UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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MEETING WITH THE ADVISORY COMMITTEE
ON REACTOR SAFEGUARDS (ACRS)
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WEDNESDAY, DECEMBER 5, 2001
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ROCKVILLE, MARYLAND
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The Committee met at 1:30 p.m. at the Nuclear Regulatory Commission, One White Flint North, Room O, 11555 Rockville Pike, Dr. Richard A. Meserve, Chairman, presiding.

**PRESENT:**

RICHARD A. MESERVE, Chairman

GRETA JOY DICUS, Commissioner

NILS J. DIAZ, Commissioner

JEFFREY S. MERRIFIELD, Commissioner

**ACRS PRESENT:**

GEORGE APOSTOLAKIS, Chairman

MARIO V. BONACA, Vice Chairman

F. PETER FORD, Member

THOMAS S. KRESS, Member-at-Large

**ACRS PRESENT: (CONT.)**

DANA A. POWERS, Member

STEPHEN L. ROSEN, Member

WILLIAM J. SHACK, Member

JOHN D. SIEBER, Member

GRAHAM B. WALLIS, Member

**I-N-D-E-X**



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

(1:47 p.m.)

CHAIRMAN MESERVE: Why don't we get started? I have to apologize to the Advisory Committee that we were testifying, or I was testifying this morning and fortunately, I had lots of reinforcements behind me, namely my colleagues here at the table and it went considerably longer than we had anticipated.

We do have two minor business items we need to clear up first, two affirmations.

Madam Secretary, you may proceed.

SECRETARY VIETTI-COOK: The Commission is being asked to act on a Memorandum and Order responding to an appeal by the Connecticut Coalition Against Millstone in a Standing For Truth About Radiation Foundation of the Atomic Safety and Licensing Board's decision in LBP 0110 which found the Petitioner's sole contention to be inadmissable. The Commission had voted to approve a Memorandum and Order which affirms the Board's decision LBP 0110. Would you please affirm your votes?

(Ayes.)

Commissioner McGaffigan had previously agreed to this order and had he been here he would have affirmed his vote.

The second item, the Commission is being asked to act on a Memorandum and Order responding to Connecticut Yankee Atomic Power Company's request for Commission review of the Licensing Board's decision in LBP 0121. The Commission has voted to approve a Memorandum and Order which concludes that the request does not meet the standards for interlocutory review and denies the petition for directed certification.

Would you please affirm your votes?

(Ayes.)

And again, Commissioner McGaffigan had previously approved this order and had he been here he would have affirmed his prior vote.

CHAIRMAN MESERVE: Thank you very much. On behalf of the Commission I'd like to welcome you to today's meeting with the Advisory Committee on Reactor Safeguards. As I think you all know and as the audience knows, we do meet about every six months with the ACRS to hear about issues of current interest or near term concern. Why don't we get underway?

Dr. Apostolakis?

DR. APOSTOLAKIS: Thank you, Mr. Chairman, Commissioners, as always, we are very pleased to be here to discuss with you topics of current interest to the Commission. These topics today are the Reactor Oversight Process, regulatory challenges for future plan designs, ACRS activities associated with core power uprates and the status of ACRS activities and license renewal.

Last time, Mr. Chairman, we went through the presentations and then we had questions. Do you wish to do the same this time?

CHAIRMAN MESERVE: Yes, that will be the process we will follow today.

DR. APOSTOLAKIS: Okay. We'll start with the Reactor Oversight Process. My colleague, Mr. Sieber, is the cognizant member.

MEMBER SIEBER: Thank you, Dr. Apostolakis, and good afternoon. Two and a half years ago, the Commission instructed the staff to implement a new revised Reactor Oversight Process. This new oversight process was to be performance-based and risk-informed to the extent possible. The object of the revised Reactor Oversight Process was to develop a process that was objective, understandable, scrutable, timely, and visible to the public.

The staff has developed and implemented to a great extent such a process and we believe the staff has done a good job in many of the goals set before it.

We are also impressed that the staff has done an excellent self assessment and if the findings from that self assessment, along with our own comments are implemented, that will result in an excellent set of improvements to the process.

In April 2000, the Commission tasked the ACRS to review the new Reactor Oversight Process and you asked us two questions. Specifically, you asked us to review the use of performance indicators in the Reactor Oversight Process to ensure that the PIs provide meaningful insight into aspects of plant operation that are important to safety and review the initial implementation of the Significance Determination Processes and assess the technical adequacy of the SDP to contribute to the Reactor Oversight Process.

We provided our response in an analysis to you by our Letter of Report dated October 12, 2001. We concluded that the current PIs do provide meaningful insight into plant operations and plant performance. However, specifically with regard to performance indicators adopted for the use in the ROP, we found that sound performance indicator thresholds for the white/yellow and the yellow/red thresholds were initiating events and mitigating systems are not meaningful.

For example, for these two categories, the green/white thresholds are based on peer group comparisons where about 5 percent of the licensees might fall into the white category. As we move further down these categories, for example, the white/yellow and the yellow/red thresholds, the performance indicator thresholds are based on risk significance.

In the case of initiating events, since plants are designed to accommodate initiating events and tolerate them, risk does not increase very much with the occurrence of a specific initiating event unless other complications occur. So, for example, it would take more than 20 reactor trips per year to effect the initiating event risk category in a sufficient amount to cause a licensee to enter the red band.

Clearly, 20 trips in a year is far worse than industry performance has been for at least four decades to my memory.

It would take over 2000 loss of heat sink events over a 3-year period or more than two per day to enter the red category for the loss of heat sink events. Clearly, these are not particularly meaningful. The same patterns occurs in the mitigating system category.

The use of risk-based thresholds for PIs has a deeper, more intractable flaw. Specifically, it focuses on the change in CDF that result from changes in a single isolated parameter, assuming that all other factors that affect CDF remain constant. The realistic assessment of the change in CDF cannot be related to the change in a single PI.

