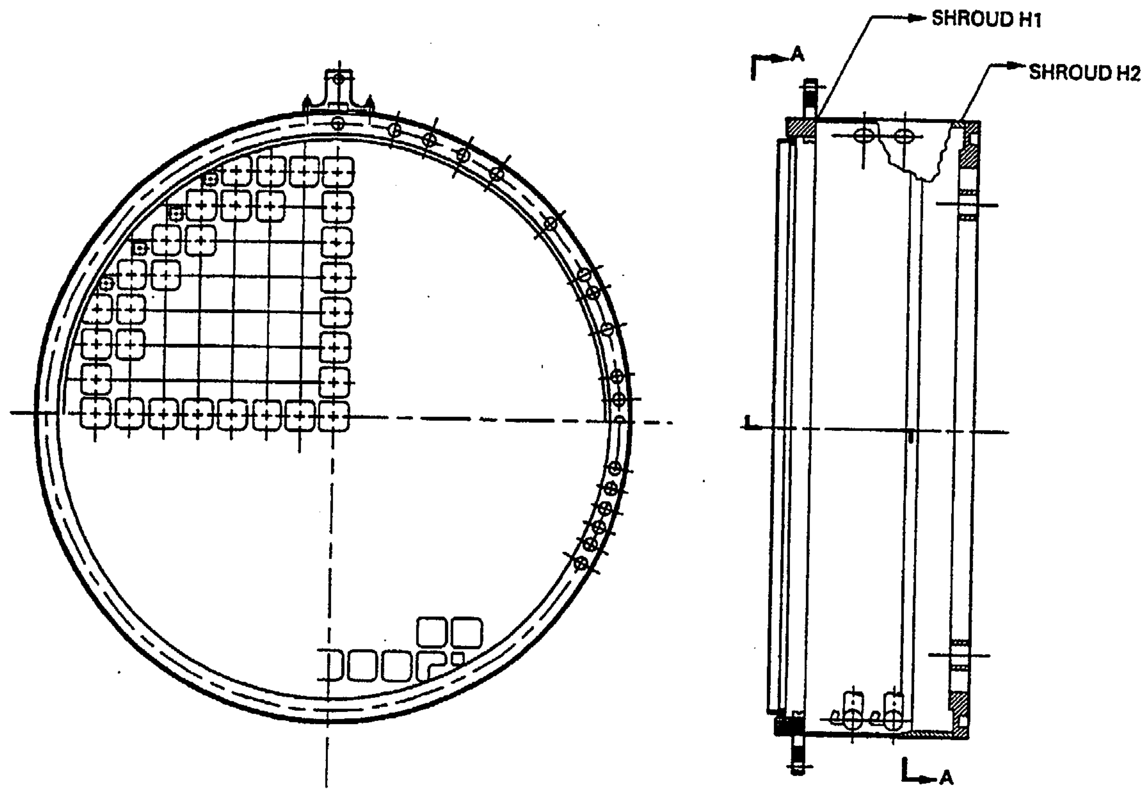


RIM TO COVER PLATE

RIM TO BOTTOM PLATE

Configurations *5 of 5*

BWR/6 Configuration



Note: Integral top guide may be more than one plate, connected by a fabrication weld (Location 17)

Inspection history

Inspections:

- Substantial VT-1 and VT-3 inspections per BWRVIP-26 and prior SILs
- UT inspection of grid beams at Oyster Creek

Findings:

- Oyster Creek reported indications in top guide grid beams
- Rim weld cracking in non-GE BWR
- Two indications in tack welds and keepers

