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NUCLEAR REGULATORY COMMISSION

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PUBLIC WORKSHOP ON TECHNICAL AND

POLICY CONSIDERATIONS

FOR NUCLEAR POWER PLANT LICENSE RENEWAL

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SESSION 6

CONTAINMENTS

SHERATON HOTEL

11810 Sunrise Valley Drive

RESTON, VIRGINIA

Tuesday, November 14, 1989

8:30 a.m.

SESSION LEADERS:

Jim Richardson, Director, Division of Engineering Technology

Larry Shao, Director, Division of Engineering, Office of Research

PARTICIPANTS:

Len Katz, Westinghouse

Joe McCumber, Yankee Atomic

Goutam Bagchi, NRC

Ken Bauer, NRC

Mr. Landover, No Affiliation

Richard Burke, EPRI

Mr. Siderick, No Affiliation

Tim Bailey, Northern States Power

Bob Nickill, EPRI

David Jeng, NRC

Melvin Lapides, EPRI

Jim Costello, NRC

Ms. Mitchell, No Affiliation

Neil Haley, Illinois Department of Nuclear Safety

Jim Statton, Bechtel

PROCEEDINGS

[8:30 a.m.]

MR. RICHARDSON: Good morning. My name is Jim Richardson. I am the Director of the Division of Engineering Technology, Office of Nuclear Reactor Regulation. My co-chairman is Larry Shao, Director, Division of Engineering in the Office of Research.

This is Session 6, where we are going to talk about issues related to license extension and license renewal, associated with containments and, perhaps, expand a little bit to other Category 1 structures. Just as a way of introduction, I think it is good to remind ourselves of what we are facing and why we are interested in the integrity of the containment.

Of course, the containment is the final barrier in the Defense-In-Depth Concept. It is that last barrier that prevents release to the public. In our Code of Federal Regulations in Appendix A, it requires the containment to establish a leak-tight barrier, and that assurances be provided that the design basis requirements for postulated accidents not be exceeded.

Several types of degradations that can occur over time in containment - and here we have listed certainly not an exhaustive list but some of the more obvious mechanisms including loss of tendon prestress, corrosion of tendons, Mark 1 Drywell shells, BWR Torus, PWR Ice Condenser containments.

These are cases where we have seen this mechanism in the recent past. Of course, one must watch out for corrosion of rebar in reinforced concrete containment and corrosion of rebar and spalding of concrete in intake structures and other Category 1 structures.

I am hoping that today we can generate some interesting feedback from you all. The real objective of this workshop, I remind you again, is to get feedback from you in helping us to formulate the proposed rule that we are putting together. I think it is essential that we hear your views. We have in your handout, three questions that the Staff has put together. There are, I am sure, other issues that need to be addressed.

What we are going to do this morning is go through the three questions that the Staff has raised to see what responses we get from you regarding those questions. After that, we have four speakers that have asked to make presentations, and then we will open it up for anybody else who would like to make a presentation.

I think Larry Shao is going to monitor the first questions.

MR. SHAO: The first question is, what kind of additional measures should be taken to monitor the degradation of containment. As you know, there are three kinds of containment: steel containment, reinforced concrete

containment, and prestressed concrete containment. Right now, the ASME Code have issued two sections, the IWL for inspection of steel containment and inspection of concrete containment and IWE, the inspection of steel containment.

The question is whether this Section 11 Code is sufficient to monitor the degradations. Right now the code has been issued, but NRC has not endorsed the code yet. We are in the process of endorsing the code. The question is whether IWL and IWE is sufficient to monitor the degradation of the containment.

I would like to have some comments from the floor.

[No response.]

MR. SHAO: Containment is two kinds of tests; one is structure test and one is a leak test and also the inspection. Right now, so far, the containment has not really been inspected except when we see some problems like some kind of corrosion in containment. Then we do a very, very detailed inspection. But in general, it is mostly a visual type of inspection.

MR. KATZ: Len Katz, Westinghouse. I have been around Section 11 for a good number of years. One of the things that we have been disappointed in is the fact that the NRC has waited this long to adopt IWE and IWL. We think it is a document that can do the job and can do the job for the future as well.

I guess I would like to ask you a question. What has been the reluctance on the part of NRC to adopt that?

MR. SHAO: I cannot agree with your comment here today. IWE I think was issued in 1981, and has been a long time. We will try to endorse as soon as possible, especially IWL that has come out. I think I have no excuses to make for NRC. We are just slow.

MR. MCCUMBER: Joe McCumber, Yankee Atomic. To add to what Len just said, I think the sections of the Code are designed to maintain a continuous level of safety that should be equally applicable to the current license going on and to the future.

MR. SHAO: It should be, but you discuss somehow degradation may go beyond for the years because it is possible the rebar may have some kind of corrosion and the tendon may lose the tendon forces beyond your control after the 40 years. The steel containment is only - it may have a tendency to corrode, and any corrosion can be significant give to the steel liner.

MR. KATZ: In answer to that just generally, I know that the subgroup containment in Section 11 has been studying - first of all, they are studying the IR's for the moment. They just came out and they have been studying the results of the pilot studies on containment. They have on their agenda, at least three or four items to augment what is already in there

to cover it.

So, things are moving ahead in 11, and I think that could be a Code very soon.

MR. SHAO: So, your comment is that IWE and IWL, it is sufficient to monitor degradation?

MR. KATZ: Yes.

MR. BAGCHI: I am Goutam Bagchi, with the Staff of the Structural and Geosciences Branch. I would like to observe that IWE, the welding inspection has nothing to do with inspection of the base metal. It does not address that kind of problem. I think we need to have some effort in that particular area.

MR. SHAO: That's a good comment. In Section 11, usually inspection mostly during the wells, but steel containment in the area because they are so thin. Not only the well but the base metal, because any corrosion to the base metal can be very severe. If you only have one-fourth of an inch that erode away, it can be very important.

So, you want to give some comment on Bagchi's comment?

MR. KATZ: Only to say that I think some of the additions that are to be looked at address that very issue now. Maybe they are not in there yet, but they will be.

MR. BAGCHI: Well, I have looked at the draft.

MR. SHAO: You mean the Code will have to try to

inspect the base metal?

MR. SHAO: Yes, they are just items on your agenda at the moment but you don't see the draft yet.

MR. BAGCHI: That's right. My point is that this really doesn't serve the purpose as yet, and I urge the Committee to look into the current day problems.

MR. SHAO: Okay.

MR. BAGCHI: On the reinforced concrete, I might like to make one more comment. On the reinforced concrete, the visual examination of the reinforced steel line containments does not receive any attention. Also, for the prestressed concrete containment, I have not addressed the prestressed concrete containment entirely and does not address the other part.

It misses certain things. We are seeing leakage outside of the prestressed concrete containment, and that has not been addressed. Part of the reason why the endorsement has been somewhat slow is because of the activity that has been going on at 135 which deals with prestressed concrete containment stress surveillance.

I think we very much look forward to the industry participation and the Section 11 work that has gone on. We wholeheartedly endorse that, but we would like to encourage that group to address that kind of problem.

MR. SHAO: Also, I understand the Code has a section

in IWE to suggest also future corrosion problem, a couple months now.

MR. BAUER: Ken Bauer, ASME. I just wanted to amplify what Mr. Katz was saying. We recently at subcommittee level, passed a revision column to cover examination of base metal containment and should be coming out in an addendum in Section 11. They are addressing a lot of the concerns that the NRC has expressed.

MR. SHAO: How about corrosion of reinforming bar, is there a possibility for not only the containment but for concrete when there is water there?

MR. BAUER: I don't know if all the subgroups are contained in there, but I assume in looking at this that they are working pretty closely with Len's group in identifying complex issues. Basically, Len's special working group on extension is an issue that is significant and daily contact is with Section 11 subgroups to have them look at it in further detail to determine whether additional changes should be made to the code.

In terms of what you said, as I said, I haven't really looked at the entire subgroup, but I am sure that they are looking at this issue.

MR. RICHARDSON: Any other comments?

MR. SHAO: In some, the steel liner, the water cannot go through the steel liner. But in other structure

where there is no liner, the concrete is permeable and any water can go through the rebar and cause corrosion in rebar.

Any more comments?

MR. LANDOVER: I have one comment. You raised the question of local corrosion, of some thinning. Have you also assessed just how important that is?

MR. SHAO: Yes.

MR. LANDOVER: A local area that would be thinned? Because when you think - my comment is directed because in many we talk about hydrostatic testing as being for materials so important, there are so many materials that have local spots that are very thin and still withstand a test.

MR. SHAO: Yes. I don't know that your are familiar with Austin Creek corrosion issue. They have a lot of thinning because of some kind of water coming from the outside. They show stress tests to show, but they keep on eroding. They keep on eroding, as a matter of time, another 10 years or 20 years. Even local thinning is getting more and more. It is a question that we have to address.

MR. BAGCHI: May I amplify one more point? Not only did we look at that, we had to use material strength to justify this existing condition.

MR. SHAO: I think the license here to do three dimensional test okay, it's not just two-tier. You do a so-called, reinforcement of corroded part to show containment.

Any more comments?

[No response.]

MR. SHAO: If not, let me summarize the conclusion here. The conclusion is, the general feeling is that IWE and IWL will do the job. NRC should get off its dead ass to endorse the IWE and IWL. There was one comment that IWE only just the one part of it they should address, the inspection of base metal. The Code is working on this issue.

There was some concern about corrosion of rebar where there is a water source. Those NRC individuals are going to look into this.

MR. RICHARDSON: The second question is that we have talked about corrosion in the environment. The question is, what additional environments or degrading mechanisms could be present that would affect the integrity of the containment.

