NUCLEAR REGULATORY COMMISSION

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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BRIEFING ON STATUS OF STEAM GENERATOR

ACTION PLAN

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PUBLIC MEETING

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Nuclear Regulatory Commission
One White Flint North
Rockville, Maryland
Monday, December 3, 2001

The Commission met in open session, pursuant to notice, at 2:00 p.m., the Honorable RICHARD A. MESERVE, Chairman of the Commission, presiding.

COMMISSIONERS PRESENT:

RICHARD A. MERSEVE, Chairman of the Commission

NILS J. DIAZ, Member of the Commission

GRETA J. DICUS, Member of the Commission

JEFFREY S. MERRIFIELD, Member of the Commission

EDWARD McGAFFIGAN, JR., Member of the Commission

STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE:

ANNETTE L. VIETTI-COOK, Secretary

KAREN D. CYR, General Counsel

WILLIAM KANE, Deputy EDO

BRIAN SHERON, Associate Director for Project Licensing & Technical Analysis, NRR

MAITRI BANERJEE, Lead Project Manager for Steam Generators, NRR

LOUISE LUND, Materials & Chemical Engineering Branch, NRR

JACK STROSNIDER, Director, Division of Engineering, NRR

MIKE MAYFIELD, Director, Division of Engineering Technology, RES

DR. JOE MUSCARA, Materials Engineering Branch, RES

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

(10:30 a.m.)

CHAIRMAN MESERVE: Good afternoon. On behalf of the Commission, I would like to welcome you to today's briefing on the status of the NRC Steam Generator Action Plan. Before we get underway, I did want to extend a welcome to Commissioner Diaz who has -- this is the first public meeting we have had since he has resumed his seat to my left here on the Commission. And I wanted to say on behalf of the Commission how much we welcome his return.

COMMISSIONER DIAZ: Thank you so much, Mr. Chairman.

CHAIRMAN MESERVE: The NRC views steam generator performance as an essential element in pressurized water reactor safety. The Action Plan represents a comprehensive program involving the Offices of Nuclear Reactor Regulation and Nuclear Regulatory Research to address regulatory and technical issues associated with steam tube integrity.

We will hear from representatives of both of those offices today. NRR staff will address progress on addressing enhanced regulatory framework for ensuring steam generator tube integrity, while RES will discuss the ways in which the NRC is developing a better technical understanding of the physical phenomenon that affect steam behavior. With that, why don't we get underway. Mr. Kane?

MR. KANE: Thank you. It's been quite some time since the staff last briefed the Commission on steam generator activities. Since that time, there have been a number of changes and we have informed the Commission on our efforts to develop an improved steam generator regulatory framework through several Commission papers.

As you are aware, we have developed an integrated Steam Generator Action Plan that you discussed, and that involves many of the offices and cuts across many of the technical disciplines.

The Offices of Nuclear Reactor Regulation, the Office of Research and the Regions and others offices are working in close cooperation in addressing the activities in that Action Plan. With me today we have Dr. Brian Sheron, Jack Strosnider, Louise Lund, and Maitri Banerjee, from the Office of Nuclear Reactor Regulation, and Michael Mayfield and Dr. Joe Muscara, from the Office of Research. With that, I will turn over the briefing to Brian Sheron.

MR. SHERON: Thanks. I would like to just kind of set the stage if I could for the briefing with a little history. We've been working on steam generators for quite some time now. Back in the 80's when we first started to see cracking which was a new form of degradation which we had not really anticipated when most of these plans were designed, the difficulty there was that the inspection methods that were being used at the time were really not capable of seeing some of the cracks that manifest themselves in stress corrosion cracking, and we found ourselves in a very reactive mode with the industry. They would go into an outage not knowing what they would find. They would be coming in looking for alternative ways to deal with this cracking. We would be under a very short fuse to try to approve something.

At that time, in the late -- I'm sorry -- in the early 90's, a decision was made that perhaps we needed a rule to dictate our -- the way we deal with generators, and the staff embarked on a rulemaking in around 1993. We did a number of studies to support that rulemaking.

What we concluded was that we really did not need a rule. We had an adequate regulatory basis upon which to regulate the industry and the steam generators, that we did not need to impose any new requirements through a rulemaking.

At that point, we decided perhaps the best vehicle was through a Generic Letter, and we ceased the rulemaking with the Commission's concurrence, and started with a Generic Letter. We were pursuing the Generic Letter and, at that point, if you remember, I believe it was DSI-22 -- I can't remember which one, but it had to do with industry initiatives -- 13, I'm sorry -- and we decided at that time rather than pursue a Generic Letter with the industry, we would pursue working the steam generator issue as an industry initiative.

We then stopped work on the Generic Letter and embarked on a course with the industry to basically have them provide a guidance document. This was submitted to the staff by NEI in December of 1997, it was Document 97-06, and that provided a set of guidelines that the industry was proposing to manage their steam generators under.

We had extensive interactions with the industry on this document, starting in when it was received. We continued these interactions with the industry until around February of 2000. At that time, we had -- the industry had submitted to us what they call a Generic Licensing Change Package -- you'll hear a little more about that -- but also, more importantly, Indian Point 2 had their steam generator tube failure and, as you know, the staff basically had to put a lot of effort into the analysis of that event and the aftermath. As you know, we prepared, for example, Lessons Learned Report and the like, and then an Action Plan.

In a nutshell, that put a delay of about one year into our schedule. We stopped working on 97-06. It was a deliberate decision. We wanted to make sure we captured all the lessons learned as well as the other items in the Action Plan before we moved forward and approved 97-06.

In about February of this year, we resumed our review of 97-06 with the industry. As a matter of fact, just last week, we had a meeting with the Executive Committee, Mr. Tuckman (phonetic) at NEI, and other executives. Basically, right now, we're down to two issues with the industry, and I think they are both pretty much resolved. I know one is -- these have to do with the inspection intervals in particular, and you will hear more about this. With regard to the type of generators. Obviously, the concern is that if you have a new steam generator that uses the new material Alloy-690 and the like and if it's thermally treated, then perhaps you don't have to do inspections as frequently as if you had an older generator with Alloy-600.

The other issue was the commitment to those intervals. We wanted that the industry would commit to follow these intervals and, if they intended to deviate, would receive NRC concurrence before they did.

We resolved the latter part, the industry has agreed to that through an administrative Tech Spec change, and we are fairly well resolved with the inspection intervals, and you will hear a little bit more about that.

Our current schedule is to -- the industry, I believe, is going to submit revisions to 97-06 hopefully in the spring, and by the summer of this year -- I'm sorry, of next year -- hopefully we have completed our review and approval of 97-06.

It's been a long process, longer than I like, but I think we need to recognize that when we work with the industry through

an industry initiative, I think, by definition, it is a time-consuming process. For example, when they come to a meeting, they cannot commit right then and there for the industry but, rather, they need to go back, meet with their own committees and so forth, bring back perhaps what the staff is looking for, what the staff's proposals are. Typically, they will come back with a counter-offer, counter-proposals we need to iterate. It so it is an iterative process, it takes time. But we are, I think, about 90 percent there.

So with that, I'm going to turn it over to Maitri to start the discussion.

MS. BANERJEE: Thank you, Brian.

Good afternoon, Chairman, Commissioners. We appreciate the opportunity to present to you the status of the Steam Generator Action Plan and the progress we have made in this area.

I will provide some background and overall status information, and then, Louise Lund, next to me, will discuss the staff activities related to NEI 97-06 whereby we are developing a steam generator regulatory framework that's improved. And then Dr. Joe Muscara will discuss the research activities, some of them are recently completed, and the long-term actions related to the ACRS recommendations on the steam generator DPO.

As Brian probably mentioned, this is an information brief to update you before the briefing we will be doing prior to issuing the safety evaluation on NEI 97-06 as you directed us to do. Next slide, please.