Inspection guidelines *1 of 4*

Location #	Description	Applicability	Results of Structural Analysis/ Consequence of Failure	Inspection Strategy	Plant-Specific Analysis	Modifications/ Repair
1	Grid Beam and Beam-to-Beam Crevice Slot	BWR/2-5	No safety consequence of single failure at this location. Failure of upper beam has no impact. Failure of lower beam could cause some core instrument damage, but would not interfere with safe shutdown.	None required. (This recommendation will be reevaluated in 1997 after the Oyster Creek UT and sample exam.)	N/A	N/A
2, 3	Aligner Pins and Sockets in Top Guide and Shroud	BWR/2	Aligner hardware is redundant to brackets between the top guide and shroud. The example analysis demonstrates that with complete rim weld cracking, and one of eight brackets failed, the maximum top guide lateral displacement is 0.5".	None required.	N/A	N/A
		BWR/3,4 without wedges	Assuming the lateral reactions are equally shared by two aligners, the maximum shear stress on the pin is less than the allowable in the example analysis. With a minimum socket/block weld size of 0.5", a maximum of 35% of the weld for vertical pins or 70% of the weld for horizontal pins is required to resist shear. With complete aligner failure, and assuming no other means of lateral restraint, the maximum top guide horizontal displacement is limited to about 5 inches by the top guide contacting the upper shroud. Control rods can insert if static displacement is <2.5 in. SLC injection is also available to shut down the reactor.	VT-1 of welds in two adjacent aligner assemblies every other cycle. If cracking is found, expand inspection to all four aligner assemblies.	Analysis to account for plant-specific dynamic loading. Intent to reduce load and reduce % of weld area needed to resist load. If less than 20% of the weld is required, no inspection is needed.	No inspection required if wedges are added.

Inspection guidelines *2 of 4*

Location	*Description*	*Applicability*	*Results of Structural Analysis/ Consequence of Failure*	*Inspection Strategy*	*Plant-Specific Analysis*	*Modifications/ Repair*
8	Hold-down Assemblies	BWR/2-4 devices	With the assumed conservative vertical loading, many of the 206-inch, 12160 pound top guides, if unrestrained during a faulted event scenario, would lift. Plants in this category were designed with hold-down devices. See Appendix A for plant evaluations.	For plants whose faulted vertical loads exceed the top guide weight, a VT-1 inspection where the hold-down latches to the shroud should be done, inspecting two hold-down devices, 180° apart, every other cycle.	For plants whose faulted vertical loads exceed the top guide weight, a plant specific analysis with improved, best estimate LOCA uplift force values may change the conclusion so that inspection would not be required.	No inspection required if a modified hold-down device were installed that was SCC resistant.
9		BWR/4,5 C-clamps	The C-clamps are 316L stainless, welded to the top guide with creviced welds. It is possible, though unlikely, that the C-clamps could work free if the welds to the top guide cracked.	For plants whose faulted vertical loads exceed the top guide weight, a VT-3 inspection of each clamp assembly each 10-year interval is recommended.	Same as above	Same as above
9a		BWR/6 Studs	The studs, numbering 84-96, are highly redundant, and the material in bolting applications has not demonstrated SCC. Inspection can be infrequent and of a general nature to look for gross cracking or total failure of single studs.	VT-3 each 10-year interval.	N/A	N/A

Inspection guidelines 3 of 4

Failure Location	Description	Applicability	Results of Structural Analysis/ Consequence of Failure	Inspection Strategy	Plant-Specific Analysis	Modifications/ Repair
10, 11	Rim Pins and Rim Weld	BWR/2	Even if rim pins or rim weld are failed, lateral loads are transferred to the brackets between the top guide and shroud, so there is no impact on top guide function.	None required.	N/A	N/A
		BWR/3,4 without wedges	The rim pins are captured and perform their function even if the fillet welds that retain them in place fail.	None required for rim pins.	N/A	N/A
			If the rim weld to the bottom plate is assumed to be failed, all lateral load is assumed to transfer to the shroud through the lower reinforcement block pins (4) and the bottom plate. Example analysis assuming a high accident loading shows that plants with dual pins with a diameter less than 0.68" exceed the allowable stress limit. In example analysis of the single pin configuration, all plants exceed the allowable stress limit if the rim weld is assumed to be failed.	Enhanced VT-1 every other cycle of rim weld locations accessible during normal refueling activities. If cracking is found, expand inspection to 25% of one side of the rim weld for qualitative evaluation.	No inspection required if analysis of reinforcement block pins with plant-specific loads shows that lower pin(s) have acceptable stress with the rim weld fully cracked.	No inspection required if wedges are installed between the top guide and shroud.
		BWR/4,5 with wedges	Even if rim pins or rim weld are failed, lateral loads are transferred to the wedges between the top guide and shroud, so there is no impact on top guide function.	None required.	N/A	N/A
12	Rim and Cover Plate Fabrication Welds	BWR/2-5	Because of the redundancy of the grid beams to the rim through the cover and bottom plates, failure of these welds has minimal consequence.	None required.	N/A	N/A