There is a difference between the definitions of terms like unavailability as used by INPO and WANO in the Reactor Oversight Process as compared to the definitions used by the former AEOD function of the Agency and by PRA practitioners. The multiplicity of definitions can lead to confusion. In the current definitions as used in the ROP are inconsistent with other Agency uses of these terms and are deficient in terms of being applicable to later more expensive analysis. We believe that it would be better to use the former AEOD definitions in the ROP process rather than the WANO definitions which are currently the definitions incorporated into the ROP.

We believe that the Agency should consider other related work that the Agency does when defining the performance indicators. We would also like to point out and believe that unreliability of mitigating systems should be added to the performance indicators. There's an important difference between unavailability and unreliability.

The most immediate and pressing need for the ROP is to improve the SDP tools. We note that the SDP tools are incomplete in some areas or are overly optimistic. We continue to believe that the technical adequacy of risk-based SDPs depends on the availability and the quality of a relevant PRA. We therefore believe that the SDPs for at-power situations are adequate, but not yet complete for every licensee. And the threshold values for risk-based SDPs appear to be appropriate and meaningful.

However, SDPs for nonreactor-based issues are not risk-informed generally, but are deterministic, and are more difficult to justify. An example is the SDP for fire production. We find this SDP to be overly simplistic and subjective.

An SDP based on low power or shutdown PRA or other management tools like ORAM which is an EPRI outage management tool is needed. Risk continues when a plant is in a shutdown mode and a significant percentage of incidents requiring significance determination occur in the shutdown mode. In all of these situations agglomerate into the total risk profile of the plant. While the worksheets in the SPAR models are adequate for the purposes of estimating risk from individual events, a document and review of the worksheets in the SPAR models is necessary to validate them and maintain licensee and public confidence.

When we look at the action matrix there is an assumption embedded in the action matrix where there is an equivalence between the white band PI versus a white band SDP. There is also an assumption that two whites equal a yellow and so on. We have not found documentation of the arguments that would show that these assumptions are valid. We believe that the derivation of the implied equivalency of PIs versus SDPs should be documented. We also suggest that the process of formal decision making could be helpful in resolving some of these problems.

We continue that the ROP is an evolving process and that more work needs to be done. We believe that the staff has done an excellent job so far in establishing and implementing the Reactor Oversight Process. We believe that this new process is supervisor to and more objective than the former oversight process.

We looked at training, communications, the displays on the NRC website, the availability and understandability of public information and we believe that all of these factors have been done very well by the staff. We understand that the regions have played a large role in making this process role with licensees, with their own staffs and with the public. We believe that the staff's implementation of the new Reactor Oversight Process so far has been a job well done.

Thank you.

DR. APOSTOLAKIS: Thank you, Jack. Next topic is regulatory challenges of future plan designs. That will be discussed by Dr. Kress.

DR. KRESS: The title may be just a little misleading. This is mostly a summary report of the workshop on this issue that the ACRS sponsored and held back in early June.

Holding such a workshop is somewhat of an unusual thing for ACRS to do, but we thought it would be beneficial mostly for the ACRS itself so that we could become more acquainted with the design features of the various concepts in Gen IV and

the other advanced things and become acquainted with the potential policy and technical issues that we may be called upon at some time to give you our best advice on.

We also thought it would be helpful for the staff and the industry to engage in this dialogue also. They had already engaged in dialogue, but this would be additional help and was more of a discussion forum than anything.

The workshop, I think, all the attendees that we were able to talk to afterwards thought it as highly successful, that it accomplished some good purposes. There were over 100 stakeholders that attended and we had presentations from basically the whole variety of stakeholders including those listed on the slide. I don't need to name them, but it's the full list of people who we selected and invited to participate.

I did want to thank Commissioner Diaz for a very nice keynote speech that he gave and he set a very good tone and we thank him very much for that. Everyone thought it was a very useful start in the meeting.

The purpose, as I said, was to see if we could identify what the major regulatory challenges might be for licensing these future reactors. We did develop such a list in the meeting. Several of the ACRS Members went through the minutes of the meeting and all of the presentations and the discussions and gleaned out of that what we thought were the major challenges that were identified. We put those together along with all the presentations and the questions and answers in the Panel discussions into a proceedings which is now ready to be issued as a NUREG. We've finished all of our reviews. It does include this list of regulatory challenges. There were more than two dozen of them, but we didn't prioritize them, so they may not all be as important as others. It makes an interesting list that I think is worth looking at and may serve as a good place for ACRS, at least, to focus some of its attention and even for the staff might benefit by looking at it.

We have continued activities in this area, of course. A couple of the ACRS Members participated in the workshop sponsored by the Office of Research in October. Looking at the research needs for the high-temperature, gas-cooled reactor and developing a list of these needs and at that time we did priorities on some of these.

We also have met with the NRC staff and Exelon to discuss a number of things. One, we discussed the readiness of the staff to conduct their licensing activities. We discussed Exelon's proposed licensing approach for the PBMR and we also discussed the staff's reaction to that proposed approach.

We intend to have additional meetings. We haven't written a letter on the subject yet because we haven't fully looked at the staff's SER on that issue. We intend to take several of what we think are the more important challenges that we identified and discussed them at much more length at our coming retreat that we have scheduled for January and arrive at some sort of ACRS position on these and perhaps at some time after that we will look for a report to the Commission.

DR. APOSTOLAKIS: Thank you, Tom. Our next topic is our activities associated with core power uprates. The lead member is Professor Wallis.

MEMBER WALLIS: One of our major activities right now and in the near future concerns applications for core power uprates and so it's a very current topic. The impetus comes from industry that sees considerable advantages to uprating the power and believes that they can do it safely. Many licensees are planning or have initiated these power uprate programs.

In the early 1990s, General Electric initiated a generic power uprate program for BWRs and Westinghouse and Combustion Engineering have recently approached the staff regarding our uprate plans for PWRs. We have not yet received these applications for PWRs so my presentation concerns BWRs only.

The first step that G.E. made was an uprate program that was initiated in 1991 which limited in scope to 5 percent typically power uprates and what happened then was they made use of the margin which was already built into the design. The designs had been licensed for power slightly below what they were capable of. And the potential for uprate was essentially already there. So this was not that big a step.