At least a subset of that question is, how can detrimental long term chemical interactions in concrete containment be measured and predicted, as one example of an additional degradation of environment and mechanism.

Do you have any thoughts on what other environments or mechanisms should be considered in containment integrity? Specifically, how do we handle chemical interactions of concrete.

MR. KATZ: Len Katz, Westinghouse. One of the issues which came up I remember in the pilot study on plant life

extension was the question of whether or not one of the most important challenges to the containment is the testing that is required. The question of fatigue and whatever happens as a result of this testing was an issue that was raised.

Do we consider the degradation that could occur as a result of too much testing?

MR. SHAO: You mean the structure test?

MR. KATZ: Right.

MR. BAGCHI: The structural test is only done once.

MR. RICHARDSON: The one that is repeated.

MR. BAGCHI: I would like to address some part of that. You are probably aware that these tests are done hardly ever as a full accident stress test. There are containment that have gone through full pressure tests, perhaps only once in life. How can you say that pressure test that may be 25, 30, 40 percent of the design strength is going to be causing degradation.

MR. KATZ: I am not saying that. I am just saying it is a potential -

MR. BAGCHI: It is a concern that has been expressed, and I just don't know the real technical reason for expressing that concern. What stress level do you think could cause degradation?

MR. SHAO: The structure test. The 1.4, 1.5, right?

MR. KATZ: That's only once.

MR. SHAO: During the retest, the pressure is more powerful.

MR. BAGCHI: No. If they can do it at a reduced pressure and predict the leakage rate at the design pressure and that is mostly what they do.

MR. SHAO: At what reduced pressure?

MR. BAGCHI: I said mostly. Most of the time 20, 25, PSI.

MR. SHAO: Twenty-five percent pressure.

MR. BAGCHI: Probably not more than 50 percent.

MR. SHAO: If it is only 25 percent of the pressure, I can't understand the point.

MR. KATZ: I wasn't aware that it was only 25 percent pressure.

MR. RICHARDSON: The form here is not to debate the issue, but get to the question of what is the issue.

MR. KATZ: It's another challenge.

MR. BAGCHI: What I should express is that what percentage of design pressure could cause a potential to be concerned? I don't see it.

MR. KATZ: Somebody should look into that question. I don't know what it is.

MR. RICHARDSON: Thank you.

MR. BURKE: My familiarity with Region 1, at least with water reactor contingent in the region, all tests were

conducted, the periodic tests at Ia Sub A which is 44 pounds of the design accident pressure. In fact, I conducted over four of those tests on positive effect.

MR. BAGCHI: I know about that, the tests that were done. Let's not say Region 1. Maybe it is from some types of containments.

MR. RICHARDSON: I would love to get into a good debate, but not on resolving the issues but merely what are the issues. This is something that we ought to at least pay attention to.

MR. SIDERICK: I think the EPRI study that you mentioned Len, suggested that additional use could be made of every core that is drilled, every core that is taken. I don't know if that is something that is done or not. I see value in those core plugs that are removed for different modifications. You could analyze concrete and rebar a little bit first hand once you have such a scrap.

MR. RICHARDSON: Any other response to this question?

MR. BAGCHI: I would like to endorse that point, because some do take core samples and look at the decrease of the concrete as a measure of degradation of concrete over the period of years. I think that is an excellent suggestion.

MR. RICHARDSON: Are there other comments?

[No response.]

MR. RICHARDSON: This one will be easy to summarize.

There are two observations. One, we need to at least be aware that certain tests and perhaps a periodic test could challenge the containment to the point where life may be degraded, something that we need to at least look at.

Secondly is to make better use of core samples to take advantage of that material becoming available to detect degrading mechanisms.

Larry, you have number three.

MR. SHAO: The third question is, before granting a license renewal, should the licensee be required to perform a continuing leak rate test, a continuing structure test, continuing configuration surveillance; that is first part of question.

The second part of the question is, or other Category 1 structures where there is a water source, what kind of surveillance should be required for detection of likely degradation during extended license?

Any comment?

MR. BURKE: Rich Burke, EPRI. Numarc Industry will report on Class 1 structures - it is being worked on at this point, that will address other than containments. Concrete structures in general, including those that would see water like at the intake and discharge structures, et cetera that are of a safety class nature. That IR is presently scheduled to be submitted to the NRC by June of 1990.

MR. SHAO: Let me ask a general question here. For other structures, other than containments, what is the inspection requirement right now; do we have any inspection requirement?

MR. KATZ: No.

MR. SHAO: What has licensee been doing for inspecting the structures for the last 20 years, in the range of 20 years. Do we look at degradation of structures at all, is there a vision inspection? Does the Code do any work in this area?

MR. KATZ: In Section 11 is not looking at general concrete structures, et cetera, containment area.

MR. SHAO: Not through ASME but remember the containment code was written that the ACI and ASME, 349. Does ACI do any work in this area? What about the steel structures, the steel frame structures, does that belong to the AISC.

MR. MCCUMBER: Joe McCumber from Yankee Atomic. I think in general, I just hate to hear silence. I think in general, I think all licensees may have a major investment in the structures of their plant. I think in general, there are walk downs, there are upgrades, there are touch ups here and there to handle degradation as it is required.

The ACI codes give all kinds of guidance for what you should do to look for types of degradation and how to correct it. So, I think in general, structures of the plant are being

kept at a good level.

MR. SHAO: I realize that. Some licensee may do a good a job and some licensee might not do a good job, but there is no requirement. Maybe the question is, since there were no inspection requirement for other Category 1 structures, both concrete and steel, should we have baseline inspection, visual?

MR. RICHARDSON: Let me turn the question around and see if I can stir up some controversy here. Let's assume that the NRC is going to, as part of its license renewal criteria- let's for argument sake assume that the NRC is going to require a re-baselining of the containment, a structural integrity test, leak surveillance test, configuration control test; that is, walking down, visual examination of dimensions and that sort of thing.

If those requirements are imposed, I am gathering from this audience at least if it is representative of the industry, that I am going to get a shrug of the shoulders saying okay. Is that true? You need to say something.

MR. BURKE: Rich Burke, EPRI. I don't work for a utility, but the industry reports that we are writing look at degradation mechanisms, look at current practices. If there is something that is deficient within any of these IRs, whether it be concrete structures that see water or containments, recommendations will be made where it is justified that for greater than 40 years the current programs are insufficient.

As you recall, the NRC had Commission studies on concrete over the years but the NOW study shows that concrete was inherently rugged. To say that proof tests, walk downs, new certifications are needed seems a bit capricious when one looks at it where there is no real technical bases.

I would ask the NRC - maybe posing a question that was asked earlier - why were there never any requirements imposed upon the licensees for the last 30 years on these, if you didn't believe that they were inherently rugged?

MR. SHAO: Section 11, the ACI, they will do some work. In my view - it is not NRC view - is that there some be some time inspection for other structure. They can be visual or whatever. But you cannot let this structure go 30 or 40 years without any inspection requirement.

MR. BAGCHI: Sixty years, 70 years.

MR. SHAO: Fifty or 60 years.

MR. BAGCHI: I would like to make one comment. Industry has said that there is no reason for doing inspection control. They have been lot of foundation degradations. Control, lining is extremely important. Containment capacity could be highly affected by what the foundation had done over the last 40 years or so. We haven't looked. We have already experienced those kinds of cracks.

MR. SHAO: This is beyond the question. I have no comment on the question of this here. Should we have a

structure test before license renewal? I would like comment on that?

MR. MCCUMBER: Joe McCumber from Yankee Atomic. I wanted to read - I don't know if this came out in other sessions. There is a task force that looked into the need for supplemental for baseline test in Section 11. I just want to read the results of that which basically were, Section 11 should not develop special supplemental requirements related to license renewal. That would include re-baseline inspection. Section 11 should continue to play a proactive role in addressing degradation. This should include code changes when technically justified on a time scale relevant to the particular aging process.

If there is a concern, I see no justification waiting for the year 40.

MR. SHAO: In answer to this question you said there should be no pre-baseline, so there would be no additional test.

MR. MCCUMBER: Not tied to a calendar year.

MR. SHAO: That is a answer to the question. How about for those structures where there was no inspection before? You cannot call then re-baseline. There is no data at all, then what do you do about that?

MR. MCCUMBER: I think each licensee is going to have to demonstrate a program to show that his structures are

continuing to keep at level of safety, and it may vary depending on the structure.

MR. SHAO: The answer is the licensee should have a program to inspect other Category 1 structure, right?

MR. MCCUMBER: Right.

MR. SHAO: Do you want to report this or not?

MR. BURKE: Yes. We are working on a Class 1 structure that will be out again, in June of 1990. I can't give you the results of work that has not been completed. You will hear about some of the other work that was done.

MR. SHAO: Is this Class 1 structure, Class 1 concrete structure.

MR. BURKE: Class 1 concrete structures.

MR. SHAO: How about Class 1 steel structures?

MR. BURKE: Can you define one for me?

MR. SHAO: Tanks and wraps.

MR. BURKE: There may be some tanks.

MR. SHAO: Tanks and frames.

MR. BURKE: Yes.

MR. SHAO: We have the whole thing, not only half of it.

MR. BAILEY: Tim Bailey, Northern States Power. As part of the Monticello plant life extension pilot study, we did numerous visual inspection tests throughout both concrete and steel structures. We really didn't find the need from those

results to do a lot of these extensive qualification tests that you are suggesting here.

It is quite easy by visual examination to identify any significant configuration problems such as settlement, cracking of the structures and that kind of thing. Those are the kinds of tests that --

MR. SHAO: When I say inspection, I didn't exclude visual inspection. Visual inspection may be sufficient.

MR. BAILEY: I think as Joe mentioned, the utilities will be expected to prove that their programs do a decent job of these kinds of inspections. I think typically, visual inspections will be the key item.