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Okay. As Brian mentioned, the Action Plan and staff activities in the area of steam generator tube integrity have evolved since mid-1990's, resulting into our review of NEI 97-06, and here are some of the significant actions taken since the IP2 failure, as Brian mentioned, the Indian Point 2 Lessons Learned Task Group report, the OIG report and, finally, the ACRS report on steam generator DPO, all of this resulted insignificant changes to the Action Plan, and also impacted our review of NEI 97-06.

Since early earlier this year, the staff is again actively involved with the industry, resolving issues related to 97-06. We are also completing the milestones related to the Indian Point 2 Lessons Learned Task Group report, and the Steam Generator DPO. As you know, ACRS is also reviewing our progress and in their October 18th letter, they stated that the Action Plan appropriately and adequately responded to their recommendations on the Steam Generator DPO. Next slide, please.

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As Mr. Kane mentioned, the Action Plan is a consolidated multi-disciplinary, across-the-agency effort where NRR, Research and the Regions are working with each other, sometimes with the help of others offices, and also working with NEI and the industry.

As the second bullet indicates, our objectives is to integrate the results of all these activities into the existing regulatory program. As the Action Plan milestones are being completed, the related program areas are revised and up-dated to incorporate the results. For example, the industry will submit a Generic License Change Package, as Brian mentioned, and the revised Tech Specs. Once we approve those changes, individual licensees will revise their individual license amendment packages.

Currently, the staff actions in response to the ACRS recommendations on the DPO are integrated into the existing research efforts and the overall object of these research activities is to confirm and improve our understanding of risk related to steam generator operation and also to develop improved tools for assessing risks, and once these activities are completed, the necessary changes will be made to the risk-informed decisionmaking processes that we have in our licensing inspection and assessment.

The last bullet deals with anticipated future revisions. After certain research activities are completed, we will develop detailed milestones for addressing some generic safety issues related to steam generator operation and also develop a regulatory guide to address risk-informed decisionmaking in the area of steam generators. The next slide, please.

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The Action Plan provides a tool and a process for managing staff generic efforts in the steam generator tube integrity area. These generic efforts support our strategic plan performance goals.

As the first bullet indicates, the Action Plan milestones are tracked and dispositioned. The Commission tasking memorandum contains the major milestones which is reviewed and updated on a monthly basis. And then the NRR Director's Quarterly Report contains the entire Action Plan. That is reviewed and updated on a quarterly basis.

Regarding the second bullet, I'd like to mention that our meetings with NEI and the industry are scheduled frequently and provide for an opportunity for public input. As of last February, we had a Steam Generator Workshop with some external stakeholder participation and, based on their comments, we have developed a Steam Generator Service List to keep them informed of the activities in this area, and they are mostly the meetings and summaries of the meetings, letting them know what is going on. We also have a Steam Generator Web Page.

The last bullet, to provide for appropriate management oversight, the completion of significant milestones in the Action

Plan are documented via memo from the responsible Division Director to the Associate Director or the Deputy Office Directors. Next slide, please.

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The Action Plan major elements. The Action Plan is primarily divided into three major elements and activities. The first element deals with shorter-term activities that resulted mostly from the Indian Point 2 Lessons Learned Report and also the OIG report, and it deals with modifications and revisions to the existing regulatory processes. And I will discuss a little bit of these items in the progress made in this area in the next slide.

And the second major element deals with revising the regulatory framework via NEI 97-06 efforts, and Louise will discuss that in the next presentation.

And the third element deals with the Steam Generator DPO activities, and Joe will talk about that. Next slide, please.

(Slide)

The first element includes items related not only to steam generator tube integrity, but also other process issues, such as risk communication, developing a Steam Generator Web Page, which are some of the Strategic Plan Performance Goal of improving public confidence related activities, in addition to improving the licensing amendments review process.

We have completed about 87 percent of the milestones in this category, 20 out of 23. For example, we recently issued an Information Notice related to steam generator operating experience. Issuing these types of generic communications to the stakeholders because it keeps them informed of what's happening in our steam generator experience in this area.

We also recently revised an inspection program in the steam generator area, and provided specific guidance to the inspectors on what to look for during the inspections.

We have provided some training material to the inspectors before the fall outages, and we are planning to do some classroom trainings before the spring outages. We have developed a significant determination process for dealing with results of steam generator inspections, and we are also -- we have also developed guidance for technical reviewers and project managers related to the review of steam generator reports.

Although we have made significant progress in this area which had already improved our steam generator regulatory program, there are still several open items that need to be completed. These deal with, I guess, the remaining 3 of the 23. This deals with the risk communication to the public and developing a process for requesting Research to review NRR safety evaluations. The issues involved with these are very well understood, and we expect to complete these items in the near future.

At this point, I'm ready to conclude my presentation and let Louise continue on the next major element, which is developing a regulatory framework under NEI 97-06, unless you have any questions.

MS. LUND: Good afternoon. As Brian and Maitri indicated, I'll be talking about the NEI 97-06 Steam Generator Generic License Change Package. First slide, please.

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The intent of this particular slide was to show the present regulatory framework for steam generators. In looking at the first one, 10 CFR Part 50, Appendices A and B address the general design criteria and quality assurance.

10 CFR Part 100 provides values for offsite release, and ASME Code, Sections III and XI address requirements on design and analysis of steam generator tubing and requirements for in-service inspection and repair. Use of the ASME Code is specified in 10 CFR 50.55(a). The reactor oversight process -- I'm skipping down to the bottom one because I'm going to come back to the Plant Tech Spec -- the reactor oversight process addresses NRC inspections of the processes used by licensees to examine their steam generators.

I've left the Plant Tech Spec as the last topic because this is the part of the current framework that will change under this new framework. And in my presentation today, I'll discuss how they will change.

Under the current Tech Spec, the focus is on surveillance. Under the revised steam generator regulatory framework, the focus is on tube integrity during the time period between tube inspections. And we believe that this change is consistent with the strategic goal of maintaining safety. Next slide, please.

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Just looking at this, this is just a presentation of actually what Brian mentioned earlier, the history of the steam generator regulatory framework before Maitri made her presentation. I'm just going to make a few quick points.

The NEI informed the NRC in December '97 of the industry's intent to commit to a formal industry initiative called NEI 97-06, with all PWRs implementing it no later than the first refueling outage starting after January 1, 1999. What this means is that the industry is currently implementing NEI 97-06 with the current Tech Specs. In the next few slides, I'll discuss the components of the industry initiative, which are the NEI 97-06 document itself, the Generic License Change Package,

and the EPRI Guidelines, and I'll discuss what parts that the industry is currently implementing and what we are working on right now. Next slide, please.

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And as I just mentioned, these quick bullets, NEI 97-06 will be discussed in the Generic License Change Package, and what we'll be doing is, on a regulatory sense, formalizing the revised framework through revised Tech Specs. Next slide, please.

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As I mentioned on an earlier slide, there are three components to the industry steam generator program initiative. The NEI 97-06 program document contains high-level guidance for development and management of licensee steam generator programs. The NEI 97-06 program document refers to EPRI guidelines which provide detailed guidance on day-to-day steam generator management activities.

The third element is the generic license change package which will formalize the industry initiative into our regulatory framework. Specifically, the generic license change package will provide a framework for taking advantage of the flexibility envisioned by NEI 97-06. As proposed, the Tech Spec in the generic license change package provide a framework for a fully performance-based approach. Currently, NEI 97-06 and the EPRI guidelines are implemented in conjunction with the existing Tech Specs, which are prescriptive, with the expectation that soon they will be implemented with the new Tech Specs and the generic license change package.

The advantage to the generic license change package to industry is a streamlining process for graining NRC approval of longer steam generator inspection interval strategies, alternate tube repair criteria, new tube repair methods. For example, licensees will be able to implement performance-based strategies for determining inspection intervals which have been reviewed and approved generically by the staff, without the need for submitted changes to the Tech Spec.

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

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Now, the high-level document and how it describes the program, as you see it, incorporates a balance of these elements of prevention, inspection, evaluation, repair, maintenance, and leakage monitoring. Next slide, please.