Most of the operating BWRs will use this program. The power uprate program that concerns the ACRS at the moment is what's called the Extended Uprate Program which goes by the acronym EPU. These uprates are substantial, up to about 20 percent. They are achieved by an improved design, by advanced fuel, by very sophisticated tailor-made fuel and by advanced management of that fuel, the way it's put into the reactor, where it's put in, when it's renewed and so on.

This is achieved by meeting all the regulatory criteria in place and changing as little as possible the key conditions. For example, the pressure of the reactor vessel is not changed as a result of this power uprate. The key -- the maximum rod power is not changed. But some other things have to change such as the steam flow rate in order to get the power and the turbine has to be changed. So there are some balance of plant changes.

The ACRS reviewed the lead plant for Monticello in 1998, 6.3 percent uprate and at that time we recommended that although this was not a risk-informed application that the staff from the applicant should review the impact on plant risk and let us know what those impacts were, that there insights to be gained from so doing and this is what actually has happened.

G.E. laid the basis for these uprates by producing typical reports which have been approved by the staff and they provided generic basis for how to go about evaluating an EPU.

I want to discuss a few of the technical issues that we addressed. ATWS, because there is more power and we're

concerned about whether or not this plant will recover from ATWS and so we needed to carefully examine the calculations of their bases for what happens during an ATWS and what the operators have to do to get out of it and assure ourselves in that which could be successfully managed.

This has been done by the IGE and the licensee. The licensee has paid particular attention to enhanced training programs for the operators so that they know just what to do, when to do it.

Core instability is a feature of BWRs. The core instability region, because the power flow rate map is more extensive, the core instability region is more extensive. We have to be assured that instability could be avoided during normal operation, that if instability did occur it would be detected. There was proper instrumentation for detecting it and the operators could handle it.

We also had a concern with the effect of core instability and also the oscillations following an ATWS and the peak heat during one of these oscillation is actually put into a fuel rod.

We were concerned that we addressed the material degradation issues such as irradiation and stress corrosion cracking and the embrittlement of the pressure vessel. This is necessary because the neutron flux distribution is different with this new fuel design. So we had to be reassured that indeed the vessel flow was not significantly changed and the embrittlement of the pressure vessel was not an issue.

Because of the greater flow rates in the feedwater there is more flow assisted corrosion. We are satisfied that it is manageable and within limits and that inspection procedures will detect it before it becomes serious. Because of greater flow, steam associated with power, there is a small potential for flow induced vibration of steam driers, for example, and this could lead to fatigue. Again, we addressed this issue and it was satisfactorily responded to.

The containment response, because there's more power and more decay heat, the containment does experience somewhat enhanced pressures and temperatures during the loss of coolant accident. These are within the regulatory requirements to meet the regulations.

We wrote a letter on Duane Arnold's application. This is a significant core operator of 15.3 percent and we recommendation approval of that application in October.

We are currently addressing the Dresden Quad Cities power stations' applications which are for 17 and 17.8 percent and we hope to finish our letter to you in the next few days.

I'd like in concluding to make a few general observations that the ACRS has on how these reviews are conducted and then I'll turn to my colleague, Dana Powers, to expand on these observations.

The staff rationale for its decision is reflected in the Safety Evaluation Report. This is the document which explains the staff's decision and what we notice is that this relies very heavily on the applicant's analysis, the applicant's presentation, the SER, the Safety Evaluation Report, tends to reiterate the rationale submitted to the staff and then there's usually a rather short statement that the staff finds is acceptable.

And the way -- the question is well, why did they find it acceptable? And the way the ACRS determines this is to meet with the staff, ask a lot of questions and satisfy ourselves that the staff had good rationale for making this decision.

I think we have thought about whether or not the Safety Evaluation Report should be more explicit, make it clearer to someone who doesn't know some of these reasons that the staff has, just why they've reached this decision.

This might be of help to the Standard Review Plan. There isn't a Standard Review Plan for power upgrades and the staff has good reasons for not having the Standard Review Plan, but if there were one it might be clearer just what the staff is looking for, what the criteria are and so on. That might be useful.

Another observation we have is that thought might be given to when the questions that are addressed by the staff are important enough or when the answers are uncertain enough it is advisable to make independent evaluations rather than relying on submission from a licensee.

And so staff needs to be clear just when it needs to ask for confirmatory analyses or make confirmatory analyses of its own. This would certainly help public confidence if there were independent assessments of some of the -- if one could identify some key issue just needed to be evaluated independently.

In the case of the power uprates we've reviewed so far, this was done for the Duane Arnold containment analysis, but I think that's the only case where the staff felt the need to make an independent confirmatory analysis.

I'd like to ask my colleague, Dana Powers to continue.

DR. POWERS: Well, I think in our examinations of these power uprates that we've looked at so far, we did conclude that the staff has done an adequately detailed analysis of the applications. They do seem to have learned the lessons that have come from the Maine Yankee incident. They have, for instance, done a very thorough examination of some of the licensees' calculations, but on site, looking at the inputs and the details the way the analyses were done.

On the other hand, they don't have a standard review plan for these activities and that raises the question of whether this

kind of detailed analysis that's been accorded the first and the second applications will be accorded to the fifteenth and sixteenth of these applications. And is the process going to be sufficiently transparent to both the licensees and the public to have confidence in.

You can contrast this approach that the staff has adapted on the power uprates to the much more disciplined and documented approach that they've accorded the license renewal process. They have a similarity in that they both involve the extended generation of nuclear power.

The documentation that the staff provides and it's a standard in the Safety Evaluation Report has been a challenge to us. We would rely on heavily to guide our review and when we don't have the rationale for the staff accepting it, we of course have to impose additional burdens both on the staff and the licensee to delve into in some depth. But I think there's a more important issue associated with the Safety Evaluation Reports. That is, as written in their summary fashion right now, they really don't contribute to the Commission's goal to engender greater public confidence in the NRC's examination of these licensing actions.