MR. RICHARDSON: You don't think that you are in any danger of not picking up things because of inaccessibility; there are parts of the structure that you just can't see?

MR. BAILEY: The other thing that I should point out is both in the pilot study and in the IRs, particularly in the containment, there will be selected areas of special concern you might say. For those particular areas where there might be a significant potential for corrosion on the steel liner or something like that, then both the IRs and the plant-specific reports will identify those as activities that need to happen and indeed they will happen.

MR. SHAO: The last question is, what about the structures that are in contact with water like ultimate heat

sink, water retaining structures. Any particular maintenance that is required to make sure that the rebar is not corroded? Are there comments on this?

MR. MCCUMBER: Joe McCumber, Yankee Atomic. I think that would be covered pretty much by what Tim just expressed, that you will do a level of checking out depending on what the concern is. I guess we will see that the structure would be looked at.

MR. SHAO: I see normal checking out would be maintenance, to make sure water - you have to do a little bit more than just inspection. You have to do maintenance, to make sure that - checking out to see sufficient year to see that maintenance and present what it does to the rebar.

MR. MCCUMBER: You will have to do whatever is necessary to do that.

MR. SHAO: Is that going to be covered in your report?

MR. BURKE: Yes.

MR. BAILEY: Maybe I could just expound on that. When you do your visual inspections of these structures you will find any potential problems where the water might get to the rebar and that will typically be fairly large cracks. If those cracks are not there, then you really don't have a concern.

MR. SHAO: Yes and no though, if permeable. If you

have water there for 40 years or 50 years, somehow the water will get in.

MR. BAILEY: The water might be permeable, but it is shown by the ACI codes that cracks of only certain depths. The chemistry of the concrete is such that it protects the steel rebar.

MR. SHAO: Yes, but in the compressor area, the tension area, the cracks. Suppose you have a concrete that is subjected to maybe 400 PSI somewhere and it cracks there.

MR. BAILEY: What you are saying is the tension area?

MR. SHAO: Yes, the tension area.

MR. BAILEY: You are suggesting ACI covers that.

MR. SHAO: Right.

MR. BAGCHI: May I make an observation. The test has come to maturity and that can be used in concrete structures as has been shown by experiments to reveal cracks that may not be that accessible at all, because they are in contact with the foundation or there is something else that you cannot access.

There has to be a consensus and a systematic way of looking at degradation, looking at the structures and looking at the high stressed area. There has to be a systematic method of looking at that. Without that, we are not going to find anything.

MR. BAILEY: I believe the IRs that Rich is talking about will address those particular issues.

MR. SHAO: Let me summarize this. No re-baselining, is a general comment that I get. No re-baselining necessary and no additional retest of structure test. For other Category 1 structures, the concern was that there was no inspection requirement at all. The licensee should have an inspection program after he is working on concrete structure but also working on steel structure.

Hopefully, the licensee will follow this inspection program. For structures that faces water some special attention should be made, especially on the retention side to make sure the water doesn't get into the rebar.

MR. RICHARDSON: I have to confess, that portion of the workshop was singularly uninspiring. Maybe that was to be expected.

PARTICIPANT: Can I make one comment on the conclusion. You make it as though water shall not get in. If water does get in, then an evaluation is necersary.

MR. SHAO: Yes.

PARTICIPANT: It is not a black and white.

MR. SHAO: Water will get in and there is corrosion.

MR. RICHARDSON: We may now be getting into the more interesting part of the workshop. That is, the presentations by the four organizations that asked to be on the agenda; Numarc, EPRI, Northern States and Yankee. Is Numarc going to make a presentation this morning?

MR. NICKILL: I am going to do it.

MR. RICHARDSON: Bob Nickill is going to - you are representing whom?

MR. NICKILL: I am representing Numarc. I am Bob Nickill from EPRI, and I am here today representing the Numarc-Nuplex working group. That is the group that has responsibility for endorsing, reviewing and endorsing the industry reports that Tim addressed yesterday to some extent in the general session, in the pressure bounding portion of this workshop.

I should make a little prefatory remark, to the extent that the program at Numarc includes not only the IRs but also two other legs of a three piece stool. That is, the industry is taking a fairly comprehensive approach toward license renewal. The three parts of it are a general methodology document intended to cover the evaluation procedures for components, system components and structures that do not wind up in our IRs.

[Slide.]

That methodology document has been discussed in another portion of the workshop, methodology to evaluate plant equipment for license renewal. The procedures that are contained in that document are roughly parallel to those that we use in the industry reports. So, there is a solid base of consistency between those two legs of the stool.

The third leg is the demonstration of the license renewal process, and that's the two lead plant projects that we are all familiar with, the PWR at Yankee Atomic and the PWR at Monticello.

Today, I am only going to talk about a few industry reports, those that are directly relevant to containment or to Class 1 structures. One of those IRs has already been completed and forwarded to the Nuclear Regulatory Commission, that is the PWR containment that is shown on this slide. The Class 1 structures and the PWR containment IRs are scheduled for submissions around June of 1990. The work on the Class 1 structure IR is proceeding on a pretty good pace. We already have a draft. I would say that it will probably be in somewhat reasonable shape by about March of 1990. The PWR containments is proceeding on an accelerated scale that has really only gotten underway a few weeks ago.

The next viewgraph, please.

[Slide.]

A bit about IRs. The purpose of the IRs are shown on this particular viewgraph. We have a fundamental formatting and procedural way of dealing with degradation mechanisms; that is, to identify all of the plausible age related degradation mechanisms for particular structures, systems and components, and we attempt to dispose of those issues or define additional requirements in a very systematic way.

We first of all go through an exercise trying to determine whether a given system structure or component is important to safety. It if is, then it winds up having to be evaluated for the plausible aging degradation mechanisms. Those are then defined, and we determine whether or not particular aging degradation mechanisms are covered by current plant programs. By plant programs, we include not only those mandated by the NRC and those mandated by the ASME code, but also those that are self-imposed by the applicant themselves.

There are a number of programs in place at plants for dealing with aging degradation that are not imposed by regulation and are not imposed by code requirements, and are simply a part of good management practice at the utility. Where a deficiency is observed, we try to recommend strategies or options for aging degradation management. I will show you on the next couple of viewgraphs - not quite yet - how that logic follows through.

I must also point out that it is intended that these IRs are supposed to close out issues generically to the extent possible, and can therefore be used in a reverential way by license renewal applicants. They have a responsibility to demonstrate whether or not in their particular plant, there are plant specific design features or operational procedures or whatever that might tend to defeat the conclusion that has been reached by the industry on a generic basis.

The next viewgraph please.

[Slide.]

As I said before, the IRs have a well defined structure. They are all going to look exactly alike, at least in format, certainly not in total content. We have an executive summary in the very beginning that is intended to provide a synopsis of all of the issues that are closed and those that remain open throughout the document.

We have a section two that provides the definition of the scope, any exclusions or supports included or not, or steam generators in or out, whatever that might be, and any special considerations such as whether some form of risk base assessment is included in the document.

Section three then provides the first meaty part of the document. It includes three sections; system component descriptions, a second where we describe the design bases of the generic design bases that tell us what requirements are being laid on this particular system, structure or component, all of the standards and regulations that apply to that particular system structure. And, in some cases there is a wide variation so this description in Section 3.2 can be quite extensive depending on the variation that exists out there in the world.

Finally, 3.3 contains a description of operating and maintenance history, evidence that gives us information that

guides us toward defining the plausible aging degradation mechanisms.

Next viewgraph, please.

[Slide.]

Further need is provided then in our logical progression as we try to close out issue. In Section 4, we define the degradation mechanisms and do an evaluation of their significant to the extent that we can on a generic basis, and this is primarily a qualitative evaluation. Temperatures are sufficiently low that we don't have to worry about freeze. Flow rates are so low that we don't have to worry about erosion. Neutron flux is so low that we don't have to worry about the radiation.

Those are the kinds of qualitative judgments that can be generically and readily made for those particular systems and components. Then we jump into Section 5. For those that cannot be closed are then evaluated against existing plant programs. Those plant programs can be inspection based, testing based, analysis based. Those plant programs are then used in an attempt to find out whether or not they are valid not only in the 40 year term but also in the license renewal period.

We believe that the continuation of the current requirements for Appendix J type A integrated leak rate testing has extended into the license renewal period and will still

remain valid for exposing any utility which will see ultimate containment structure. That determination was, in fact, made. Other kinds of quantitative evaluations are provided; fatigue, et cetera.

Finally, we are left with a number of issues in general that cannot be closed generically on the basis of current plant programs. We have to drop into Section 6, where we have to describe the options that are available for that aging degradation.

Next viewgraph, please.

[Slide.]

You will see that when you read these IRs, the terminology is potentially significant for significant aging degradation. This is the definition that we use. It is a part and parcel of our whole process. You will get a copy of this in the proceedings. We use it extensively in all the IRs. The important thing to note here is that if the degradation is allowed to continue without mitigation or whatever, then it could become significant. If you can show based on standard accepted practices that you confine the deterioration within established limits, and that it is no longer potentially significant then it is not significant.

Next viewgraph, please.

[Slide.]

We tried to identify the responsibilities in the IR.

The responsibilities for the industry as a whole when we close out an issue and the responsibility of the license renewal applicant who may choose to reference this document in a submittal. Industry, in the case of those conclusions that arise from Section 4 of the IR, the industry has a responsibility to define their assumptions, define on what grounds that they close an issue, and the applicant has the responsibility to make sure his plant design feature does not defeat the assumptions and the conclusion reached in the IR.

Next viewgraph, please.

[Slide.]