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And, also, NEI 97-06 establishes performance criteria that define the basis for steam generator operability. The performance criteria include structural performance criteria, accident leakage criteria, and operational leakage criteria, which are essentially the same for everyone. The performance criteria are located in the Steam Generator Program, which is a licensing control document. However, the proposed administrative Tech Spec in the Generic License Change Package will require NRC review and approval before alternative criteria may be implemented. Next slide, please.

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This slide just defines how the revised framework will be implemented, and will rely on the NEI Steam Generator License Change Package, and the utilities will submit revised Tech Specs based on an NRC-approved Generic License Change Package. The cover letter will contain a commitment to follow the higher level guidance in NEI 97-06, and the NEI 97-06 program guidelines will be translated into plant procedures. And that's what's currently going on with the high-level guidance being put into plant procedures. Next slide, please.

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With the change coming with the Generic License Change Package, you'll see revised Tech Spec and bases. The revisions will include a revised limiting condition for operational specification for operational leakage, and a new LCO for limiting condition for operation for steam generator tube integrity.

The new Admin Tech Spec states that the Steam Generator Program must be implemented to ensure that tube integrity performance criteria are maintained. The licensees will be explicitly required to assess the conditions of the tubes versus the performance criteria. And that shall be performed at each steam generator inspection outage. Changes to the performance criteria, tube repair criteria, and repair methods are subject to NRC review and approval. Next slide, please.

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In this slide, all we were trying to point out is that technical issues will continue to be able to be resolved under the revised framework. We have been working a number of technical issues, and technical issues will exist under the new current framework, and it gives us a way to work the issues as they arise under this new framework. Next slide, please.

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So, at the point Brian discussed earlier, the initial part of the staff review, both the industry and the NRC, are intending a review of the performance-based inspection intervals as we became aware of changes to the guidelines, it was apparent

the predictive methodologies to support performance-based inspection intervals had not been fully developed. However, the industry is proposing a reference inspection interval strategy for the newer steam generator tube materials, and these are the ones Brian mentioned earlier, 600 thermally treated and alloy 690, than those currently allowed in the Technical Specifications.

The industry is currently addressing both NRC comments and internal industry comments with respect to this proposal. And the staff believes that this approach must ensure that tube integrity performance criteria will continue to be met, and that tubing conditions not meeting the performance criteria will be promptly detected. And I think that Brian said that we have made a lot of progress in this particular area, and we expect to receive a submittal from industry in the near-term, and I'll discuss that in just a moment. Next slide, please.

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In looking at the review status, as Brian had mentioned, the staff concluded that regulatory controls were needed, and we needed to incorporate a provision in the Administrative Technical Specifications regarding the use of NRC-approved inspection intervals. We have reached agreement on these issues with the industry and a resolution path and schedule have been worked out to reach conclusion of the review of the Generic License Change Package. Next slide, please.

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As far as the near-term actions, based on our recent meetings with industry, we're looking at the staff to review and anticipated package which we expect in mid-2002 from industry defining generic inspection intervals. Based on recent meetings with industry, we expect this submittal and, after the submittal is made, we will use the process of issuing the safety evaluation that we previously informed the Commission that we would follow -- this is in SECY-0078 -- sending it out for public comment, resolving comments, briefing the Commission, and publishing it in a regulatory issue summary. We anticipate that this will take approximately six months.

As it says up on top, we had a recent meeting with NEI on the final Generic License Change Package, and we have agreed to a schedule. Next slide, please.

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And then our longer-term actions and plans are to resolve the outstanding issues with the EPRI guideline documents to permit use of intended performance-based approach and removal of prescriptive inspection interval requirements.

So, at this point, I guess to summarize, we think that we've made a tremendous amount of progress, and we have the completion of this underway, and agreement with industry on how to approach resolving the remaining issues. Thank you.

MR. KANE: At this point, we'll go to Dr. Muscara, who will talk about the Steam Generator Action Plan for Differing Professional Opinion Issues.

DR. MUSCARA: Thank you. Good afternoon. As a way of introduction, I would like to make a few points on events related to the DPO. On October 12 and 13, 2000, the staff provided detailed presentations to ACRS Ad Hoc Subcommittee on the DPO Issues, including detailed presentations and ongoing research that are relevant to the DPO issues.

The ACRS provided its conclusions and recommendations in NUREG 1740, dated February 2001. The report provided support for the ongoing research and planned research and helped us to focus on future research.

In May 2001, the NRR and RES staff developed a Joint Action Plan to address the comments, conclusions and recommendations of the ACRS. Next vu-graph, please.

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The NRC research in steam generator area from the three divisions in RES addressed both current issues and some other research that is anticipatory in nature. The objective of the research is to provide NRC with an independent capability for evaluating industry proposals, to confirm the effectiveness of current regulations, to support ongoing regulatory activities, and to make recommendations in improvements as needed. Next, please.

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The Office of Nuclear Regulatory Research has a broad-scope program on steam generator tube integrity. Research studies are conducted in the areas of materials behavior and structural integrity, on accident analysis and thermal hydraulics, and on improved risk methods. The information from these areas is integrated into risk assessment for safety evaluations of various steam generator actions and proposals.

With respect to the Action Plan, about 80 percent of the DPO milestones are addressed by Research within its broader research on steam generators. Today, I will provide only a brief overview of some currently completed research that has addressed DPO issues, some ongoing research that will be completed over the next year to year and a half that will address other issues, and some long-term research. Next, please.

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One issue that evolved as the staff addressed the DPO was the potential for propagation of existing cracks by dynamic loads and cyclic loads that are imposed on the tubes from a main steam line break, which could propagate the cracks and result in multiple tube failures.

To address this issue, we will estimate the loads including cyclic loads acting on tubes during an MSLB from thermal hydraulic analyses in Codes. Work will be conducted by area staff and by its contractors. As a starting point, staff will use the track M-Code, however, the staff is aware of concerns with the ability of this Code to actively predict the conditions very early in the transient. Therefore, the staff is reviewing other Codes for potential use in this study.

When using these loads, displacements and cycles, in addition to the pressure stresses, we will estimate crack growth, if any, for a range of crack types and sizes. Structural integrity correlations in models developed earlier in NRC research will be used for these calculations. We will also estimate the loads required to propagate the cracks to obtain margins over and above the MSLB loads. And, finally,m we will conduct some tests on the graded tubes under pressure and with axial and bending loads that simulate the MSLB loads to validate the analytical results. Next, please.

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One of the DPO conventions was that the jet emanating from a leaking tube under accident conditions would impinge on and cut adjacent tubes, resulting in cascading failures of the tubes. Leakage from tubes under accident conditions can result in containment bypass and is an important safety consideration. To address this issue, we have completed jet impingement tests under both severe accident conditions and under MSLB conditions. Tests under simulated severe accident conditions were conducted at the University of Cincinnati. The erosion rates are 2-5/1000ths of an inch or mils per hour. Steam generator tubes are typically 50 mils thick. In times of interest under these conditions of 30-45 mils. Tests under MSLB conditions were conducted at Argonne National Laboratory. Results show 5 percent wall loss and 25 percent wall loss for the hot leg and cold leg temperature, respectively, after two hours testing at 2430 pounds per square inch. This is a long-duration test and the high pressures compared to MSLB conditions.

Based on the results of the low erosion rates, we have concluded and ACRS has agreed that damage progression from jet impingement on adjacent tubes is a low enough probability that it can be neglected in accident analysis. Next, please.

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In conducting risk analysis, it is important to know the conditions experienced by steam generator tubes under normal operation and accidents, including severe accidents. The conditions of interest are the times temperatures and pressures are experienced by the tubes. This information is needed to evaluate the structural behavior of the greatest steam generator tubes under severe accident conditions. To improve our knowledge of the conditions experienced by steam generator tubes, RES staff has been conducting computational fluid dynamic studies of the hot leg and steam generator to determine temperatures experienced by the tubes. The CFD results were in good agreement with Westinghouse 1/7th scale test data showing that the model is able to simulate the mix phenomenon in the inlet plan. A full-scale CFD model is now under development and it will be used to evaluate the effects of scale and for sensitive disparities of pipe geometry and location of tube leakage. Next, please.