It may well be we need to think about considering returning to an earlier era when our Safety Evaluation Reports that the NRC produced really were engineering evaluation documents and provided the kind of detail that would give one confidence that the NRC had done a very thorough examination of the applicant's analysis.

DR. APOSTOLAKIS: Thank you, Graham and Dana. And the last topic is the status of ACRS activities on license renewal to be discussed by Dr. Bonaca.

DR. BONACA: The purpose of my presentation is to provide you with a brief update on the license renewal activities.

Since the last Commission meeting we have performed a number of reviews. First of all, we evaluated whether revisions to 10 CFR Part 54 are required. We also completed the final reviews of Arkansas Nuclear 1 and Hatch applications and we performed an initial review of Turkey Point. I would like to note that Hatch application is the first BWR application that we reviewed and that the Turkey Point is the first Westinghouse. With these two reviews behind us, we have then reviewed one plant of each type of reactors run in the U.S., a BMW plant, a CE plant, a Westinghouse plant and the boiler plant. And so we have a significant experience behind us in different types of reactors.

Regarding 10 CFR 54 and possible need to revise it, we concluded that 10 CFR part 54 is effective and efficient. We feel that it is effective because it allows the implementation of the rule, leads to the identification of safety important components that need to be managed for aging and also leads to the identification of adequate management programs.

It is efficient also because it utilizes existing established categorization processes of components and relies on existing processes to the extent possible, also from aging management, so it is an efficient system. It doesn't create something that we know. It just relies on existing processes.

We have learned a lot over the past two, three years in license renewal and I believe the staff and the industry have done a significant effort in the guidance documents. Therefore, we feel that we need to maintain these processes stable and avoid any rule making that will, in fact, destabilize the process as we need to do.

There are still differences between the staff and the industry. They are technical and their resolution can be accommodated in the upcoming updates of the generic license renewal guidance documents. The first update will be next year. So for two years are there.

Regarding Arkansas 1 and Hatch applications, we completed our reviews in May 2001 and November 2001, respectively. And we felt for both applications that the requirements of 10 CFR Part 54 were effectively implemented. In those cases, in both cases, we found that the staff had performed an effective review of the applications. The SERs are extensive. They go into high detail and good analysis. We found that the resolution of the open items was appropriate and essentially we concluded that adequate programs have been established to manage the effects of aging, so that these plants can be operated safely and in accordance with the licensing basis for the extended plant operation.

A couple of observations I would like to make for Arkansas 1 and Hatch. First, the Arkansas 1 application was completed five months ahead of schedule. Well, we noted already that before, but one of the reasons is that there were only six open items in the interim report. Clearly, there is a convergence of understanding between the staff and the applicants between what needs to be done. And so, in fact, for Arkansas 1, we didn't feel that we needed to write an interim letter because simply there were very few open items to be dealt with.

For Hatch, there were many more open items. And the staff performed a significant SER. They also included in the SER significant notification of some of the main issues of contention, especially the seismic 2/1 issues. They were very highly discussed in the SER. They provided significant information. We recommended that those clarifications be included in the guidance documents because they will prevent the same issues to become contended issues on future applications.

Turkey Point, as I mentioned, we only reviewed the interim application which is very complete. The document was very scrutable. By scrutable, I mean very easy to understand through the document how you lead to the selection of components and scope, how do you go about looking at the aging and the draft SER was comprehensive. Again, on this application we have only four open items. Of those, only one has some significance, including seismic piping issue. The other three can be readily dealt with, I believe. And because of that, again, we chose not to have an interim report and as you know, we will be issuing a final report on Turkey Point in the spring of 2002. We plan to visit the site in March 2002

and have the whole final subcommittee meeting for this application at the site or close to the site.

A couple of observations before I complete my presentation. The point was that the applications are becoming more scrutable and complete and again I define the use of the word scrutable in just you can understand what's happening and how you get to the conclusions. And we expect this strength to continue in those applications following the generic license renewal guidance documents. We hear that San Onofre will submit in the upcoming year the first application which is developed in the standard format and so we have high expectations that that would be facilitating a review further.

To conclude my presentation, for 2002 we plan to review Surry, North Anna, McGuire, Catawba and Pitch Bottom applications and to also perform the final review of Turkey Point, Surry and North Anna.

In addition to that, we plan to review revisions to the generic guidance documents. So we have a full table and to cover this pretty large scope of applications, in a fair way, we will develop two license renewal subcommittees starting at the beginning of 2002 and that practically will involve every Member of the Committee on one of the two subcommittees.

With that, this completes my presentation.

DR. APOSTOLAKIS: Thank you, Mario. This completes the formal presentations. I hope it's evident to the Commission that in addition to completing the reviews of the license renewal applications in record time, the Committee also managed to complete its presentation in record time.

(Laughter.)

So now we are open for questions.

CHAIRMAN MESERVE: Thank you very much. Clearly, you have been very busy and we appreciate, as always, all the help that you offer us.

Let me turn first to Commissioner Merrifield.

COMMISSIONER MERRIFIELD: Thank you very much, Mr. Chairman, and I compliment the Chairman of the ACRS in the precision of the testimony and certainly you have set a standard which will be difficult to meet, one of which I'm certain you will in the future.

The first question goes to Mr. Sieber and it relates to Slide 8 of the presentation. In the most recent monthly update on the tasking memo, our staff indicated the selected risk-based performance indicators for unreliability and unavailability will be incorporated into a pilot program in early 2002 for potential enhancements to the current set of PIs.

Does that recommendation or that comment meet what you set out in your second bullet and I'm wondering the extent to which they may or may not have briefed you recently on risk-based performance indictor efforts and if so, do you have any particular insights you'd like to share on that?

MEMBER SIEBER: Well, the last time we were briefed as in September, early in September, so that isn't real current. We knew at the time that they were considering these, but we felt an obligation to put it in our letter report to reinforce the fact that they would continue to redefine their PI process.

On the other hand, I'm not aware of specifically what it is the staff is going to do. Maybe I can ask Dr. Apostolakis if he has any more insights than I do.