The same is true for Section 5. Industry is quite clear about what evaluation procedures and testing programs and inspection programs are used to close out an issue. The applicant has the responsibility to determine whether those established programs are in effect and in use at his plant so that that conclusion can be taken advantage of.

Finally, I am now ready to talk about a particular IR. As Rich Burke has pointed out, we only have one that we have in. The other two are in the process of being prepared. In some cases, we are not ready at this point to define the industry conclusions as to what might happen, for example, for water retaining structures that are Category 1 equipment.

I would like to talk, however, about the conclusions that were reached in the PWR containment IR today. PWR

containment industry report takes advantage of four pieces of evidence upon which to base its conclusions. There are other pieces of information as well, but these are the four. First of all, there is historical performance of related structures that show that 40 years is a rather artificial requirement or limit being placed on the life of these structures. Many of these kinds of reinforced and prestressed concrete structures last ever so much longer.

Secondly, there are construction quality standards that apply to the Nuclear Industry that provide additional protection over and above standard construction on which this historical performance is based. Third, we have available to us a number of inspection and testing requirements, either through the ASME code, the regulatory guides and other means, to ensure that these structures continue to maintain their performance during their intended life.

Finally, and importantly, there have been a number of test programs - many of them conducted by the NRC and their contractors - that demonstrate the tremendous amount of capacity margin that these structures have available and, therefore, they are resistant to small amounts of degradation that do not inflict any harm on that capacity margin.

In the PWR containment IR, we found that based on current plant programs, primarily again IWE, IWL, Reg Guides such as 1.35 and other things like the integrated leak rate

testing, the Type A as well as the B and C, that we can dispense with a number of issues. Corrosion of grounded and ungrounded pre-stressing tendons primarily based on Reg Guides and on IWL, progressive reductions in the level of tendon prestress which is an item that was pointed out in one of your questions. It was felt by the industry group that prepared this IR that that was a manageable form of degradation; that it would be detected and managed with current plant programs.

Degradation of exposed concrete surfaces, and I emphasize the word exposed; that are accessible for visual inspection. The IR is also very careful to point out those regions that are not readily accessible for visual inspection and proposes alternative strategies for those.

General corrosion of concrete containment liners and free-standing steel containment shells again, especially in visually accessible areas. To some extent, even in visually inaccessible areas because of the ability of the integrated leak rate testing, could expose potential problems. Finally, fatigue damage of free-standing steel containment expansion bellows, which was called out as a potentially significant item but was felt to be able to be treated by an extension of existing fatigue analysis requirements.

Next viewgraph, please.

[Slide.]

The issues that were left open that require

degradation management are listed on this viewgraph, and there are three of them. We were concerned about aggressive chemical attack on below grade or inaccessible portions of the containment. That, by the way, also included such things as ice condenser systems and there are potential areas there that you might want to consider as well.

We were concerned about floor beneath the concrete floor slab which could corrode without being observed initially. We were concerned about the degradation of coatings used to try to mitigate corrosion. I am going to go through briefly here on my last viewgraph, the kinds of options that the industry has prepared for applicants to use at their discretion.

You will recall in Section 6 we tried to offer options, strategies. It is up to the individual plant applicant for these open issues to define a program for closing out that issue. The industry has attempted to close out issues generically in Sections 4 and 5 of the IR, but in Section 6 we merely provide options. This is an example.

With regard to the possibility of aggressive chemical attack on portions that are not accessible for visual inspection, one thing you might consider doing is monitoring to find out whether or not you have aggressive conditions sufficient to cause problems in the first place. If you don't, no further requirements are in place. Therefore, you might

consider the possibility of just providing some sort of monitoring system for your groundwater. If the groundwater turns out to be aggressive, then it throws you into a different category.

You could consider the possibility of mitigating the possible corrosion through some sort of protective system, including such things as coatings - that is a choice. Finally, you might wish to take advantage of the robustness of the integrated leak grade testing to try to determine whether or not you can tolerate the potential leak that might be caused by excessive degradation, corrosion in an inaccessible region.

These are merely three options. They are described in somewhat greater detail in the IR. It gives you a flavor of the kind of approach that the industry has taken for providing options to the individual plant applicants for license renewal.

Thank you.

MR. RICHARDSON: Does anyone have comments or a need to clarify?

MR. BAGCHI: I would like to ask one question. You have mentioned a number of aging degradation mechanisms. Those are dealt with as important or not important, based on what you studied.

MR. NICKILL: Yes. Significantly is the term, yes.

MR. BAGCHI: Significant or not significant. Did you consider foundation settlement and relative displacement as

being a potential aging degradation mechanism?

MR. NICKILL: No, we did not. For the moment, we did not consider it in the IR.

MR. BAGCHI: Do you think that is a potential degradation mechanism?

MR. NICKILL: I think it is a potential degradation mechanism. On the other hand, it is not unlike some of the other degradation mechanisms that were closed out in Section 5 on the basis of current plant programs. We probably could have considered it and still closed it out. This was not included in our scope.

MR. BAGCHI: I would just like to offer one thought though, that containment is designed for accident pressure which it really doesn't see, and most of the leak rate tests are done at a much lower pressure. Therefore, some of the stress is particularly - could be imposed on the map of the foundation could be exacerbated by this foundation problem. You would not see it from the report.

MR. NICKILL: That's right.

MR. SHAO: Does it include very active within the lead plant program? What about the ACI 349, are they doing any work in the lead plant program?

MR. NICKILL: To my knowledge, they are not. If that is something that we need to look into, we would. We have used ACI documents extensively in the IRs for providing the basis

for some plant programs not mandated by the NRC. For example, condition monitoring. To the extent that condition monitoring as described right now by ACI, is insufficient. It would probably be wise to go back for additional help.

I think the lead plant program might be the place where we could find out whether those conditioning monitoring suggestions and recommendations are effective. We will probably be checking with Monticello as to whether or not those ACI conditioning monitoring suggestions are useful and are being implemented.

MR. BAGCHI: Another question is, how about the foundation, the soil conditions, the sediments and 60 year life; would that be an issue for the extension? Are you going to look into the soil conditions for the next 20 years?

MR. NICKILL: The soil condition, we looked at. Not movement so much as, we were very concerned about the possibility of aggressive groundwater. That kind of soil condition we were concerned about.

MR. BAGCHI: I think of soil in general. Groundwater, differential settlement.

MR. NICKILL: I think if differential settlement winds up being an issue that regulators raise, it certainly gets the attention from industry.

MR. JENG: I am David Jeng, NRC Staff. In regard to the excessive relaxation, I saw your slides. You put into the

category of measurable relaxation. My specific question is, these tendons are designed for 40 years life, and at the end of the 40 years they are expected to reach the minimum design forces. Now, we are talking 20 years extension.

Does your recommendation include at the beginning of the 41st year, to retention to the tendon to such an extent that they will provide additional 20 year extension; is that your recommendation or not?

MR. NICKILL: I think the recommendation was that for low monitoring programs to find out whether or not excessive relaxation would occur in the current 40 year period. That was examined to see whether or not those programs were effective. It was determine that not only were those programs in place and being used, but that excessive relaxation would be observed and they would be retention - yes.

MR. JENG: Are you aware that --

MR. NICKILL: It was decided that the current plant programs would be worrying about retentioning in the current license period and they would extend those same procedures on into the past 40 year.

MR. JENG: There is not a requirement to bring up the notch to allow the next 20 year relaxation. There would be no such requirement?

MR. NICKILL: I would interpret what we have in the IR as meeting that requirement. It was not determined to be an

exact 40 years as required during the current license period.

MR. LAPIDES: How about corrosion tendencies, it is possible --

MR. NICKILL: The recommendation made by the industry group in this case was that the Reg Guide that is in place and the IWL were sufficient to --

MR. LAPIDES: To prevent corrosion.

MR. NICKILL: Yes. Both grounded and ungrounded tensions.

MR. JENG: One more questions. On the containment inspection, I wasn't quite clear. Are you recommending inspection program to the effect that even in the regular structures like bridges on highways - the bridge department do interviews there in a regular period, inspection of the structures, beams and painting and so on.

MR. NICKILL: Right.

MR. JENG: I am a bit concerned about the fact we have weaker structures which, in some cases, have not been inspected for 40 years life and maybe the industry want to think about possibility of some inspection of some kind, particularly containment.

MR. NICKILL: You mean, over and above what we already have?

MR. JENG: As far as the containment structures, yes, some region inspection I presume is in place, but not on other

Category 1 structures. For that reason, I am concerned.

MR. NICKILL: For Category 1 structures, in that particular case, we are well aware of the fact that integrated leak rate testing which was a large part of our justification for not requiring additional inspection on the containment structures - that is not available to us for Class 1, Category 1 structures.

Therefore, we intend to look carefully at additional or augmented inspection programs. That has not been finished yet. We have no industry position at this time. We will keep you informed as it develops.

MR. JENG: One more question, last one. You categorize one item as non-significant. Could you elaborate a bit what criteria judging, asserting degradation to be non-significant. Is that qualitative or is there some guidance?

MR. NICKILL: There tends to be some qualitative, but there is a little bit of a mixture. For example, we considered freeze-thaw damage and we looked at a weathering index which is quantitative in a sense, but it tends to be barely quantitative. And, we dismissed freeze-thaw damage as being non-significant because of the weathering index considerations.

They tend to be qualitative and not quantitative.

MR. JENG: I would like to recommend when you issue a report for the staff for review, to the extent that you can, please try to be quantitative or for those reasons you have a

basis to be so.

MR. NICKILL: We tend to be qualitative when we think it is a judgment call. That is clearly working in our favor. We tend to be quantitative when we require evidence to support our contention.

MR. JENG: Thank you.