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Because in-service inspection is not perfect, Generic Letter 95-05 requires an adjustment to the as found flaw distribution to take into account the flaws that were missed by the in-service inspection. Generic Letter 95-05 used a constant probability of detection of .6 for all flaws.

At the time the Generic Letter was developed, there was no data on the probability of detection as a function of voltage, and very little data on the probability of detection of functional crack depth. A probability of detection of .6 was selected for detection for a range of different crack sizes. In reality, probability of detection will vary as a function of flaw size and signal response.

We have been conducting research at Argonne National Laboratory on a steam generator mock-up to evaluate the reliability of in-service inspection. Probability of detection curves have been developed from the study as a function of flaw depth, voltage, and possible variety of parameters that takes into account both the depth and the length of the flaws.

A technical report on the reliability of in-service inspection has been prepared, has been reviewed, and is currently in publication. Next, please.

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Some of our anticipatory research addresses stress corrosion cracking mechanisms. We are seeking a better understanding of future steam generator tube behavior. In particular, we need to understand how Alloys 600 and 690, which is the replacement material, will perform in the operating environment so we can avoid the problems of the past.

Understanding of cracking mechanisms was also a DPO issue. Research to evaluate crack initiation, evolution and growth will be initiated in the new calendar year under the NRC's Third International Cooperative Steam Generator Tube Integrity Research Program. Cracking mechanisms in steam generator tubes are not well understood. On the secondary side, cracks often occur in crevices. Very little information exists about the chemical nature of the crevices. For example, is there water, steam, or both bases in the crevice, and what is the chemistry in the concentration of impurities in the crevice. This

information is needed to conduct tests that are realistic.

Under realistic conditions, crack initiation takes a long time, and crack growth rates are slow. For example, crack initiation times in crevices in operating plants can be as long as ten years. So, it takes a long time to conduct realistic tests, thus the research continues through 2006. Testing will be conducted using realistic loads and environments for both Alloys 600 and 690.

Using the operating experience and results from laboratory testing, we will develop models for predicting cracking behavior of steam generator tubes in the operating environment. The notion here is that if we can understand the behavior of 600 and 690 in the laboratory with the extensive data we have available in 600 with field experience, we can then find a bridge to be able to predict the behavior of 690 in the operating environment based on laboratory data. Next, please.

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To conclude, some research has already been completed to resolve the DPO issues, for example, the jet impingement work in the probability of logic action. Research to address most of the DPO issues will be completed by the end of 2003. Next, please.

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Long-term research on degradation mechanisms will continue through 2006. Finally, Research and NRR have worked closely together to implement research results into the resolution of technical issues. This close working relationship will continue in the future through the establishment of a Technical Coordinating Group made up of staff members both from NRR and RES and the Regions so that the research program can be reviewed on a periodic basis, so the information can be used on a timely basis, and so that the regulatory needs are addressed.

MR. KANE: Mr. Chairman, Commissioners, that concludes the staff presentation.

CHAIRMAN MESERVE: Thank you very much for a helpful presentation. In honor of Commissioner Diaz' return, I'll give him the first crack.

COMMISSIONER DIAZ: Well, I don't know if you want to be talking about cracks, one of my favorite subjects. Thank you very much, Mr. Chairman, a pleasure to be here with all my colleagues again, and a pleasure to be with the staff one more time on an old issue that I have a few gray hairs on -- steam generators and tube integrity which has always been a concern.

Let me, now that I have this opportunity to, take one minute in here and talk of some of the things that I realize have been evolving through the years, and one of the things that is I think we realize since like half a century ago but was five years ago, was that there was a connection between the maturity of the industry and the NRC and the evolution to a more risk-informed, more performance-based. Those are not independent issues, they actually complement each other. One of the things that I always insisted is that maturity and that evolution would have to have as a result the fact that we should not be event-driven in our regulations, that we would have the maturity and would have the body of knowledge to be able to avoid events, especially events that are not safety significant to drive us beyond our normal pattern of behavior. And in that sense, I hope that is the objective of this project because I do see that Indian Point did take us a little bit away from the path that we were going and, again, we responded to an event.

I think that fundamentally, when this is put together, I would like to see that the staff responds to how do we respond to one event, not only that we are preventing an event because an event will happen. There is no amount of inspection, no amount of NRC regulation that will prevent a tube failure on a steam generator. They are going to take place, they are going to happen and, therefore, we need to be ready for that eventuality and not be caught like, oh, we were not ready, it's not going to happen, and we need to be able to respond to the public. The main issue of Indian Point 2 was how do we respond to the public.

There is no doubt that you have resolved many things and I look forward to your final report and look at it, but I certainly would ask the question now, are we ready to respond to the public in the case of an event tube failure? Do we have the capability to technically and from the communications viewpoint assess the safety, and be able to clearly interdict the communication issues -- if I use now a word that is used quite frequently -- and avoid propagating beyond what I believe it should if the event does not have safety significance -- anyone?

MR. STROSNIDER: I think I can at least give you a status of where we are on that action item because it was an action item that was identified by the Indian Point 2 Lessons Learned Task Force, and staff has developed the technical message, if you will, that we want to deliver, and it's been provided to the communications specialist within NRR and I believe also the EDO staff, for working into the Agency's communications plan. So, this is one that's not totally complete yet, but I think it was one we expect to have finished in the fairly near future. But, as I said, the technical message that we want to give people in terms of the technical -- the risk associated with tube ruptures and that sort of thing has been developed and it's being worked into the communications plan now.

COMMISSIONER DIAZ: Is that something that we should expect in the near future just because, you know, like I use one of my favorite words, this is a random event and it will take place no matter what the thickness of the wall is? It will happen, no matter what -- you have a full wall or just a little thing because you can't predict it. So, are we ready, if it happens, to be able to properly communicate the safety significance of the event?

MR. KANE: That's an interesting question, are we ready. I think I would answer the question, yes, we are, but I believe that -- as Jack indicated -- I believe we're doing more work and I think we can continue to refine the information and be in a better position than we were earlier. But I think there's more work to do.

COMMISSIONER DIAZ: Well, I certainly hope --

MR. KANE: Certainly, I agree with the premise of your question, and certainly to be able to do a good job in that area is important really from the public confidence standpoint one of our major goals, of course, as you are aware, improve public confidence, and it is extremely important.

COMMISSIONER DIAZ: Well, I think it is one of our major responsibilities because, if not, what will happen is things will escalate, and then we will spend more time, you know, searching a ghost and finding the reason of it. And I think that is a hope that will be resolved in the near future because it is --

MR. STROSNIDER: If I could add just one comment. There's several people at the table here who participated in town meetings in the area to following that event and who did discuss with the public the risk implications and the consequences and health implications of the event, so we have done that. And I think having done that, we're looking for ways to improve the way we do it. Certainly, it's one of the more difficult things to explain to people, but we learned some lessons there, and so we're looking at improving our ability to communicate that message.

MS. LUND: I just wanted to mention, in addition to what Jack said, is that the recommendations that we've made, we've indicated that they should be memorialized in a communication plan so they are readily available to the staff. So, that is part of the work that we've done in putting together the recommendations based on the lessons learned and suggesting that they be made part of the communication plans that are being revised.

COMMISSIONER DIAZ: Let me just make a -- I realize I might be confusing terms -- there is no doubt that the NRC has to be very responsive to events, that is obviously always the case. There is a difference between being responsive to an event and having our regulations being driven by events, especially by those who safety-significant and, therefore, it is very important to tell the difference, and it is more important to tell the difference to the public which might not have the understanding that all our experts have on the issue, and I think that's a formidable task, but one that I hope you are able to put down to rest soon.