DR. APOSTOLAKIS: Well, I was at that meeting too. I don't know anything after that what happened, but I think it was encouraging that the staff was aware of the main difficulty that Mr. Sieber identified that you can't really have risk-based performance indicators by looking at one event, like initiating events only.

Now whether we will be successful in identifying risk-based performance indicators is open to question. We really don't know, but clearly, you cannot look at one event. You have to look at a number of events and the staff was aware of it when they came before us.

COMMISSIONER MERRIFIELD: What this leads me to thinking is perhaps the staff having had that encounter has had further thinking on the topic and there may be usefulness in their getting back together with all of you to update you in terms of where they're going and so that you can --

MEMBER SIEBER: I think that would be a good idea.

COMMISSIONER MERRIFIELD: At the last Commission meeting that we had with the staff on our new oversight process, the staff had similar views that you have in slide 9 relative to the SDP and the need to improve the SDP tools. Late September, they did complete plant-specific SDP notebooks for all the plants.

MEMBER SIEBER: Well, that's good.

COMMISSIONER MERRIFIELD: And I'm wondering if you had a chance to look at any of those and if so, if you have any reflection on their value?

MEMBER SIEBER: I have not had an opportunity to do that, but we intend to look at some examples and discuss those at our January meeting. We have a session planned for four hours to look at SDPs.

COMMISSIONER MERRIFIELD: I guess similar to my last question, it's positive you've got a meeting schedule that would be instructive to get some understanding of the value that you think those may have for us moving forward in terms of addressing it and concerns you have in Slide 9?

MEMBER SIEBER: It was my understanding that there were some. There are 13 SDP types all together. Some are based on operating plant. Some of them are radiological control and effluents and you know, containment, and so forth.

Not all those are complete and some that are complete could stand a little more work. And so I think it's going to be a while before the staff gets everything done. In fact, they may never get everything done because as they use this process over and over again in different situations, I'm sure that they will realize that there are ways to improve the process and I encourage that kind of an attitude on the staff's part.

DR. APOSTOLAKIS: I suppose that they will never be done, that we will have something adequate at some point, if that's what you mean.

COMMISSIONER MERRIFIELD: It will never be perfect. None of us are. We all struggle with that.

MEMBER SIEBER: I think right now though the revised reactor oversight process is superior to the old process.

COMMISSIONER MERRIFIELD: Right.

MEMBER SIEBER: In that it's more objective and I guess I' like to say I was very much impressed by the communication of the process, the public meetings that all the regions had, the NRC website which the last time I looked wasn't there, but I guess it's being revised right now, but all these additional factors add strength to the oversight process the way it is and when I read the initial goals, I think the staff has met them.

COMMISSIONER MERRIFIELD: Dr. Kress, in October, the staff provided the Commission an information SECY paper, SECY 01-01-88 with the staff's readiness to review applications for licenses and to inspect new plants. In that report, the staff outlined some of the research that will be needed, some of the staff skill gaps and some of the inspection and technical challenges we have before us. I'm wondering if you could give us any thoughts in terms of your views on that report?

DR. KRESS: I thought the staff did an excellent job in putting together what their needs were there and they did find some substantial gaps. We haven't had a chance to develop a committee position on this, but I personally thought they hit it pretty much right on the button. It was a good job.

COMMISSIONER MERRIFIELD: Okay, in the presentation, you mentioned some of the activities that you all have been working on relative to the pebble-bed modular reactor and I'm wondering if you can comment on where you are relative to keeping abreast of matters associated with AP-1000 and General Atomics gas reactor.

DR. KRESS: We need another committee meeting on that subject. Our new subcommittee chairman on that is Professor Wallis. I don't know what his plans are for near term.

MEMBER WALLIS: Well, we're meeting. We have set some preliminary presentations on AP-1000 and we're waiting for the substantial ones.

The question is we did approve AP-600 and there were questions are there other such scaling differences, are there significant differences between AP-600 and AP-1000 that need to be addressed. There may be a few of those.

COMMISSIONER MERRIFIELD: Yes, to the extent to which -- I think the direction of my question was to make sure that although there is a lot of notoriety about the pebble-bed modular reactor effort, there are a number of utilities out there that are exploring a variety of reactors and certainly the AP-1000 and the General Atomics reactor are also reactors which have gotten licensee attention. I think not only is that information that we get, but obviously it's out in the trade press as well. I just wanted to make sure you're keeping your focus on not merely one reactor design, but a myriad of designs --

MEMBER WALLIS: We're well aware of AP-1000. We've been collecting information. We're really waiting for the staff and Westinghouse to come through with the hard nosed presentation.

COMMISSIONER MERRIFIELD: Maybe you need to press them in terms of setting --

MEMBER WALLIS: I'm not sure it's our role to press Westinghouse.

COMMISSIONER MERRIFIELD: Well, at least in terms of our staff.

DR. KRESS: Yes, certainly.

COMMISSIONER MERRIFIELD: I think there's an expectation on the part of the Commission that we as a Commission be ready to review those reactors and --

MEMBER WALLIS: That was our expectation too and I'm not quite sure why we haven't seen it a little earlier. I think we do

have to wait until we get to the proper submission.

DR. POWERS: It's my understanding that the staff and Westinghouse are now going through a decision process to decide the extent and content of the review that will accord the reactor and I think we're waiting the outcome of that decision process.

COMMISSIONER MERRIFIELD: One last quick question directed toward Dr. Wallis, you talked a little bit about the Duane Arnold power uprate, in the latest monthly report, the Tasking memorandum, it did reflect that the ACRS comments had required substantial changes to the safety evaluation. And I'm wondering sort of the driver behind that, you did have a bullet on slide 35 in which you spoke about the need for confirmatory analysis and improved guidance required from the staff on safety evaluations. And you did comment about standard review plan. So I'm trying to get those things together and just have a quick sense of where you are.