MS. MITCHELL: Josslyn Mitchell, NRC Staff. I was interested to see the calculations of large margin in the capacity of the containment used to justify the fact that it will really support the design bases loading. I want to know, did those kinds of calculations that have been submitted to bolster the idea that they really could withstand much larger than design basis modes. Would you care to comment on how we should view those in the future?

MR. NICKILL: Yes. They are not only calculations, of course, they are test results as well. The way the industry used those was to demonstrate the fact that perturbations in the current state and configuration would not cause that margin to erode significantly. Therefore, we attempted to take advantage of that.

It is only one part of the whole story, of course. The way we would like to do it - the way we used it in the IR was to merely reference and quote significant results from specific reports such as those contained in the laboratories. We have not made any intention at this point to submit those in

some form in any docket at this time. Our intention was that they are accessible to the NRC and many of them were produced by the NRC as a part of the research programs.

However, is your question related to whether or not further testing is required, further analysis?

MS. MITCHELL: No. It was just that the tests at the International Laboratory have been used to say relative to severe accident world, that the capacity of the containment is two to three times what the design basis is. Now I see those same tests saying look, since it has all that capacity if it is degraded, it really will have its one time design basis.

MR. NICKILL: You are surprised at that? We found it instructive and informative and useful.

MR. RICHARDSON: Any other comments?

MR. COSTELLO: I am Jim Costello of the NRC Staff. I hope I am not intruding on what someone else has already said. I couldn't help but notice that - perhaps it is not surprising - the difference in viewpoint appropriate to the type A test. On the one hand, Dr. Nickill and his associates find comfort in the fact that the Appendix J test is done presumably at full pressure because less pressure is less likely to give you any kind of a tell tale of performance.

On the other hand, Mr. Katz and his associates are a little concerned about the full pressure of the test. I didn't realize that there may well be these differences of viewpoint.

MR. NICKILL: May I comment?

MR. COSTELLO: Sure.

MR. NICKILL: I comment by saying that in the early draft of the TR on PWR containments, we were carrying along a concern about the possibility of repeated integrated leak rate testing, defeating the crack width assumptions that we were making as a result of ACI 318. We were going to try to make a claim on the retention side that the cracks are relatively narrow and the water can't make its way in because you have satisfied the reinforcement spacing requirements and coverage requirements.

Then you start doing cyclic loading on a fairly frequent basis and you might defeat that. We haven't done the analysis to support it, but there has been some kind of back of the envelope look at that problem to indicate that we don't think that cyclic loading of the type that people are now doing is going to exacerbate that problem. We probably ought to look at it a little further. At this time, we consider it to be a non-problem at this time.

MR. JENG: David Jeng, NRC staff again. Bob, I forgot to ask you one more question that I thought was important. In regard to the liner at the bottom of the containment normally covered with two feet concrete, because of the most likely cracking of some concrete on those two feet portion there should be some water deposited. That is my

belief, okay.

Based on our experience at Oyster Creek, when the liner is in contact with stagnated water, the chance of corrosion and thinning of the base metal will be very highly likely. Given this experience, I wonder if your Committee looked into the specific means of looking into potential thinning of the base liners by potential rate on the part of concrete and come to some kind of specific recommendations. Could you elaborate a bit?

MR. NICKILL: That particular issue was shown on one of my viewgraphs as being a Section 6 issue. It was a non-closed issue requiring options and strategy. The IR merely contains a number of recommendations. We consider it to be something that each license renewal applicant is going to have to address on their own, but we provided some recommendations going all the way from trying to prevent it from happening to trying to just see if we could take advantage of the integrated leak rate testing to expose the problem.

I don't know whether Mel wishes to address that in any more detail or not. The issue here is, to what extent the strategies contained in Section 6 directly address the floor covering degradation and potential addressing to that is to the staff.

MR. LAPIDES: I think you said it correctly. In some plant-specific issues, some of them for example, have

excellent de-watering systems and shouldn't have such a requirement. Some of them have protection systems that would preclude it. All that has been given is a Section 6 conclusion which lists about eight or nine different criteria which lead you to a preferred option for managing that.

I can't imagine how you would give a single recommendation, and I think that is what bothers you.

MR. NICKILL: Therefore, what you do is, it's a utility base to decide whether they want to prevent it or try to live with it, or they try to dig it up and repair it and so forth. Those options are all presented in the IR. The industry takes no position as to which one is preferred, we merely provide the option.

MR. JENG: Thank you.

MR. RICHARDSON: We are going to, after the break, we are going to - since the room is getting crowded, we are going to switch rooms. They are going to allow us to have Room A, which is a bigger room. We have two other speakers. My question to you is, after those two speakers, do we have others that would like to make any kind of presentation?

I am trying to balance in my mind, what our time constraints are. Is there anybody that would desire to make additional presentations?

[No response.]

MR. RICHARDSON: Seeing none, since we only have two

left and we are getting near break time, I am going to suggest that we take a little extra time for break. Let's reconvene at 10:15 in Room A.

[Brief recess.]

MR. RICHARDSON: We might as well get started. We have a larger room and it looks like fewer people. We have two other presentations to be made; Tim Bailey from Northern States Power and Joe McCumber from Yankee Atomic. If you have questions or comments to make, I would ask that you use the two microphones at the center aisle so that the reporter will pick them up. I will call on Tim Bailey of Northern States Power. If you will come up, Tim to make a presentation.

MR. BAILEY: I am Tim Bailey, and I am representing Northern States Power. I would like to give an overview of the Monticello pilot study, results on the primary containment. Since Monticello was one of the pilot plants, we chose to do an extensive examinations to support our technical evaluations.

[Slide.]

One of the things that I would like to show here is that those extensive examinations haven't resulted in any significant findings for our primary containment system. Our overall conclusion of our evaluations to date and examinations is that our primary containment is in very good condition and is expected to provide the structural and leak integrity well beyond the current period of the initial operating license.

The scope of e evaluation that I would like to talk about is the drywell metal shell, the suppression chamber shell and vent system, and the penetration assemblies. On this next sketch, we can see that Monticello is a PWR-3, Marc I containment. The lightbulb shape structure is the drywell, and as you can see above the concrete floor of the drywell, there is two inch gap between the steel structure and the concrete structure.

Then you can see that there is a vent line that goes down to the suppression change. Of course, the suppression chamber is the donut shaped structure that we can see here. I would like to point out a couple of features tnat we took special examinations of. That is, right below the surface of the concrete floor in the drywell on the exterior side of the shell, there is what is known as the sand pocket region. This is a transition zone between the free drywell space above it and, of course, a vessel which allows for thermal expansion of the drywell. That is one feature.

Of course the other feature is that we have the vent line going into the torus, and the downcomer vent header region there. We found it particularly important to take close inspections of those areas to assure corrosion is not going to be a problem in the long term future.

Our evaluation determined there to be two potentially significant degradation mechanisms; that being corrosion of the

shell, including the embedded portion that I just spoke of, and mechanical and thermal stress fatigue of the suppression chamber shell and the vent line bellows. Conclusions of our evaluations were that the drywell shell is capable of an expected life well over 100 years. The main degradation mechanism that we are concerned about there is corrosion.

The vent line and vent header is capable of at least 76 years. Again, corrosion is the main degradation mechanism. The vent line bellows is expected to see at least a 95 year life, and the main degradation mechanism here is fatigue. Then, for the suppression chamber we expect well over 100 years, and the main degradation mechanism there is, of course, corrosion.

There are several surveillance and maintenance activities that were in place at Monticello prior to our life extension evaluation. I would just like to make note of those. They are that we typically visually examined the interior shell coating of both the drywell and the torus on a cyclic basis to ensure that the coating is sufficient. Of course, we have in the past and will continue to maintain this coating as degradation is observed. Of course, the other key thing is that we do the containment leakage test for the tech-spec and ASME code.

As a result of our study, we decided to do additional examinations. I have listed here some of those examinations and

the results of those examinations. We did decide to expand our visual condition survey of the suppression chamber by including the interior visual examinations of the vent system on a cyclic basis. We also instituted a wall thickness measurement program to ensure that general corrosion of the drywell shell and the suppression chamber doesn't become a long term problem. You might say this is an aging management decision.

We also removed a section of concrete floor in the drywell and performed wall thickness measurements. The result of that inspection was that there was no significant degradation found. This examination included excavation of a three by three foot section of the concrete floor, and when that examination was completed we just replaced the concrete.

We also, since corrosion of the exterior of the drywell shell was a potential concern and since it cannot be readily visually examined, we took a boroscope in a couple of the penetrations of the drywell and verified that there was no significant erosion going on in the exterior of the drywell shell.

Another concern for BWR's is the potential existence of moisture in the sand pocket region. One of the activities that we took on was to inspect the sand pocket drains to ensure that there isn't water standing on the backside of the shell. Again, we inspected several hot piping containment penetration bellows for any observable damage. Again, we found no

significant findings. Another potential source of water for the sand pocket zone might be a leak in the drywell bellows. This past outage, we went and did a visual examination of those bellows and did find them to be in good condition.

A controlling degradation mechanism that we were concerned about there was corrosion of a center spool plate between the bellows convolutions. We observed that indeed, very little corrosion was going on in that region. The thickness of the quarter inch spool plate is still greater than a quarter of an inch. We also, as a result of the pilot study recommendations, examined the vent line bellows and, again, we found no significant damage or problems to those bellows.

We came up with three expectant aging management activities that we plan to pursue in the future, the first being taking periodic wall thickness measurements and trending those results of both the suppression chamber and the drywell shell. We also plan on implementing ASME, Section IWE and service inspections once we have our 10 year roll over period. We think that will enhance our ability to detect any degradation mechanisms of any significance.

We are also planning on monitoring the sand pocket drains for water flow, since corrosion of the shell and the sand pocket region appears to be the main degradation of serious consequence for the primary containment structure.