On the issue of how do we put our arms about the entire project -- I can see we have things going into 2006 -- and I believe you have put your arms around the issue very well. I think it is obvious you have progressed to that point. However, there is another effort, which is wrestling the subject to the ground and putting it in a position that it will not rise and kick you in the back. So, that is something that I think needs to be further defined -- how do we put closure to an issue, not that it's always closed. I realize there will be further technical issues, further actions required, but how do we close the issue to the point that our regulations and our requirements of licensees and our communications provide confidence that we are assuring public health and safety with the appropriate amount of burden? And I think that is something that I have not seen in here, where are we going to finish all of these things to the point we say yes, there is more to be learned, but we are going to close it at this point. Closure is something that is necessary to avoid being event-driven. Anybody?

MR. SHERON: I can start maybe. I guess my opinion would be that we have a performance-based approach through NEI 97-06 which, recognizing that, I would certainly expect down the road to see other forms of degradation -- for example, every time you open up a generator, you kind of get surprised sometimes.

So, the whole idea is to have a framework in place that will allow licensees to be able to effectively deal with what they find when they go into generators without having the staff be in a reactive mode. And this gets into the whole question of what kind of an inspection do you do, can you then through your assessment, operational assessment, basically try and ensure that regardless of what you find, you can now forward predict, you might say, and assure yourself that there is a low likelihood of a failure during the next operating cycle. And that's what the whole approach is really geared towards okay. That's why we talk about inspection intervals, so when a licensee goes in, they will have a process they can follow. Hopefully what comes out of that process will be how long they can operate for the next cycle. In some cases, they may have to come down in nine months and do another inspection; in others, they may be able to justify going much longer.

But, again, the whole thing is premised on having an effective process in place that the staff does not have to go in and constantly change every time we learn something different. I don't know if Jack or Louise want to --

MS. LUND: I thought that was a good explanation.

COMMISSIONER DIAZ: I think that certainly will be very worthwhile. On a specific issue on the interval between inspections and the Tech Specs, I understand that there's still some differences. Certainly, a mature process will take us to a set of Tech Specs that if there is change in the interval, I agree that the NRC should be able to have concurrence on the issue. However, I personally don't see a need for going into license amendments if the process is mature enough. Do you have any comment on that?

MR. SHERON: Do you want to speak to that, Jack?

MR. STROSNIDER: Well, the process that's been proposed and which I think we have, based on the meeting last week, I think we have some agreement with the industry -- that needs to be confirmed -- but the idea is that the technical

specification would have -- would, in the program, the administrative program, would lay out the expected inspection intervals, but that those could be changed, and what's in the technical specifications is that once NRC approve a change at one plant, or generically, if you will, that other plants will be able to adopt that without coming for a Technical Specification amendment, as long as they can demonstrate that the basis for that interval extension is applicable to their plant in terms of material or whatever is driving the limit on inspection intervals. So, in terms of trying to accomplish more efficiency, we think we can eliminate a large number of Technical Specification amendments because, in the past, anytime somebody wanted to change that, they had to come in and change their Technical Specifications. This will allow it to happen on a more generic basis.

COMMISSIONER DIAZ: Okay. Well, thank you, Mr. Chairman, I don't want to over extend my welcome.

CHAIRMAN MESERVE: You needn't worry. Commissioner McGaffigan.

COMMISSIONER McGAFFIGAN: Thank you, Mr. Chairman, I'm trying to sort out if I were asked -- and so I'm going to ask you -- by member of the public at Plant X, who fears that their steam generators are like Indian Point, what these new Tech Spec changes/EPRI guidelines/whatever mean for improved safety of the steam generators at my Plant X that I'm worried about, what would you say? What is it that these revised Tech Specs, this generic change package is going to do to help ensure that there's lower probability that I will have a steam generator to rupture at Plant X next to my house here.

MS. LUND: I think that is a very good question. I think that for plants like Indian Point 2 that have older steam generators, the inspection intervals are not going to change. The ones that are looking for inspection interval changes are the ones with the new material 600 thermally treated and Alloy 690.

I think it's also important to realize, too, with the guidelines, the guidelines are a living document, and they've had a lot of this experience factored into the guidelines. In fact, what they are looking at, the revision to the Steam Generator Examination Guidelines from Rev. 5 to Rev. 6, in Revision 6, which is now they are working out the comments and that's what we are expecting in mid-2002 from the industry, they specifically deal with topics like data quality and noise level, things that were big issues for Indian Point 2. So, the guidelines will no longer be silent on those particular topics.

So, I think that the new framework is conceptualized to have these guidelines that are living documents and include this experience and have the condition monitoring that we were discussing during the inspections to see where you are and project forward.

COMMISSIONER McGAFFIGAN: So, I'm going to get better condition monitoring. I'm going to get better inspections. I'm just trying, to you know, figure out what it is -- I know I'm not going to get -- hopefully I'm not going to get longer intervals, you said I'm not. I'm going to get the same intervals or perhaps shorter, if any, but what is it I'm going to get at a plant that might have steam generator issues? I'm going to get better condition monitoring, better inspections when they occur, more consistent inspections. I'm just trying to put words in your mouth. I'm trying to figure out what the sound bite is.

MS. LUND: Right. And I think the --

COMMISSIONER McGAFFIGAN: He wants to sell what it is you guys have been doing, why this is safer from the point of view of this resident next to Plant X.

MS. LUND: Well, I think the framework does contain these elements. And I think as far as when you shut down and you look at the condition of your steam generator tubes against this performance criteria, as I think that Jack mentioned earlier, that will give you an idea of how long you can run. And instead of just having surveillance intervals that really are not predicated about the condition of your tubes, this is one of the changes, and also looking at --

COMMISSIONER McGAFFIGAN: Is there any change in the Tech Specs? I'm trying to remember the Indian Point experience. My recollection is that their leak was something like 2 gallons per day. It had gone up from half a gallon per day to 2 gallons per day. Are those number approximately, correct? And the Tech Specs are something like 130 gallons per day.

MR. SHERON: It's a very low number, well within their Tech Specs.

COMMISSIONER McGAFFIGAN: It was a very low number, well within their Tech Specs, and yet my recollection is that you all had said that -- weren't residents sort of attuned -- the resident was attuned to the half-gallon going to 2 gallons and had even remarked at the time, are you guys on top of your procedures in case there's a rupture? Hadn't that occurred before the rupture? Am I for getting something? It was way below Tech Specs, it wasn't appropriate to try to shut the plant down or anything, but we were attuned to something going from half a gallon per day to 2 gallons, and just wanted to be sure they were on top of their game in case this was an indication of things to come. Is anything like that getting into the new Tech Specs, you know, be on top of your game if you see -- even though it's still well below Tech Spec level, a change?

MS. LUND: Well, I think we can also address that in the EPRI guidelines because there are action levels contained in the EPRI guidelines, and I believe they start at actually 5 GPD, and what it does is gets everybody sensitive to something going on. It's not only the number itself, but it's also the rate of change that people should be aware of, and it actually talks the licensees through how you evaluate this type of situation, so it's being the primary/secondary leakage guidelines.

I think it's important to realize that as they developed 97-06, they've also developed all these different guidelines and some are very new guidelines, too, like the integrity assessment guidelines, and what they are meant to is strengthen the program so they can address issues like are you discussing.

COMMISSIONER McGAFFIGAN: How do these guidelines get captured in our regulatory framework. We are going to have this Generic License Change Package that then individual licensees are going to submit amendments for changes to both their Administrative and regular Tech Specs consistent with that Change Package that presumably will go very rapidly itself, and then you have these guidelines from EPRI that tell the licensees how they should go about staying consistent with these Tech Specs which -- are we going to endorse these?

MS. LUND: Or how to meet the performance criteria, I guess, is a better way probably to state it. It is a way to achieve that.

COMMISSIONER McGAFFIGAN: Right. Are we endorsing these guidelines?

MR. STROSNIDER: The framework, the Technical Specifications have requirement for a steam generator program that's supposed to have certain elements in it. In fact, I think one of the vu-graphs talks about those elements in terms of inspection and leakage monitoring and various parts of the program.