MEMBER WALLIS: We have an on-going discussion with the staff about these issues. The staff doesn't believe they need a standard review plan, although the Maine Yankee lessons learned reports said there should be one for power uprates. They believe they have enough information, there's enough precedence being set, they're going to learn by having to learn from Duane Arnold. They can keep learning and this is an evolutionary process which is as effective as trying to put together a standard review panel at this point.

On the need for confirmatory analysis I think what we're really saying is you need to get it clear what the criteria are for you to decide whether or not you need a confirmatory analysis and make that clear. This is perhaps the hardest part, be more specific. I mean a standard review plan will be more specific and clear and if there could be sort of criteria established that these are the kind of situations where you really need to do something confirmative, rather than just accepting what you see. I think that would hep.

So they've gone through the rationale process which we can understand is transparent. The licensees can understand it and it's clearer. I think that's what we're suggesting there might be a need for.

COMMISSIONER MERRIFIELD: Thank you, Mr. Chairman.

CHAIRMAN MESERVE: Thank you. To Mr. Sieber, I'd like to come back to this issue you raised about the thresholds for the initiating events and mitigating systems and particularly the white/yellow, yellow/red thresholds and the problem of making those risk-based and viewing them in isolation means that you've got these huge number of events before you cross a threshold.

MEMBER SIEBER: That's right.

CHAIRMAN MESERVE: And I'm curious about -- I read from your letter that you sent -- the ACRS sent us that there's a role for our expert judgment in setting those thresholds.

I am curious about how you think through that problem. I mean we have said we want to base those thresholds on risk has been something that the ACRS has supported and urged in a central theme that has been one that I think the Commission has been very responsive to and it would seem to me that if you're going to make those departures from the one at a time, you'd have to think about what other things could be happening at the same time as these other events, what's the probability of those. It seems to be an enormously complicated issue that one would have to address to set the thresholds at some other level and I wonder at the end of the day if you're really going to be able to say that they're based on risk rather than some other criterion.

You've raised an issue that's a legitimate one. I just don't know how to solve it in a way that's consistent with the philosophy that you've advocated and that we have accepted.

MEMBER SIEBER: Well, I think to start off with, it's even more complicated than you describe because when you go through that process and not look at performance indicators in isolation, all the thresholds end up being plant-specific and that adds another degree of complexity to it.

It would seem to me that the further away that you get from the current method of doing it which gives answers that are thresholds that aren't particularly meaningful, the less risk-based you become. But I concede to myself in thinking through this problem is that really what the reactor oversight process is is a management tool to identify and escalate performance that isn't up to par and once it's identified through the inspection process or by crossing into a white threshold that puts you into the action matrix where additional attention occurs, and until I get to red thresholds, the Commission ordinarily would not be taking an action by issuing an order or something of that nature.

So I think that the oversight process even the way it is right now will function. The question is when the public or the technical community look at these thresholds or licensees, do they have that hidden smile on their face and we really have to be bad before you get to this level.

Perhaps Doctor, you may want to add to this --

DR. APOSTOLAKIS: Mr. Chairman, the bottom line of our recommendation is that at this time anyway the performance indicators for initiating events and mitigating systems should be decoupled from risk. There will be measures of performance where performance is defined as -- it was defined by the original -- I believe it was 007 or 0007 report,

namely, they looked at the performance of all the plants, of all the units and they took the 95th percentile. They said if you are below this, your performance is acceptable.

This is the message we're getting from the performance indicators and what we're saying is you define this green/white threshold that way, but then when you went to white/yellow you switched the risk. Don't do that. Find another way related to performance to define these additional thresholds which creates now some inconsistency between the performance indicators and the significance determination process which is risk-based and that's why it's really very important to make sure that we all agree that the white in the initiating event performance indicator means similar things as a white in the SDP because they are treated interchangeably in the action matrix.

I'm not saying it's an easy problem, but essentially the answer to your question is yes, we are decoupling the performance indicators from risk.

DR. KRESS: And one of the reasons for that is we have searched for ways to actually do this risk significance and I think you put your finger right on it. It virtually is impossible to do it at this time. We cannot come up with a technical way to relate to sample of things to the actual change in risk that you would get. That's a very difficult problem.

DR. APOSTOLAKIS: Of course, in an ideal world one would have a PRA, get the input and then get it on the CDF.

(Laughter.)

But even though the work is not ideal --

CHAIRMAN MESERVE: That's a great unified theory.

DR. APOSTOLAKIS: Well, they've been searching for it for 60 days.

(Laughter.)

CHAIRMAN MESERVE: But it seems to me that you've solved this problem, but then you've shifted in the whole of the action matrix is sort of premised that these thresholds have a risk basis, and so now you've got two of the categories performance indicators where you're admitting up front they don't have a risk basis.

How do you say you've acted in a fashion that's consistent in applying those nonrisk-based performance indicators against other things you're getting out of the significance termination process that are all guided by risk to show consistency?

DR. APOSTOLAKIS: And this is related to recommendation for checking the consistency of the colors. How to do that, well again, it will be an expert judgment process, but at least you will be asking the right questions. We didn't, I hate to say, we didn't supply the answer because Commissioner Dicus will use it against us, but this was the issue really. I mean maybe we have to revised the action matrix. Some of us felt that we should, but the Committee's position was not to say anything about it.

DR. KRESS: Well, some of us felt that in the significance determination process it is possible to determine the risk and that maybe that ought to be risk-informed and a different set of considerations than the performance indicators and that was one thing we discussed was the possibility.

DR. APOSTOLAKIS: But also -- I'm sorry.

DR. KRESS: Go ahead.

DR. APOSTOLAKIS: Even if you look at it now, I believe the actions are really driven by the SDP findings. Is that true, John?

MEMBER SIEBER: I think so too.

DR. APOSTOLAKIS: It's not the PIs.

MEMBER SIEBER: And I don't really see an inconsistency by having part of the Reactor Oversight Process as performance-based and not necessarily

risk-based and another part of it being risk-informed because it's supposed to have elements of both. I think that that's a legitimate approach. I think you will accomplish your overall goal of management if that's where it is we ultimately end up.

DR. APOSTOLAKIS: There were some ideas discussed around this, but we failed to have a committee position, unfortunately.