That concludes my presentation. Are there any

questions?

MS. MITCHELL: Could you clarify when you said that you had expected lifetimes of 100 years or 75 years or 95 years, what criteria were you looking at to get those numbers? Was it a pressure capacity and, if so, what pressure capacity was it?

MR. BAILEY: It was mainly in the case of the corrosion where we determined corrosion was the degradation mechanism of significance, we used general textbook type numbers for corrosion rates for the particular material and assumed that the material was not in a coated environment. So, we took the service life and that anticipated corrosion rate and thereby came up with the expected life.

In that case, we feel that is conservative because we are going to continually inspect our structures and do coating maintenance to upgrade those situations where we might have coating degradation. As far as fatigue concern, we took a look at the typical ASME evaluations of using a fatigue factor of one and then plotting those out with our anticipated cycles through the rest of the plant life. That is how we came up with, in the case of the suppression chamber, of well over 100 years anticipated fatigue life.

I might say that even if we did approach one as a usage factor, there would be other alternatives to determine if fatigue really is a concern. But in this case, it appears that

our original design was very conservative and we can justify extended life on that basis.

MS. MITCHELL: I don't think I made the question clear. I can understand that from a corrosion point of view, you evaluated that it might corrode by a certain number of mills a year. But when you get down to a minimum thickness a certain number of mills a year, you will able to tolerate a net metal thickness of a certain amount.

On what value was that based? Did you say if I have a quarter of an inch or half inch that it will withstand a certain pressure? Was the answer that you were looking for was that it will be design pressure, will take a design pressure?

MR. BAILEY: Yes, I think I can answer that. Basically, there was no original corrosion allowance in the original design of both the drywell and the corrosion structure. We found out that the actual design pressure of the vessel turns out to be significantly higher than the reanalyzed design pressure, which is 41 psi. Basically, we were able to take that difference and develop a conservative corrosion allowance that would account for that. That is really, you might say, the threshold of corrosion that we could withstand.

MR. SHAO: I have a question here. You keep on mentioning fatigue and containment. In my experience, fatigue and containment usually is not a major factor, mainly because the temperature is quite low in the containment and wall

thickness is very thin. Usually the fatigue should not be a major problem in containment. I am surprised to hear you with such a large fatigue factors aside from bellows.

MR. BAILEY: It is mainly localized areas that we are talking about.

MR. SHAO: You are talking the main shell?

MR. BAILEY: We are talking about very large fatigue life, expected life in the shell. Then there are some areas such as the vent line headers which might have higher stresses due to the Marc I loads where fatigue might be of more concern.

MR. SHAO: After one of the ASME code Section 3, that is one time requires 15 hours for containment. Are there any ASME Code people here? At one time they don't even require 15 hours of containment because of the thick shell and low stresses.

MR. BAILEY: Again, I guess one thing that should be pointed out is that the pilot study just went and re-evaluated everything on its --

MR. SHAO: You go beyond ASME Code?

MR. BAILEY: Right, just to make sure that there aren't any problems. Our conclusion is that there are no potentially significant degradation mechanisms with the kind of cyclic pattern we expect to see in the future.

MR. BAGCHI: In your evaluation of the life, it appears as though the major emphasis was on the accident

pressure load, which is what it should be. But, there are other concerns, other loading conditions. For example in external load earthquake, have you looked at the possibility that if you lose certain sections you have significantly reduced the margin or, perhaps, the capability to resist those kinds of loads?

MR. BAILEY: I am not real sure of the question. Is the question that there may be portions of the structure that might be degraded due to something like corrosion and that an earthquake could therefore result in the kind of stresses that might do damage and thereby lose part of the structure?

MR. BAGCHI: That is correct.

MR. BAILEY: I would say we didn't specifically look at that, because the results of our inspections and the results of our evaluations determined that the containment structure is still well within its design parameters, including accidents such as design basis earthquakes.

MR. SHAO: Goutam, I think this may not be an aging issue. It may not be a license issue but a severe accident issue.

MR. BAGCHI: My concern really is, when one is looking at containment category in one structure in all of these things, if you have significant creep and shrinkage cracks in concrete structures, the capacity to resist the design base in loading including the earthquake in external

loading may have been significantly reduced. This is something that should be looked at as well.

MR. BAILEY: I would say the one thing that we did do that partially addresses your question is, we did do a thorough visual examination of all the structures involved including the base mat and found no evidence of degradation that would lead to a configuration problem that you might be concerned about if you did have an earthquake and things were not symmetrically aligned.

MR. BAGCHI: Corrosion in the Mark I wet well supporting structure, for example, could significantly reduce your earthquake. Those are the kinds of things I would think you would want to look at.

MR. BAILEY: One of the items that I didn't list is, we also did a visual inspection of the supporting structures on the exterior of the suppression chamber and believe that it is in good shape and will continue to be in good shape, due to the fact that we have inspection programs in place that will call for coating maintenance as it is required.

MR. JENG: My questions are trying to understand your recommendations clearly. In your recommendation that you are going to propose a check of the thickness of the shells, does that check include opening up that you did - concrete areas to look at the base metal containment. Is that included in your part of a consideration?

MR. BAILEY: Yes. We did an initial inspection, and we haven't yet set the frequency for the doing that inspection again. I expect that it will include at least an additional inspection prior to going into license renewal.

MR. JENG: In your future recommendations, you would include a proposed frequency of such a check; that check would include a scope of a check in the basement or the bottom?

MR. BAILEY: Yes.

MR. JENG: Second question. Are those separate inspections that you did for renewal purposes?

MR. BAILEY: Yes.

MR. JENG: Which have not been done in the past is part of your existing program, do you recommend that some of them be carried out in the extended life, say first five years in a 40 years or 50 years, some items which you have not been doing which you do feel should be recommended for implementation in the extended life period of years. What are those items?

MR. BAILEY: I think that's a good question. We do plan as part of our license renewal project to re-evaluate the inspections that have been done and determine which ones should be continued on a regular frequency. I would say that those recommendations that I identified under the expected aging management are the ones that I can tell you right now, we do intend to do in the future.

The other ones, we have not completed a review on, and selected ones of those will be done. In some cases, we have already upgraded our surveillance procedures to include many of the visual examinations, such as structures outside the suppression chamber, such as vent header and vent lined visual examinations, those kinds of things.

MR. JENG: Last question. In our past experience, the anchor bolts opened identified one potential deficiencies in pilot plants such as the lose of bolts or loss of tension which in design consideration is very important.

In your current effort as a pilot program, did you make a consensus effort to look into such potential deficiencies and, if yes, what did you find? Do you think you need consider just one items for future renewal inspection or not?

MR. BAILEY: As part of the primary containment system, I don't believe we identified any anchor bolts that were of special concern as far as a pre-tension situation.

MR. JENG: In particular, torus anchor?

MR. BAILEY: As part of the exterior visual inspections I mentioned, we do periodically inspect those for any type of --

MR. JENG: Visual, right?

MR. BAILEY: Yes.

MR. JENG: Tension.

MR. BAILEY: On those particular ones, we haven't committed to check the tension on those particular ones. We believe by visual examination we can determine if they are loose.

MR. JENG: Thank you.

MR. HALEY: Neil Haley from the Illinois Department of Nuclear Safety. Would you describe for us over at Monticello's operating history, what kind of corrosion control and chemistry control program that you have had in your torus water and, if as a result of your investigations were any changes made in those programs?

MR. BAILEY: I know we do take a look at the torus water as part of the pilot study. We did do an evaluation of that chemistry and basically confirmed that there was no chemistry problems that would lead to accelerated aging of either the containment coating or the steel structure itself.

I guess what I would summarize is, we didn't identify any significant problems there. Like I mentioned, typically on a cyclic basis we go in and inspect the suppression chamber. If, on occasion we might find some crud buildup or some sort of problems like that in the torus, then we would take corrective, pro-active actions to mitigate that in the future.

MR. HALEY: Do you use a corrosion inhibitor in --

MR. BAILEY: No, we don't.

MR. RICHARDSON: Are there other comments?

[No response.]

MR. RICHARDSON: Thank you, Jim. Our final presentation is going to be by Joe McCumber of Yankee Atomic.

MR. MCCUMBER: Good morning. My name is Joe McCumber, representing Yankee Atomic. Today I would like to talk a little bit on the containment and go a little but further into plant structures, and then I would like to tie that into the general process that is depicted in the Rule, focusing on the scope and actual methods of flexibility and implementing it.

[Slide.]

As was discussed in previous presentations, it was recognized that the containment has key safety importance within the plant. Because of that, it was determined to do a detailed evaluation. The industry report has been issued for PWRs. In that, that report pretty much confirmed the inherent adequacy that is involved with the containment structure. It also determined the generic degradation issues that need to be considered.

The potentially significant issues that were determined to require further review were liner corrosion and, also, coating degradation. Again, in addition to that, each licensee has to look at the results of that report and demonstrate applicability to their own site. Also, address any plant-specific issues that may arise.

With respect to plant structures again, just in their inherent design, there is a lot of generic aspects to them. Depending on whatever structure you look at it is basically comprised of steel, concrete, roofing materials and the like. Because of that, there is a chance of doing some generic coverage as far as assessing what are the concerns. There are several management programs in place at plants today. For instance, masonry wall inspections, ISI of piping supports and several others that are plant-specific.

As far as Yankee's own review of structures, we have performed generic assessments of the materials involved with the different buildings and the buildings themselves to try to determine what is the potential for degradation and how would that degradation manifest itself. We then are doing very focused plant walk downs, using the results of those assessments and going out and looking for signs of degradation. Based on what we find there may be actions taken, one of which could include trending as appropriate to either follow a crack that may be found or something of that nature.