The expectation is that when the change package comes in, that the licensee will be committing that program will, in fact, incorporate the EPRI guidelines, which means that those guidelines will somehow be translated into their plant operating procedures. And so from there, in terms of regulatory controls or effectiveness, you have the same controls that are normally in place with regard to any of the plant's normal procedures for operating, surveilling and maintaining their plants. So, in other words, we would be look at it in terms of the -- from an inspection point of view in terms the revised oversight process would drive that. But the other thing is, we have been careful, as we were just discussing, to make sure we have regulatory controls over what we think are very critical parameters, such as the inspection intervals, and making sure that we understand what changes are being made there.

A similar approach in the Tech Specs has to do with the repair criteria and the repair methods, the same approach being taken there that if a licensee wants to implement new repair criteria -- that is, instead of repairing a tube at 40 percent through wall degradation, to change that somehow -- that would require NRC review and approval first. One approved, it could be applied by other plants. But we wanted to make sure we were able to look at that, and one of the things driving that, in fact, was understanding the risk implications because some different repair methods and repair criteria could have different risk implications which we can't really understand until we see them. We don't know ahead of time what they might look like.

So, I think we've been careful to try to keep the regulatory controls in those important areas where we feel we need them.

COMMISSIONER McGAFFIGAN: How will you -- and I'm not going to over-stay my welcome here either -- but how do you keep track of what we have approved? Is there going to be an annual update as to this is what we approved in the way of new repair criteria, or new inspection techniques, or new whatever? Is NEI going to do it for the licensee? You know, NRC just approved a plant-wide new criteria and anybody who thinks they can meet it should apply? Whose job is it going to be to sort of keep track of this -- what the rules are if they are -- if they are tied to guidelines that we don't really control, which we want to be living documents, and tied to safety evaluation reports that we issue on specific licensing cases. Is that maybe no more complicated than the Appendix R at the moment, but that's not a good example.

MS. LUND: I guess I'll take a stab at it. I think what I'm hearing you say is how do we keep track of all the approvals, especially the generic type of approvals, because we have given generic approvals and specific approvals to alternate repair criteria as well as to different --

COMMISSIONER McGAFFIGAN: Have we done that in the past by like a Generic Letter or something?

MS. LUND: Not that I'm aware of -- as far as voltage-based criteria, we have.

MR. STROSNIDER: Yes. In fact, that's one example where we've done it by Generic Letter. We could use a regulatory information summary, but I think --

MS. LUND: Safety evaluations are a typical mode of doing that.

MR. SHERON: But the other way is we meet usually about twice a year Steam Generator Executive Committee of NEI, and typically we will discuss issues such as what have we approved recently and the like. And, quite honestly, that message gets back to all of the BWR licensees and they will decide whether they want to avail themselves of something we've already approved.

COMMISSIONER McGAFFIGAN: I'm trying to think in terms of the public, being able to convey to them what the current state of play is. Let me just ask one last question. Did the scheduling of this meeting have anything to do with the progress that was made in the last month on this interval issue between you guys and NEI -- you know, the interval length issue?

I have these graphs from last Friday, or Thursday, and it looks like a lot of progress is made between November 2nd and the current date.

MR. STROSNIDER: Well, we had a meeting scheduled, and it was scheduled sometime ago, to go over these issues, and we've been working with the industry to try to come to resolution of this. But, frankly, we were hoping to be able to come and say we have a success path laid out, which I think we do.

COMMISSIONER McGAFFIGAN: Okay. Thank you.

CHAIRMAN MESERVE: Commissioner Merrifield.

COMMISSIONER MERRIFIELD: I would like to follow on and first compliment the staff for obviously a significant amount of time they been wrestling with a myriad of issues associated with this. While he's not here, I would also want to put a plug in for all the work that Region I, particularly Hub Miller, had to deal with in responding to the events at Indian Point. It was a significant amount of time that they took over the course of the last year, and Hub should bear much of the credit for that.

I appreciate the comments and the unique perspective that Commissioner Diaz brings back with him to the Commission, and it is welcome. I agree with many of his observations. There is much for us to learn regarding IP2 and how we may move forward in many layers. I would layer on top of what he said also that I think our licensees have some things to learn about that event as well. And as we think about reassessing our own ways of enhancing the public confidence and the way in which we engage with the public, I think our licensees, NEI, and certainly now the incumbent at Indian Point, should think as well about how they engage with the public because that has a big impact going forward as well.

The first question I have involves -- we've had some more attention more recently on some of the issues coming away from the TMI steam generator concerns within the last few months -- and I'm wondering to the extent, if any, they are being factored into our Steam Generator Action Plan and our steam generator research going forward?

MR. SHERON: I'll start out, maybe staff could chime in, but the I think the answer is yes. We take kind of a multi-layered approach here. The first, obviously, is we need to determine if there is a safety issue associated with this. In other words, why should I not assume other plants have this kind of problem and why shouldn't they by doing something right away?

When we met last week with the Executive Committee, that question was put to them. We asked them to put together a program that told us how they would deal with it, or how they intend to deal with it and, more importantly, between now and when they proposed to deal with it, why is it okay for plants to continue to operate? Likewise, we're doing our own assessment of, for example, risk, to justify why we believe we either need to justify why we need to do something very quickly, or we can wait and do that.

So, obviously, whenever we get new information, the first step is to basically understand the safety significance and risk, and that kind of sets the stage for how we operate in terms of whether we need to do something right away, whether we have time to study it, and the like. Obviously, you always have to wait for root cause and the like. That's been done.

The industry has committed to get back to us with what their program is. We will have more information from our own risk analysis probably shortly.

The next step then, obviously, is to, once we identify this program, is to factor it into our Steam Generator Action Plan, if it's appropriate, and also to identify if we need any confirmatory research to help us in terms of our evaluations, and that would be factored into the research program usually via a User Need Letter. Jack, do you want to --

MR. STROSNIDER: I just would like to make one comment, though, which actually follows up on Commissioner Diaz's comment on this area, that this regulatory framework that we are working on not being event-driven, that the framework that we want to put in place should have a process for addressing these sort of issues and, in fact, we think it does. And the TMI, the recent event, is probably a good example where the licensees have taken action, the owners group have taken action, staff have taken action.

I don't believe, at this point at least, that we have seen anything come out of that that requires to us change the framework that we're talking about putting in place. So, the notion being that there will be other issues that come up, technical issues, things that come up during inspections that we hadn't anticipated, and the process needs to be able to handle it, that's the important thing. For that matter, there will be improvements in technology which could allow licensees, if they want to take advantage of it, the process needs to allow that, too. And I think that as Dr. Sheron just indicated, when this event came up, the process seemed to have worked pretty well.

COMMISSIONER MERRIFIELD: I agree with the aforesaid point that we should not be event-driven, but I also agree we need to confirm, as you are, a processes that ongoing events are captured within our regulatory framework, and so I appreciate that.

I had a question, moving back to some of the earlier presentation slides, particularly on the first presentation Slide 6 -- presentation by Ms. Banerjee. In that, you mentioned that we have made significant progress, and you mentioned that 20 of the 23 milestones are complete, with open items scheduled for completion by February of '02. That seems to focus, for the most part, on milestones and outputs. And I'd like to shift back from outputs to outcomes, perhaps hearing from our former Chairman.

What were the outcomes that the 23 milestones were designed to achieve?

MS. BANERJEE: That is a very good question. Let me try to answer that. One of the important ones is how we do inspection in the steam generator examination area, tube examination area. Before we put out the new guidance on steam generator inspection, our inspections were primarily based on how the licensee is doing the current testing. Now, our focus will be how they are assessing the results in terms of what we call condition monitoring and operational assessment trying to figure out if the degradation methods that are existing are understood and the steam generator behave the way they predicted it to behave previously and how it is going to behave during the next operating cycle, so there will not be any unpleasant surprises in terms of not meeting the performance criteria, as Louise mentioned. So that is a definite improvement to the inspection procedure in the guidelines, and are giving us better capability.