CHAIRMAN MESERVE: One other issue that has come up in our previous discussions of performance indicators in various contexts, and you haven't mentioned at all which is the issue of leading indicators versus trailing indicators and ideally, we'd like to have lots of leading indicators. Is this something that you're continuing to evaluate. Do you have any advice for us?

MEMBER SIEBER: We haven't given you any specific advice and I guess I can only speak from my personal appearance. In

order to develop some kind of leading indicators in a real actual power plant, you end up looking at 200 to 300 indicators to say I see declining performance here and sooner or later this is going to lead to trouble. When you do that, you get into observation of administrative factors and how managers manage and that's really not practical for -- in my view anyway, a regulatory agency to be in there attempting to manage the plant. So I think that with the white thresholds and performance indicators you will have some idea that a plant is headed for problems just because of the way they're set and this is the way the industry groups do it also. But perhaps without getting into all this detail down in the functioning of various departments in the plant, you would -- might be the best thing, you know, the best you can get out of the set that you have. They are not leading indicators in my opinion, except to the extent you can tell a plant this performance is declining.

CHAIRMAN MESERVE: Dr. Kress, you gave us a summary of where you are. And let me push you just in one area. Are there any issues that came out of your examination of gaps or problems and our capacity to deal with advance reactors of which the staff is not aware?

DR. KRESS: No.

CHAIRMAN MESERVE: I mean is there anything we should push you to raise with us now?

DR. KRESS: No. I'm absolutely certain the staff is just as aware of the various issues as we are. So I don't think we came up with any new ones that -- we may put different priorities on them than the staff --

CHAIRMAN MESERVE: Good. Thank you.

DR. POWERS: Well, I think it's fair to say more than that, we did participate in one of the staff's workshops to share information to assure that there's a pretty good consensus of what the issues are.

DR. KRESS: Yes.

CHAIRMAN MESERVE: Dr. Wallis and Dr. Powers, I'd like to just take you one step further. You got right to the threshold of saying you think there should be an SRP. Didn't quite say it. Should I push --

DR. POWERS: Well, we think there's an SRP.

CHAIRMAN MESERVE: Okay, thank you.

CHAIRMAN MESERVE: Commissioner Dicus.

COMMISSIONER DICUS: Thank you. I had three short and easy questions but he just asked one of them so now I only have two. I was going to push you to the threshold too, but you bumped up against it and you didn't quite step over it.

On future plant designs on the NUREG you said you identified perhaps a couple of dozen regulatory issues. I want to ask you to elaborate beyond that. I think you want us to read all about it, so I'll wait to read all about it. But involved in there, were there any policy issues?

DR. KRESS: Oh yes.

COMMISSIONER DICUS: So the regulatory issues are policy issues?

DR. KRESS: It's policy and technical issues.

COMMISSIONER DICUS: Okay. Well, maybe I will push you a little bit then. We'll wait and read about it.

DR. KRESS: I have the list with me but I hated to pick out any one because we haven't prioritized them. In general, it seems like what is the role of a prototype test in the regulatory area. It's really broad issues. How do you deal with defense-in-depth and a system like the pebble-bed modular reactor. It's the standard list, but I think having them all written down in one place is going to be helpful.

COMMISSIONER DICUS: And I guess the only other question then I will have is you mention that there had been quite a few open items on the Hatch renewal application. Was that the -- if you want to go into it, something with the kind of application of the fact that it was the first BWR?

DR. BONACA: No. There really wasn't much to do with the fact of the BWR. It just simply -- I think the licensee first of all took an approach in the scoping process that was different from the one used afterwards. It was function based. Therefore, it made it very difficult for a reviewer to understand what components were in scope and which were not. There was the beginning of the difficulty there. Since it was function-based and the function identified may not be the principal function of the system, okay the system may have been in scope, but then was put within the function that was normally not thought about, so that caused a couple of problems. One is the significant number of RAIs that the staff had to go through.

And then of course, there were other issues of interpretation that the applicant made. I think in part seems to me, at least as a personal observation, it depends very much on how an applicant has gone after the previous application and look at success criteria to determine which way they're going to go and how an applicant may choose, in fact, to challenge that

resolution and to go its own way. So that was, I believe more of a choice of the applicant than anything else.

COMMISSIONER DICUS: Okay, thank you. That's it.

CHAIRMAN MESERVE: Commissioner Diaz.

COMMISSIONER DIAZ: Mr. Chairman, what a pleasure to be in front of you again. It seems like it's been a long time. Let me start with where the Chairman was dabbing at in the PIs and the significant determination process and of course, having been a professor, I like to preface things with a statement. Heterogeneity is not bad. Not bad at all. In fact, I don't know anything homogeneous that functions well, not a reactor core, not a transistor, not a society, so having one part that is essentially

performance-based and one part that is risk-based or risk-informed, actually seems to complement each and is the total that we look at and not any one of the parts.

Any comments?

DR. APOSTOLAKIS: We have not said anything in the letter that would make you say things like that.

(Laughter.)

We fully agree and in fact that's why decision theory has been developed to deal with multiplicity of attributes and that's why the Committee, in fact, decided not to state what would be the way to do that. But when you have heterogeneity, as you identify them, you have to have some internal consistency. White here must be the same as there, unless your action matrix doesn't something else. The way it is now though, all it says is if you have two whites here under the same -- what is it, goal -- or if you have a yellow, no matter where they come from, do this. Well, the question is then because of the heterogeneity, are we sure we want to do that? And white has been the same thing -- that's all we're saying. And I think we can think about it and come up perhaps with different bands or something. But there is nothing new. You're absolutely right about this.

COMMISSIONER DIAZ: Yes. And I think what we should try to do is from my viewpoint is to strengthen that process, not make it homogenous, actually make sure we understand when we are in one mode and in the other mode and when the total gets together, that it has the proper strength.

I think this -- we need to understand this as a regulatory tool, so it's not just a management tool.