Again, it is also understood that there are several areas that will require plant-specific evaluation. I think as was brought up in other discussions, the level of this plant-specific review is going to depend a lot on the plant-specific conditions. For instance, what the groundwater is like, if you are dealing with a soil plant versus a rock plant, the whole

concerns with settling and cracking would be different. There is a very key plant-specific evaluation that has to be involved.

I would like to turn now to the proposed rule and tie in the whole review process. What is expressed in the philosophy statement in the rule right now seems to kind of exemplify a focused approach in trying to determine and get down to where are the real degradation concerns. However, if you look at the proposed rule wording in Section XX.9, it seems to go much further than that. We are required to identify design conditions, functions and environmental conditions, as well as identify degradation mechanisms, and programs to manage that degradation for all equipment important to safety; that is, all structures, components and systems is the way the rule is worded right now.

We feel that this is unnecessary. It is well recognized that all components aren't subject equally to degradation and should not be given the same extent of coverage within an application. There are many factors that affect this rate of degradation. That would be design considerations, benign environmental conditions, inspection, maintenance that is performed, actual refurbishment or replacement that is undertaken. The process needs to consider these factors so that resources can be put where the real attention is needed. Also, the level of review and documentation of the whole

process should be tied in only as necessary to support whatever determination that you need to show that the degradation is not a concern.

We feel again the wording in the rule has to better show a screening process so that you can efficiently reduce the scope of equipment for license renewal to those components important for safety in which degradation is a concern. We feel the process has to be comprehensive and comprehensive needs to be defensible, clear and consistent, very much so in the scope of coverage. There can't be any ambiguity insofar as what needs to be in and what is out. There needs to be an efficient process to give you flexibility in the method of implementing it or managing degradation. And again, only to require the information necessary to support the technical basis.

On degradation mechanisms, especially in the civil area that we are dealing with here, they are well understood based on years of experience. What we are seeing though, is this understanding tends to grow with experience as far as different material environmental interactions. Some examples are the concern with boric acid attack based on leaking, in attacking support components. There is a new emphasis on that today, and it is being taken care of.

One that was mentioned earlier had to deal with vibration-induced structural damage or supports loosening up.

Again, there is an added awareness to that right now, and I think the appropriate steps are being taken.

The existing programs in place today monitor, maintain, refurbish and replace components and equipment. They have been proven during the original licensing term, they are continuously updated based on experience, and we feel that the rule should allow or give credit for these programs. Furthermore, we feel that license renewal should not be pushed on to impose new requirements over and above the existing programs that are not tied specifically to degradation. An example of that would be the maintenance rule.

We feel there are several methods available for managing degradation. This is where I was alluding to the flexibility in implementation. The best way that you deal with that degradation depends on the actual conditions or the degradation that you are dealing with. They include further analysis to demonstrate that the projected degradation is acceptable, demonstrating that the current programs in place are adequate, possibly by procedural enhancements, or including trending where appropriate, modifying operating practices where necessary and even going as far as replacing or refurbishing the component.

As far as additional administrative controls to assure that the actions that we take are continued, we feel that these should only be applicable to those actions necessary

to manage age-related degradation for the license renewal term. And that, such actions become licensing commitments for license renewal. We do feel very strongly that you don't want to overburden your existing tech-specs and the like, and that these things can be covered by existing administrative programs.

In summary, we feel Section XX.9 does need to embody this screening process to be consistent with NRC philosophy so that you can focus on the important safety components which unresolved aging issues have been identified. Also, we feel that the rule needs to allow the flexibility for you to manage that degradation appropriately.

That is it. Are there any questions?

MR. JENG: Joe, you mention about coating or containment. Did you find particularly troublesome indication in your Yankee containment; is that the basis of your recommendation?

MR. MCCUMBER: No. Where I commented on the coating, that was the result of one of the potential areas that needs to be looked at based on the industry report. Based on our own inspections, the coating looks very well. In addition to that, our design allows you to do both an internal and external review. No, we haven't found any concerns.

MR. JENG: Another question is, did you take an effort to look into the potential corrosion of water structures

and to ensure that no unacceptable corrosion has been going on in your case?

MR. MCCUMBER: As I stated, what we first do is look at generically at the type of structure and what it is fabricated of, and determine what are the potential for degr[illegible]ion. For intake structures, it was clearly shown that the potential for erosion and degradation of rebar if you get water inside, are concerns. Based on that assessment, we have identified what you should look for to identify those concerns, and that is included in the walk downs that we do of those structures.

So, yes, we were looking for those types of problems.

MR. JENG: Your essence of recommendation is that one should take a specific walk down of these important structures and take whatever action that is consistent with the license renewal. That is your basic assumption, recommendations?

MR. MCCUMBER: Yes, that each plant will have to look at these type of concerns on a plant-specific basis, with a focus directed on where their own site may show concerns. For example, a site like ours with very clean water, a rock-based site may not have the same concerns others may have, but maybe we have a little bit different. So, yes, I agree.

MR. JENG: Thank you very much.

MR. RICHARDSON: Are there other questions?

MR. STATTON: My name is Jeff Statton. I am with

Bechtel Power Corporation. I would just to further comment on that, that Joe is making. We are currently under contract to EPRI for the preparation of an industry report on Class 1 structures. Some points and items came up earlier, and I would like to reconfirm for your own information, the scope of what we are intending to review within the industry report.

Specifically what came up several times is the area of Class 1 structures and structures exposed to flow-in water. That definitely is under the review of the report. In addition, we are looking at tanks and tank foundations. Another issue separate from what Joe mentioned is the settlement issue. It is being addressed in that Class 1 structures report, as well as a last miscellaneous item of steel structures.

Those are being address. That plant schedule, I think Bob Nickill advised you a little earlier, submittal to you is toward the middle of 1990.

As a footnote to that though, I would add and spring boarding off yesterday's plenary session, that the scope of the review of the license renewal issue is those degradation mechanisms unique to the renewal term. Of all of the issues that we are wrestling with at this time, we haven't found degradation in any of the Class 1 structures that we are dealing with that is strictly unique to the renewal term.

MR. RICHARDSON: Thank you. Are there other

comments?

[No response.]

MR. RICHARDSON: That concludes the presentations by those that requested. I would open the floor up. Is there anybody else that would like to make any type of presentation or comment in the area of containment or structures as related to license renewal?

[No response.]

MR. RICHARDSON: If not, we will adjourn until 1:15, at which time we will all come back together in a plenary session here to sort of wrap the whole thing up here from the different working sessions and see what conclusions can be drawn.

Thank you.

[Whereupon, at 11:05 a.m., the meeting adjourned.]

REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission

in the matter of:

NAME OF PROCEEDING: Session 6 Public Workshop

DOCKET NUMBER:

PLACE OF PROCEEDING: Reston, VA

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.

Mary C. Rosenberg

Mary Rosenberg
Official Reporter
Ann Riley & Associates, Ltd.

SESSION 6
CONTAINMENTS

R. E. NICKELL

EPRI

PUBLIC WORKSHOP ON TECHNICAL AND POLICY CONSIDERATIONS FOR NUCLEAR POWER PLANT LICENSE RENEWAL

NOVEMBER 13-14, 1989

RESTON, VIRGINIA

SESSION 6
CONTAINMENTS

NUMARC NUPLEX Working Group Industry Reports

- PWR Containments — Completed August 1989
- Class I Structures — June 1990
- BWR Containments — June 1990

PURPOSE OF NUMARC NUPLEX INDUSTRY REPORTS (IRs)

- Identification and evaluation of age related degradation for major plant systems and structures
- Disposition of age related degradation issues:
  - Non-significant
  - Adequately managed by current evaluation programs
  - Enhanced aging management may be required on a plant-specific basis
- Intended to be referenced in individual plant license renewal applications to the NRC

INDUSTRY REPORT OUTLINE

SECTION 1 EXECUTIVE SUMMARY

- Elements of License Renewal
- General Considerations (if needed)
- Specific Conclusions -- Section 4
  -- Section 5
  -- Section 6

SECTION 2 INTRODUCTION

- Scope (Systems/Components, Exclusions)
- Degradation Mechanisms Addressed
- Special Considerations

SECTION 3 SYSTEM/COMPONENT EVALUATION BASIS

- System/Component Descriptions
- Design Bases, Standards, Regulations
- Operating and Maintenance History

INDUSTRY REPORT OUTLINE

continued

SECTION 4 DEGRADATION MECHANISMS

- General Mechanism Descriptions
- Specific System/Component Considerations
- Significance to Systems/Components (Regulatory Conclusions)

SECTION 5 COMPONENT LIFE EVALUATION

- Description of Established Evaluation Procedures
- Accepted Limits of Degradation
- Quantitative Results for Systems/Components (Regulatory Conclusions)

SECTION 6 AGING/DEGRADATION MANAGEMENT

- Recommended Prevention, Mitigation and Improved Assessment Strategies
- Level of Existing Demonstration
- R & D, C & S Recommendations
- Generic And/Or Plant-Specific Actions (Regulatory Conclusions)

SIGNIFICANT AGING DEGRADATION

Significant aging degradation is such that, if allowed to continue, the capability of the system, structure or component to perform its intended function during the license renewal term would be compromised. In that case, additional generic or plant specific evaluation or aging management options shall be pursued for license renewal. The evaluations may be based upon standard and accepted practices, with the deterioration found to be within established limits; otherwise, some form of improved assessment or preventative/mitigative action may be required.

INDUSTRY REPORT REGULATORY CONCLUSIONS

Section 4

The first set covers issues that are considered to be generically resolved for all _____, on grounds that the aging degradation mechanism under consideration does not cause significant degradation (for particular systems, components, or structures). Applicants seeking license renewal need not evaluate these issues, beyond assuring that no plant unique features exist that would preclude the applicant from verifying the conclusion in the IR.