Inspection guidelines *4 of 4*

Failure Location	Description	Applicability	Results of Structural Analysis/ Consequence of Failure	Inspection Strategy	Plant-Specific Analysis	Modifications/ Repair
13	Eye Bolt Boss	BWR/2-5	These components have no function during normal operation, and serve no safety function for off-normal transients.	None required.	N/A	N/A
14	Support Bracket to Shroud Welds	BWR/2	The brackets are captured in place by the combination of small clearance between the top guide and bracket and the fillet welds along the shroud on both sides of the bracket. Since the brackets are loaded in compression against the shroud, they will function even if fillet welds are cracked. Also, there is redundancy in having eight brackets.	None required.	N/A	N/A
15	Threaded Boss to Cover Plate	BWR/2-5	These components have no function during normal operation, and serve no safety function for off-normal transients.	None required.	N/A	N/A
16	Lifting Lug to Rim Bolt or Weld	BWR/2-5	These components have no function during normal operation, and serve no safety function for off-normal transients.	None required.	N/A	N/A
17	Integral Top Guide Fabrication Welds	BWR/6	Since the BWR/6 top guide is single piece construction, the worst consequence of weld cracking in the typical fabrication is that cracking in both HAZs could cause a small piece, containing the weld, to fall out of the top guide onto the core plate. The top guide would still perform its function in this case, and the failure would be observable while moving fuel bundles during the next refueling activity.	None required for typical fabrication	Determine from fabrication records, if available, that top guide plate welds are arranged as described here, or comparably.	N/A

Flaw evaluation

- For flaw evaluation of the grid beams, linear elastic fracture mechanics techniques are used
  - Equations given in Appendix B of BWRVIP-26
- For other locations, specific flaw evaluation methods are not defined
- Evaluations of components other than grid beams based upon stress analyses

Status of U.S. NRC review

Review Status:

- BWRVIP-26: SE 9/99

Notes:

- Guidelines to be revised per SE

BWRVIP-75: IGSCC in BWR piping
IGSCC History

- 1960s: Scattered Incidents of IGSCC
- Mid - 70s: Small diameter piping IGSCC association with weld residual stresses
- Late - 70s: Larger diameter piping IGSCC
- Mid - 80s: IGSCC in 304Land 316L in creviced locations and areas of cold work

BWRVIP-75: IGSCC in BWR piping, History of Industry Response

- Collaboration on remedy development
  - BWR Owners Group for IGSCC Research
  - BWROG I 1979-1983; BWROG II 1984-1988.
  - New developments and adopted innovations
- Plant-specific decisions on remedy selection varied
  - Full or partial piping system replacements
  - Local repair and augmented inspection
  - Local mitigation and augmented inspection
- Regulatory guidance on remedy implementation
  NUREG-0313 Revision 2, 1988

BWRVIP-75: IGSCC in BWR piping, NUREG-0313, Rev. 2 categories

Category	Weld Description	Inspection Frequency
A	Resistant materials	25% sample every 10 years (Same as Code)
B	Non-resistant materials stress improved within 1st 2 years of operation	50% every 10 years (at least 25% in 6 years)
C	Non-resistant materials stress improved after 2 years of operation	Once within 2 cycles of stress improvement then once per every 10 years
D	Non-resistant materials, no stress improvement	100% every 2 refueling cycles
E	Cracked - reinforced by weld overlay or mitigated by stress improvement	Every 2 refueling cycles
F	Cracked – Inadequate or no repair	Every refueling outage
G	Non-resistant, not inspected	Next outage

BWRVIP-75: IGSCC in BWR piping, IGSCC control strategies implemented

- Detect IGSCC before damage compromises system integrity
- Remove found defects before continued growth compromises system integrity
- Prevent initiation by introducing a resistant material
- Maintain structural integrity and prevent unacceptable growth by reinforcing with a resistant material
- Prevent initiation by modifying the residual stress distribution
- Prevent further growth by modifying the residual stress distribution
- Slow initiation and growth using improved water chemistry