DR. POWERS: I think that's a very important point to bear in mind before you devote huge amounts of resources to resolving issues of two whites and their equivalency or lack of -- the outcome of the action matrix, the NRC doesn't say anything about the plant unless it happens to hit red and then you guys get -- you're so involved, I don't think you need the action matrix at red. But short of that, really deciding on how you marshal your internal resources from the action matrix and whether you want to devote enormous amounts of effort to assuring out to three significant digits who have consistency across these definitions, maybe you don't need to have that kind of --

COMMISSIONER DIAZ: But we need and I agree, we need to be able to understand them and be able to say which one is in which base and then I think that's important.

DR. APOSTOLAKIS: And I think, Commissioner, you're managing now to push us to the point where internal disagreements will start surfacing.

(Laughter.)

So you have another question, I would really appreciate it.

(Laughter.)

COMMISSIONER DIAZ: See, I have never been known to do that.

(Laughter.)

But I might start in the future.

DR. APOSTOLAKIS: But it's something we are agreeing with you or you are agreeing with us.

COMMISSIONER DIAZ: I'm agreeing with you, of course. Yes. All right. I might make a comment in here. Just to make a point that the brief duration presentation was appreciated. I think it was directly proportional to the fact that the Chairman's comments were very short.

(Laughter.)

DR. APOSTOLAKIS: As opposed to the past Chairman here?

(Laughter.)

COMMISSIONER DIAZ: All right, let me to go the next one because I think we're all getting tired and punchy in here. On the issue of the conclusions regarding plant design and the Chairman touched on it. There was no specific recommendation that you have on that issue?

DR. KRESS: Not at the moment.

COMMISSIONER DIAZ: On the issue of the -- getting an SDP for low power and shutdown, an issue that I know is close to your hearts and not so much to mine, have you narrowed down something that is specific and simple and doable in getting an SDP for low power and shutdown which does not include the rulemaking? Have you narrowed that down to a point where you could say yes, there is something that can be done that is meaningful and that will serve the Commission?

DR. APOSTOLAKIS: Dr. Powers?

DR. POWERS: We have not. The viability of doing that though, we're confident in, because the tools that licensees are using to organize their shutdown processes have this color component to them of rating the various levels of risk that they're tolerating, even though it's qualitative. It's clearly doable. Whether you have all of the regulatory handles that you might want to have to address that is probably something that I'm not competent to answer. I suspect you don't, but on the other hand, I suspect you have sufficient licensee enthusiasm that they may be able to come forward with their own approach on this and an NEI approach on here's an indicator that our shutdown operations are indeed proceeding safely for you, because they're having tremendous success, as you're well aware and it appears that these tools are suitable for controlling a process and they would be equally suitable, I think, for evaluating the process.

So the doability exists. We haven't done it.

COMMISSIONER DIAZ: Okay.

DR. KRESS: The point I'd like to make there is when you have an event during shutdown, you do have one point snapshot in time configuration of the plant that you can identify and you can determine the risk significance of that through normal PRA processes. When we complained about not having the risk implications of shutdown, it's different than that. It's considerably different. What you're interested in there is over the lifetime of the plant, during all of its shutdown configurations, how much risk does it add to the system? Those are unknown configurations and they're different at each snapshot in time and it's not something you can simply stick in a PRA. So the two conditions are quite different from each other. We think a significant determination process can be done with current PRA technology. It just has to be done.

COMMISSIONER DIAZ: Which, of course, brings to heart the issue of the quality of the PRA, keeps coming back. We heard that before, the quality of the PRAs. That's something that will be raised in the near future.

Let's go back to the public involvement in the license renewal process. As you know, we're all now struggling with the fact that in the new -- after September 11th, there are things that really don't appear to be appropriate or right now to be in the public domain. However, the Commission keeps wanting to make sure that we provide the appropriate information that doesn't compromise the national security.

Has the Committee deliberated on the issue of the license renewal? Are there any components in there that you believe are appropriate to maintain very open in the process, any changes? Is that something you have looked at?

DR. BONACA: The question is referring to license renewal?

COMMISSIONER DIAZ: License renewal, yes.

DR. BONACA: Well, I think if I look at the process by which you identified the components for the aging management programs, I don't think there is anything that should prevent really access from the public to the information in the process itself. I mean it's just -- as I said before, we are using categorization processes which already exist at the plant to identify the components as separately related or supporting those and so I don't see how the information would be useful to somebody who wants to harm the plant.

DR. APOSTOLAKIS: I guess this is a case where it's a good thing that the rule is not

risk-informed.

(Laughter.)

DR. BONACA: Although I think the staff has been diligent in including considerations of existing IPEs or risk-informed information to pull components into that, but if you look at the actually the way the applications are developed, it's really a painstaking development of results of evaluations with no judgments regarding safety significance.

DR. POWERS: Subjecting someone to going through carefully the entire GALL report may be the biggest deterrent to terrorism at nuclear power plants.

(Laughter.)

DR. BONACA: I must say any one of the applications too.

COMMISSIONER DIAZ: Okay, a very quick last one. Dr. Wallis, on the power uprates, the confirmatory analysis that you have raised, is that a substantive issue on the -- in the actual decision making or is it a process issue?

MEMBER WALLIS: We are reaching decisions based on what we see and I think we can do it. We have raised questions about the boiler aspect of power uprates and there is actually a research program RES is initiating to do that, so in the long run I think we expect the maybe questions. It all looks so easy now. When you start approaching limits this way and this way and some way, the interactors are something you have to worry about. It's a feeling we have. And I noticed there is a research program starting now to address that.

One might ask about -- this is going to give some confirmatory results down the road. It might be nice to have them now, but we don't have them yet.

COMMISSIONER DIAZ: Okay, all right, thank you. Last comment. Now that I said it, I think I want to take back that I did agree with you, that would not be true to my form.

(Laughter.)

Thank you, sir.

CHAIRMAN MESERVE: Again, I apologize for our late start, but we very much appreciate the time you spent with us. It's been very helpful as always. With that, we're adjourned.

(Whereupon, at 3:04 p.m., the meeting was concluded.)