INDUSTRY REPORT REGULATORY CONCLUSIONS

continued

Section 6

A final set of issues remain in which significant aging degradation cannot be addressed on a generic level by the industry as a whole. For these issues, aging management recommendations are suggested in the IR for use. The applicant or group of applicants for which these aging mechanisms are applicable are responsible for implementing an effective approach for resolving these issues.

PRESSURIZED WATER REACTOR CONTAINMENT STRUCTURES

LICENSE RENEWAL INDUSTRY REPORT

PWR CONTAINMENTS

Concrete and free-standing steel containments will continue to provide structural and leak-tight integrity, well beyond the period of the initial operating license, as demonstrated by

- Ultimate capacity assessments (margin)
- Historical performance of related structures
- Construction quality standards
- Current testing and inspection standards

PWR CONTAINMENTS

Potentially significant age-related degradation mechanisms that are adequately managed by current effective programs

- Corrosion of both grouted and ungrouted prestressing tendons
- Progressive reductions in the levels of tendon prestress
- Degradation of exposed concrete surfaces
- General corrosion of concrete containment liners and free-standing steel containment shells
- Fatigue damage of free-standing steel containment expansion bellows

PWR CONTAINMENTS

Potentially significant age-related mechanisms that require plant specific evaluations and may require an effective management methodology:

- Acid attack on below-grade portions of the containment that may be exposed to sulfate-bearing soils or acidic ground water
- Floor liner plate beneath the concrete floor slab which could corrode without being observed and could result in a potential leak path
- Interior containment coatings which are used to mitigate general corrosion of steel liners and free-standing steel containment shells

SLIDE 1

SESSION 6
CONTAINMENTS

MONTICELLO PILOT STUDY
PRIMARY CONTAINMENT OVERVIEW

TIM BAILEY
NORTHERN STATES POWER COMPANY
MONTICELLO LEAD PLANT
PROJECT TECHNICAL DIRECTOR

MONTICELLO
PRIMARY CONTAINMENT

Monticello's primary containment will continue to provide structural and leak-tight integrity, well beyond the period of the initial operating license as demonstrated by the pilot study evaluation.

SCOPE OF SERVICE LIFE EVALUATION

Drywell Metal Shell

Supression Chamber Shell & Vent System

Penetration Assemblies

POTENTIALLY SIGNIFICANT DEGRADATION MECHANISMS

Corrosion - Shell Including Embedded Portion

Mechanical & Thermal Stress Fatigue - Shell, Vent Line Bellows

EXPECTED LIFE

Drywell Shell Over 100 Years - Corrosion

Vent Line & Vent Header 76 Years - Corrosion

Vent Line Bellows 95 Years - Fatigue

Suppression Chamber Shell - Greater Than 100 Years Corrosion

SURVEILLANCE & MAINTENANCE ACTIVITIES

Visual Examination of Interior Shell Coating Each Cycle

Coating Maintenance as Required

Containment Leakage Tests per Tech Specs

IMPLEMENTATION ACTIVITIES SINCE STUDY CONFIRM EVALUATION RESULTS

Expanded Interior Visual Examination to Include Vent System

Wall Thickness Measurement Program - Actual Thickness Exceeds Design Wall Thickness

Removed Section of Concrete Floor in Drywell & Performed Wall Thickness Measurements in Sand Pocket Region - No Significant Corrosion

Boroscopic Examination of Exterior Drywell Shell Through Concrete Penetration - Loss of Coating, No Metal Thinning

IMPLEMENTATION ACTIVITIES SINCE STUDY CONFIRM EVALUATION RESULTS (Cont.)

Inspected Sandpocket Drains

Inspection of Selected Hot Piping Containment Penetration Bellows - No Significant Findings

Performed Visual Examination of Refueling and Drywell Bellows - Good Condition

Visual Examination of Vent Line Bellows - No Damage to Exterior Identified

EXPECTED AGING MANAGEMENT ACTIVITIES (additional)

Take Periodic Wall Thickness Measurements and Trend Results

Implement ASME IWE Inservice Inspections

Monitor Sandpocket Drains for Water Flow

NRC WORKSHOP ON LICENSE RENEWAL
NOVEMBER 13-14,1989
SESSION 6

PRESENTATION
ON
CONTAINMENT AND PLANT STRUCTURES

BY
JOSEPH T. MCCUMBER
YANKEE ATOMIC ELECTRIC COMPANY

CONTAINMENT

- DETAILED EVALUATION DETERMINED NECESSARY
- INDUSTRY REPORT
  - CONFIRMED INHERENT DESIGN ADEQUACY
  - DETERMINED DEGRADATION ISSUES
- POTENTIALLY SIGNIFICANT ISSUES REQUIRING PLANT SPECIFIC REVIEW:
  - LINER CORROSION
  - COATING DEGRADATION

PLANT STRUCTURES

- GENERIC APPROACH POSSIBLE
  - TYPICAL MATERIALS OF CONSTRUCTION
- SEVERAL MANAGEMENT PROGRAMS IN PLACE
  EX: MASONRY WALL INSPECTIONS
  ISI OF EQUIPMENT SUPPORTS
- ASSESS DEGRADATION POTENTIAL AND FORM OF MANIFESTATION
- FOCUSED WALKDOWNS WILL TAKE CARE OF MOST CONCERNS
- AUGMENT PROGRAMS AND TREND AS APPROPRIATE

NRC EXPRESSED PHILOSOPHY

"Those structures, systems, and components that are effectively covered by existing ongoing NRC requirements and/or licensee programs, or are not subject to aging mechanisms need not be addressed in the application (and need not be within the scope of the hearing process)."

PROPOSED RULE SECTION XX.9
REQUIRES

- IDENTIFICATION OF DESIGN REQUIREMENTS, FUNCTIONS, AND ENVIRONMENTAL CONDITIONS
- IDENTIFICATION OF DEGRADATION MECHANISMS
- PROGRAM TO IDENTIFY, EVALUATE, AND TREND EFFECTS OF RELEVANT DEGRADATION

FOR ALL EQUIPMENT IMPORTANT TO SAFETY

SECTION XX.9 SCOPE
UNNECESSARY

- WELL RECOGNIZED THAT DEGRADATION CONCERNS DO NOT EXIST FOR MANY COMPONENTS BECAUSE
  - -DESIGN CONSIDERATIONS
  - -BENIGN ENVIRONMENTAL CONDITIONS
  - -INSPECTION AND MAINTENANCE
  - -REFURBISHMENT OR REPLACEMENT

- PROCESS NEEDS TO CONSIDER THESE FACTORS SO THAT RESOURCES CAN BE FOCUSED ON THE AREAS WARRANTING ATTENTION

RULE NEEDS TO REFLECT A SCREENING PROCESS

TO EFFICIENTLY REDUCE THE SCOPE OF EQUIPMENT FOR LICENSE RENEWAL TO ONLY THOSE COMPONENTS IMPORTANT TO SAFETY FOR WHICH UNRESOLVED AGING DEGRADATION ISSUES HAVE BEEN IDENTIFIED.

NECESSARY SCREENING PROCESS FEATURES

- COMPREHENSIVE
- CLEAR AND CONSISTENT
- EFFICIENT
- FLEXIBLE
- REQUIRE ONLY INFORMATION NECESSARY TO SUPPORT TECHNICAL BASIS OF SCREENING DECISION

DEGRADATION MECHANISMS

- IDENTIFIED AND GENERALLY WELL UNDERSTOOD BASED ON YEARS OF CIVIL EXPERIENCE

- UNDERSTANDING OF ENVIRONMENTAL/MATERIALS INTERACTIONS CONTINUE TO DEVELOP
  - BORIC ACID INDUCED DEGRADATION
  - VIBRATION INDUCED STRUCTURAL DAMAGE

EXISTING PROGRAMS

- MONITOR/MAINTAIN/REFURBISH/REPLACE
- PROVEN DURING ORIGINAL LICENSING TERM
- CONTINUOUSLY UPDATED BASED ON INDUSTRY EXPERIENCE
- CONCLUSION - RULE SHOULD ALLOW FOR CREDIT OF THESE PROGRAMS

SEVERAL METHODS AVAILABLE FOR MANAGING DEGRADATION

- FURTHER ANALYSIS TO DEMONSTRATE THAT THE PROJECTED DEGRADATION IS ACCEPTABLE THROUGH THE RENEWAL PERIOD
- CURRENT PROGRAMS ARE ADEQUATE TO ASSURE DEGRADATION MECHANISMS DO NOT IMPACT SAFETY
- PROCEDURAL ENHANCEMENTS MAY BE NECESSARY FOR THE RENEWAL PERIOD
  - e.g., Trending, As Appropriate
- MODIFICATIONS TO OPERATING PRACTICES
- COMPONENT REPLACEMENT OR REFURBISHMENT

ADDITIONAL ADMINISTRATIVE CONTROLS

- ONLY APPLICABLE TO SPECIAL ACTIONS NECESSARY TO MANAGE AGE RELATED DEGRADATION IN SUPPORT OF LICENSE RENEWAL

- SUCH ACTIONS BECOME LICENSE COMMITMENTS FOR LICENSE RENEWAL

SUMMARY
MODIFY SECTION XX.9 TO:

- INCLUDE SCREENING PROCESS TO FOCUS EFFORTS ON AREAS WARRANTING ATTENTION

  ** IMPORTANT TO SAFETY COMPONENTS FOR WHICH UNRESOLVED AGING DEGRADATION ISSUES HAVE BEEN IDENTIFIED **

- ALLOW FLEXIBILITY IN DETERMINING OPTIMUM METHOD OF MANAGING DEGRADATION