We also developed the risk-informed significance determination process, thereby all the inspection findings under the new regulatory oversight program will be assessed for their risk significance, so that we know what is the level of engagement for NRC. So that helps us improve our response to those kind of events.

Then, there are other issues not directly related to the steam generator, but also the processes, the regulatory processes we use. One is risk communication, as Commissioner Diaz asked and we responded to his questions. We are working -- we developed the recommendations on it.

Then, there are other processes like the licensing amendment review process. In order to respond to what we call RAI, request for additional information, we have improved and clarified the management guidance in this area, so that now we are focusing on putting together a RAI which is complete and effective so that we don't have to iterate the process, and other ways of getting information from the licensee without engaging them in a detailed RAI response which has to be docketed and goes a time-consuming process.

So, these are a few examples of the little improvements we made in our Steam Generator Program and in the long-run will improve our effectiveness and efficiency and also reduce unnecessary regulatory burden.

MS. LUND: I just want to mention one other thing, as Maitri had discussed this revised inspection procedures, and we're having the Regional inspectors come in in January for some additional training on this procedure. And because they've been using this procedure during the fall outages, it will give us an excellent opportunity to receive feedback. We can also fine-tune the procedure based on their feedback, so instead of it just being an output, us hucking it over the fence at them, it gives us an opportunity to engage the Regional inspectors and find out how it performs.

COMMISSIONER MERRIFIELD: Speaking of -- you mentioned it occurring now, so I'm going to switch back to Dr. Muscara -- you talked about some of the work that's being undertaken Argonne. When I was there last year, they had a program in which they had -- a new computer tool that they were designing that would take the current testing and provide a better ability to analyze that and detect it. And I'm wondering if you could provide a little bit of an update about where that stands. You talked about a report in publication, but I'm wondering about that particular element of the research that Argonne is working on.

DR. MUSCARA: That particular work was done to help to us to characterize flaws in the mock-up because in order to evaluate for better detection, we need to know what flaws we are looking at, and we do not want to destroy the sample. So, we needed to have a very accurate method for characterizing flaws. And so this method has been developed. And, of course, this is very useful in conducting official assessments because we need to be able to characterize the flaw so we can evaluate how it will behave structurally.

Now, the work has progressed. The system we have is really a laboratory system, it not really intended for the field at this point. It is not very user-friendly. However, EPRI, Westinghouse, our partners in this program, are very interested in this work. We have met with them. They are interested in taking this information and applying it for field inspections. So we are working with them and transferring the technology and helping them make it useful for the field.

COMMISSIONER MERRIFIELD: I remember at the time having reviewed that, and it sounded quite promising. So I'm certainly encouraging of efforts to bring that into the field because it could take current tests and really enhance the ability the to detect those.

DR. MUSCARA: We have characterized -- maybe beyond the time that you've seen it -- by comparing the ND result to destructive examination. And when we compare the flaw shapes and profiles, they are very, very close. The standard deviation is quite small, on the order of 2-5 percent for the larger flaws. So, it is a very good technique and, as I say, it's quite important to be able to do appropriate and reliable operational assessments because a flaw shape and size is quite important in the analysis.

COMMISSIONER MERRIFIELD: Okay, good. The last question I had, there was a presentation at ACRS on November 29th at which the staff indicated that certain EPRI guidelines were not sufficiently well developed to support inspection intervals significantly longer than what was it being implemented under current requirements or acceptable alternatives.

I'm wondering if you can just give me an update in terms of whether there is any resolution of that matter, or whether it still is an outstanding concern?

MS. LUND: Well, I think as we discussed with the -- we have technical issues, and as we look at the EPRI guidelines -- and we don't endorse them -- but through our review of NEI 97-06, we ended up doing a lot of review of the guidelines. And we brought up issues and we actually commented on Revision 6 to the examination guidelines. And I think specifically with specifically with regard to the inspection interval extension, I think that we had questions and we had comments regarding

using a performance-based approach, and we discussed getting a technical basis developed for the Alloy 600 thermally treated and 690. So I think there is a lot of interaction back and forth to provide input on this.

MR. STROSNIDER: There very specifically was a concern about some of the proposed intervals in that we thought they were too long, and that there needed to be more technical basis for that. But one thing I do want to point out, too, is that that was in, I believe, Rev 6 of the guidelines which the industry had not approved yet themselves, and so that was still under review by the industry. And we had been having these discussions, as we indicated during the presentation, and I think we have come to agreement that a different set of intervals would be used. We made some comments on those, and I think hopefully we are coming to resolution on those, that set of intervals.

COMMISSIONER MERRIFIELD: Thank you, Mr. Chairman.

CHAIRMAN MESERVE: Thank you. Brian's introduction to this talked about how this has been a long time getting to the point where we now find ourselves. And it does raise a question of the extent to which the NEI Guidance 96-06 is, in fact, being implemented by licensees in this time period. Would you say something about that?

MR. SHERON: When we received 97-06, we were told by NEI that the industry had already agreed to implement that document, I believe, by January 1st, '98 -- first refueling outage after --

MS. BANERJEE: 1999.

MR. SHERON: I'm sorry -- after 1999. And the industry, in fact, has been moving forward on that. We did remind them that if there were any guidance in that document that that was inconsistent with our regulations, they needed to be aware, obviously. But they have been moving forward with it.

I would add to that, though, something I was going mention before and that is that while we're waiting to complete our review of 97-06 and hopefully get it along with the revised licensing change package and everything put in place, the staff has been interacting with licensees on a case-by-case basis. I imagine Louise could give a little more detail. This didn't come out in the briefing, but we had, for example, conference calls with some of the licensees at every outage, and this is where we discuss with them things like, for example, the scope of their inspection, what kind of probes they are using, are these the appropriate probes for the type of degradation they would expect to see? This usually gets into a back-and-forth with the licensee. Sometimes the licensee will make modifications in their inspection program as a result of these, but that's how we basically gain our assurance that we believe that the plants can operate safely for the next cycle.

So, you know, there's that combined with the industry following 97-06, and then, as Jack said, hopefully when we finally get this all approved and in place, we will have a framework that, at least in my feeling, hopefully will eliminate the need for us to continually monitor and have these type of conference calls.

MS. LUND: I would just like to make another comment to that, too. It is very true that on our phone calls that we have with the licensees during their steam generator outages, that we do ask questions such as what does NEI 97-06 tell you to do? What does the steam generator examination guidelines tell you to do in this situation, so we do end up having those type of conversations. And just about every phone call, we have a list of questions that we send to them that address a lot of these topics.

CHAIRMAN MESERVE: Let me say I think it is a very important point that anyone in the audience who is trying to understand what we're doing, I would not want to have any implication that we been dead in the water on this issue since the early 90's and trying to figure out how to deal with something, and this is something that has been worked continuously and case-by-case or an ad hoc basis since then.

MR. SHERON: And just to follow up, as Brian indicated, we've had generic communications in terms of information notices, Generic Letters, et cetera, from the NRC's perspective, from a regulatory perspective. But I think also we really do need to credit the industry on this particular initiative. And when we look what this from an industry initiative point of view and our decision not to go with a Generic Letter that, in fact, in '99 they were implementing this. And that has, I think, really improved safety. Typically, what they are doing under 97-06 is more conservative, more aggressive than what's required by our current Technical Specifications. So, I think we do need to recognize that and give them credit for taking that initiative.

MS. LUND: I want to follow up with just one more thing, that even though they are working on Revision 6 to the examination guidelines, they've also put out interim guidance -- this is after Indian Point 2 -- for things like pressure testing and other issues that have come up. So, these issues just didn't sit until a revision could be made, there is additional guidance out there. When we've brought up issues, we've interacted with the industry. Interim guidance has gone out by NEI on these various issues.