BWRVIP-75: IGSCC in BWR piping, Reasons to revise NUREG-0313

- Since 1984, losses in capacity factor have been dramatically reduced
- IGSCC countermeasures are effective
  - Inspections are confirming little or no new crack initiation and growth in existing cracks
- Inspections result in radiation dose to personnel
  - Minimize inspections, particularly those that do not have an impact to safety

BWRVIP-75: IGSCC in BWR piping, BWRVIP Approach

- All piping categories evaluated for appropriate changes to inspection frequencies
- Service experience and deterministic evaluations used to evaluate performance
  - Inspection results
  - Effectiveness of HWC and NMCA
  - Effectiveness of IHSI and MSIP
  - BWRVIP crack growth studies for stainless steel and nickel-base alloys
- Generic risk-informed studies used to support the technical basis for new inspection frequencies

BWRVIP-75: IGSCC in BWR piping, GL88-01 vs. BWRVIP-75 Inspections

Category	Weld Description	Existing Inspection Frequency of GL 88-01	Proposed Inspection Frequency per BWRVIP-75	
			NWC	HWC
A	Resistant Materials	25% every, 10 years at least 12% in 1st 6 years	B-F = 25% every 10 years B-J = 10% every 10 years	10% every 10 years,
B	Non-Resistant Materials Stress Improved within 1st 2 years of Operation	50% every 10 years at least 25% in 1st 6 years	25% every 10 years	10% every 10 years
C	Non-Resistant Materials Stress Improved after 2 years of Operation	All within 2 cycles of SI, then all within 10 years, at least 50% within 1st 6 years	25% every 10 years	10% every 10 years
D	Non-Resistant Materials, No Stress Improvement	Every 2 refueling Cycles	100% every 6 years	100% every 10 years, at least 50% in 1st 6 years
E	Cracked – Reinforced by Weld Overlay	Every 2 refueling Cycles	25% every 10 years	10% every 10 years
	Cracked – Mitigated by Stress Improvement	Every 2 refueling Cycles	100% every 6 years	100% every 10 years, at least 50% in 1st 6 years
F	Cracked – Inadequate or No Repair	Every Refueling Outage	Every Refueling Outage	Every Refueling Outage
G	Non-Resistant, Not Inspected	Next Outage	Next Outage	Next Outage

BWRVIP-75: IGSCC in BWR piping, Conclusions and Status

- NRC requirements and IGSCC countermeasures have been effective in managing IGSCC
- A revision of the inspection frequencies in NUREG-0313 is warranted and justified based on BWRVIP-75
- NRC has issued safety evaluation
- BWRVIP developing responses to address open items in safety evaluation

Conclusion

- The BWRVIP has developed a program that is broad in scope
- The BWRVIP Program includes the appropriate elements including inspection, evaluation, repair and mitigation to assure reactor internals integrity
- Use of the BWRVIP Program during the period of a renewed license provides an adequate aging management program

March 27, 2001

NEI 95-10
Industry Guideline For Implementing The License Renewal Rule 10 CFR Part 54

Presentation to

Advisory Committee on Reactor Safeguards

Plant License Renewal Subcommittee

Doug Walters

Nuclear Energy Institute

NEI

March 27, 2001

NEI 95-10

- Key Elements
  - Reference to the GALL Report
  - Standard application format and content
  - Table of components/commodity groups subject to an aging management review

NEI

March 27, 2001

NEI 95-10, Revision 3

- Revision 3 Changes
  - Included a reference to the GALL Report
  - Included PRA summary report and EOPs as potential information sources
  - Modified components/commodity group table
  - Incorporated selected references

NEI

March 27, 2001

NEI 95-10, Revision 3

- Revision 3 - Additional Changes
  - Drawings printable in black and white
  - Guidance to reflect when an aging effect requires management
  - Inclusion of SAMGs as potential information sources
  - Incorporation of additional selected references

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NEI 95-10

- Future changes to reflect lessons learned from the demonstration effort
- Goal is NRC endorsement without exception