CHAIRMAN MESERVE: I would like to ask you one or two questions about an ACRS letter of October 18th, which has basically been supportive of what the staff has been doing in this area. It does have a comment about the lack of correlation between leakage and voltage for 7/8th-inch tubes which it finds perplexing, and later the correlation observed for the 3/4-inch tubes. This is a troubling sort of statement, just sitting here, that the EDI current testing, I guess, as this applies to the 7/8th-inch tubes. Could you comment about what we're doing about this and where this stands today? You're smiling. I'm troubled that --

MR. STROSNIDER: I think maybe one of the problems is that there was a good correlation for the other size tubes, but this

is an empirical approach, and it's true that the one size tube that the database that supports the voltage-based approach does not have as good a correlation. But, in fact, if you look at what went out in the Generic Letter that allowed implementation of this voltage-based approach, it's empirical. There's a statistical analysis that takes into account whatever level of correlation there is, that's what you get credit for and you have to account for the uncertainties in it.

Having said that, people would like to see an improved correlation. The data that we have are the data that we have, and it height be difficult to force them into anything that is not there. But having said that, I think maybe Dr. Muscara has some comments with regard to some of the more fundamental looks in this area.

DR. MUSCARA: We've had discussion in this area for many, many years, and clearly what we see is what we would expect out of the voltage correlation. The voltage really does not have a physical basis for relating to structural integrity.

CHAIRMAN MESERVE: It's completely empirical?

DR. MUSCARA: It's completely empirical, and there are reasons why voltage in certain situations may not work, may not tell us what to expect as far as leakage first in failure pressures. One of the advantages of the advance in E-techniques for sizing flaws, it gives us a direct method of evaluating the flaw size and shape, and that directly can relate to leakage and to burst and failure pressures. And so one direction we're going into is to improve our integrity modeling and our NDE, so we can get a better correlation, in fact, industry is also following along with some of their newer repair criteria are based on the profile of the flaw instead of its voltage response.

CHAIRMAN MESERVE: So is this an issue that you think over time then is going to resolve itself?

DR. MUSCARA: Yes, definitely.

CHAIRMAN MESERVE: The other thing they note is that they propose some work for better understanding of radioactive iodine behavior on design basis accident conditions, and the implication here is that staff is in disagreement with them as to the iodine spiking phenomenon.

MR. SHERON: Dr. Rich Barrett --

MR. BARRETT: My name is Rich Barrett. I'm with the NRR staff. The phenomenon they are referring to has to do with the accounting for the iodine that's released from the fuel as a result of a pressure spike during an accident. And their comment was that -- that the so-called spiking factors might not be conservative enough for all possible regimes where a plant might be operating.

We've been looking at that phenomenon since that meeting, ever since we got the recommendation. And we're in the process now of finalizing that analysis, and we plan to publish a response for public comment in the next few months. And after we've gotten public comment, we are going to evaluate whether further work is needed to refine that guidance.

For the moment, however, we think that what we have out there in the operating fleet is not nonconservative, and we're prepared if any licensee proposes to change their Technical Specification limits to move into the area that the ACRS is concerned about, to deal those on a one-on-one basis. So, we take this recommendation seriously. I think the ACRS may have gotten a mistaken impression from our status briefing recently that we've completed that work and that we're not continuing, and that we're not going to respond to them. But we certainly plan to, and I'm looking forward to seeing the results of that work myself.

CHAIRMAN MESERVE: Thank you. Commissioner Dicus.

COMMISSIONER DICUS: Thank you. I guess the first thing I want to say is, sometime ago I had requested that there be a list of acronyms on briefings and I appreciate the fact that you did supply me,and the rest of us, of course, with a list of acronyms, but just for the record, I do know what NRC stands for.

(Laughter.)

COMMISSIONER DICUS: Now, I'm not so sure about NEI, but anyway --

CHAIRMAN MESERVE: They wanted to be complete.

COMMISSIONER DICUS: It was very complete, and I appreciate that. I want to add my voice to the ones you have been hearing that any regulations or guidance or where we go with something is definitely -- is definitely safety risk-driven and not event-driven. I think you've heard it from all of us, so just put my voice in with it.

I would like to go to the first set of slide, slide Number 4, and you mentioned resolution coordinated with stakeholders, and you did have active stakeholder involvement, and I kind of wondered who those were outside, I know the industry.

MS. BANERJEE: Other than the industry and, of course, our licensees. We had some meetings last year in December, and our Steam Generator Workshop in February, where we invited many concerned scientists and a couple other external stakeholders who are traditionally very involved in our regulatory processes. And one or two of them attended the first day of the workshop, but at the workshop they indicated that they liked to be kept informed in a directly participating minute. For that reason, we developed a service list whereby we keep them informed of all the activities that are happening in this area.

And then in the past couple of meetings, the industry on NEI 97-06, we had some public attendance. These meetings are open for public observation only, and we had attendance from McGraw-Hill, that one I can think of right away. So, it's sporadic involvement from the public.

MR. STROSNIDER: If I could add one thing -- excuse me. I think one other important thing is that when you look at the process we have laid out reporting this generic Tech Spec change into place, that we included going out in a Federal Register Notice after we've developed a generic safety evaluation requesting any stakeholder comments through that process, which is not normally a necessary part of the process, but we think important to make sure that we do have everybody's input.

COMMISSIONER DICUS: Are you getting --

MR. STROSNIDER: Once we come to agreement, we developed a generic safety evaluation, it will go out in a Federal Register Notice for anybody to make comments on, and we'll incorporate those comments in the final evaluation.

COMMISSIONER DICUS: One of the places I'm heading with this question, excluding IP2 because we're all very much aware of legislative and local interests because the event and perhaps TMI and others, but, in general, are you getting public concern or state legislative concern or governor's concerns over steam generator issues across the nation where we have our stations?

MR. SHERON: I'll try that. I would not say it is across the nation, but there are certain plants where it is more of an issue -- Salem, for example, is a good example. Last summer we held a public meeting near the Salem Station, with a group up there that was very actively concerned about the Salem generators in the wake of the Indian Point failure. Their concern was obviously that the Salem generators may be degraded to the extent that the Indian Point was, and they were very interested in the inspection results. They wanted the inspection results released for their own analysts and the like.

We interacted with that individual, and we agreed to a public meeting, which the Region participated in, as well as the Headquarters staff. My guess is we didn't satisfy this individual or his organization completely, but I think we did make some gains, you might say, in terms of explaining what our processes are.

I'm not aware of any other plants -- maybe anyone else on the staff knows of any recently -- but that's the only one that comes to mind right now where there was active public concern.

COMMISSIONER DICUS: I was just going as to whether or not, given any number of events like our liaison, our governor offices liaisons, had contacted you expressing any concern that the governors were asking about where we had stations.

MR. SHERON: I'm not aware of any.

COMMISSIONER DICUS: Okay. That's good. Thank you, that's all.

COMMISSIONER DIAZ: Can I over-extend my welcome?

CHAIRMAN MESERVE: You'd find it hard to do that.

COMMISSIONER DIAZ: I just wanted to say that although the words will come back to haunt me, it is always a pleasure to be involved in steam generator issues rather than other issues.

(Laughter.)

CHAIRMAN MESERVE: You might find unanimity on the Commission for that.

COMMISSIONER McGAFFIGAN: I heard, Nils, that they are going to introduce legislation requiring NRC conduct all steam generator tube inspections with federal employees, and that all stem generator tubes will be inspected at least every six months by this massive workforce.

COMMISSIONER DIAZ: Florida, here I come.

(Laughter.)

CHAIRMAN MESERVE: With supervision by the Commission.

I would like to thank the staff for a very helpful briefing, and on behalf of the Commission, I feel confident saying that we're all pleased at the progress you have made in resolving the technical and regulatory issues, and that we very much look forward to resolution of the issues associated with NEI 97-06. And, with that, we're adjourned. Thank you.

COMMISSIONER McGAFFIGAN: And I was not trying to give any legislator an idea for a bill.

(Whereupon, at 3:40 p.m., the meeting was adjourned.)