UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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MEETING WITH THE ADVISORY COMMITTEE

ON REACTOR SAFEGUARDS (ACRS)

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Nuclear Regulatory Commission

One White Flint North

Rockville, Maryland

Friday

April 11, 2003

The Commission met in open session, pursuant to notice, Nils J. Diaz, Chairman of the Commission, presiding.

COMMISSIONERS PRESENT:

EDWARD McGAFFIGAN, JR., Member of the Commission

JEFFREY MERRIFIELD, Member of the Commission

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STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE

DR. GEORGE APOSTOLAKIS

DR. MARIO BONACA, Chairman

DR. PETER FORD

DR. THOMAS KRESS

DR. DANA POWERS

DR. WILLIAM SHACK

DR. GRAHAM WALLIS, Vice-Chairman

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

CHAIRMAN DIAZ: Good morning. I don't know whether it is reward or punishment that my first meeting as Chairman is with the ACRS. But it is certainly a pleasure to start this type of my activities with you guys. I was thinking what intelligent words I could say to begin with but I could not find any. So I believe that Commissioner Dicus is not going to be with us so I want you to notice that this meeting is heavily oriented to the left. Commissioner Merrifield is always so much to the right that he balances that end over there. Commissioner Merrifield.

COMMISSIONER MERRIFIELD: As I have told the Chairman, part of my background when I was in college I took some acting classes and did some acting. I view it as being stage right from this perspective. So I'm always happy to be to the Chairman's right to that regard.

It is a pleasure to be here. I want to make two comments.

One relating to the ACRS. We had a very good opportunity to be involved in the celebration of the 500th meeting of the ACRS. I know I personally appreciated the dialogue that we had and I think we learned a lot through those discussions and hopefully will enhance the cooperation and usefulness and utility of that dialogue in the future.

The other comment I want to make is, I think, fitting that this is, in fact, the Chairman's first meeting. The President has chosen the Chairman to take our agency forward over the coming months. I think that was a wise choice and I wanted the Chairman and everyone to know certainly my strong support for the Chairman. And I will certainly be doing everything I can to make his chairmanship here a success because that is ultimately important for the success of the agency as a whole in the service that we provide to the American people to protect health and safety.

So I did want to make that comment and issue my public congratulations to the Chairman.

CHAIRMAN DIAZ: Thank you, Commissioner Merrifield. Now, we go back to business.

I also congratulate you on your 500th meeting of the ACRS. I'm sorry I could not come to it. I understand it was a grand meeting. This takes over almost 50 years of history and also for the record, I would like to state that most of you have not attended those 500 meetings. And that, therefore, you maintain some sanity in your endeavors.

We have interacted many times over the years and you know your role very well and you are to advise the Commission with regard to potential hazards with regard to emerging safety issues. The emphasis is providing sound technical advice to the Commission.

I believe that you know that I have some specific views on your activities and now that I have this little thing in here, I'm going to make them better publicly known. I think that you enhance and complement significantly the work that the staff does by conducting your reviews which go to a level that sometimes the staff does not have the time or is just really not pointed in that direction. I think that is a very valuable exercise.

I also believe that you should serve as an integrator of key issues. You should really look at all of these technical issues that are taking place and not only zero in on the one that consumes you or the staff but how they relate to each other, how they come together to provide the best set for the Commission to use as they make policy decisions.

There might be things that might be lagging or might be leading and so sometimes it is important for us to know how we need to deal with those issues in the proper perspective, not just sometimes a single issue but more than one issue. I think it is

your experts -- one of your things to discriminate what is important and what is not, not get lost in minutia. I do believe that there are areas, that the areas that have sufficient maturity, there are times, sometimes to let them go and let the staff work on them. I know you are going to talk about that today.

From the many learnings that you have done, it might be a time as the Commission refocus some of their safety activities and there is a bunch of new things that were done on March 31st, I believe, as a way of not only saying goodbye to Chairman Meserve and thank him for his many contributions, but also as a way of going forward with the Commission's work in the safety area.

There is some very interesting issues that were put forward including the 50.46 and 50.69 and a few other things. I look forward to working with you. I think that we have the best advisory committee that any regulator can have and I look forward to challenging you. And with those statements, I now turn to you for your briefing.

DR. BONACA: Thank you.

Before I start with the presentation, let me congratulate you for your appointment to Chairmanship of the Commission. I speak on behalf of the whole committee. We have enjoyed working with you in the past and are looking forward to supporting you and the Commission in the future.

My presentation today -- well, the presentation we have ready consists of four individual presentations. The first one is going to be an overview on my part of the ACRS activities, current activities, future activities and then sunset activities that speak to some of the issues that you raised beforehand.

After my presentation, Dr. Kress will give you an overview of ACRS activities in the advanced reactor design area. We will have some notes from Dr. Shack on the PTS

reevaluation project. And finally, Dr. Ford will give you an overview of the 2003 report on the NRC research.

Page number 3.

My overview this morning will cover six topics. First of all, the 500th meeting celebration and then the quadripartite meeting that we held with our counterparts in Germany in October 2002. Page 3 please. License renewal activities, core power uprates, summary of future ACRS activities and, finally, sunset activities.

Before I move on to the next slide, I would like to point out that the 500th ACRS meeting celebration on March 4th and 5th, 2003, was a very successful symposium. And on behalf of the committee, I want to thank the Commission for the support we got. It was a success because of your participation. It's as simple as that and you know that. I think that in addition to making it a success, I think there were lot of insightful observations, respectfully presented both by the Commissioners and by past members of this committee. It was very valuable for us.

Particularly, those observations in the direction of the committee and productive activities are valuable to us and certainly, we are planning to have specific discussions of those initiatives and thoughts also when we get to our ACRS retreat.

Page 4.

In October 2002, we participated in the quadripartite meeting in Germany with our counterparts from Germany, France and Japan. We also had invited observers. They were from Sweden and Switzerland.

The topics we chose, the four categories presented here, were discussed ahead of time. And I believe in the discussion among the safety review groups, clearly, they came up as the four areas of highest interest right now in all the six countries actually.

So I think there is some message there of what the regulatory agencies in all these countries are focusing on. Topics were safety culture, the first one. Just a few words on that.

It was a very interesting session. Clearly, there was a consensus on the perception that -- that the recent impact on safety operation coming from safety culture, whatever definition we want to give to it -- in fact, we discussed the issue of a definition and the difficulty in coming up with a definition that would be functional and also would be acceptable to different countries because of different attitudinal and behavioral situations that you have in different countries.

We all agree that irrespective of the complexity of the issue, it is important that we need to understand it better, we need to try to understand the elements of it and what can be done to probably better monitor performance in those areas.

The area of probabilistic safety assessment, there is now everywhere a full consensus of the value of PSA to identify liability of power plants. There is no consensus, as you know, on the value of PSA in eliminating unnecessary regulatory burden. In fact, some of the members, France, for example, is very adamant about not using PSA in that way. And there is still some level of, I guess, suspicion of possible manipulation of results or whatever. We had an interesting debate on that. Of course, we have a different belief here and we presented that.

In the area of thermal-hydraulic codes, much of the focus was on the transition we intend to make to best estimate codes and the necessity of skilling those codes even better on the issue of uncertainties just because since you are not dealing with conservative approach to it. Uncertainty has become ever more paramount in the application of the results of those codes to regulatory decisions.

And finally, we spoke about stress corrosion cracking. We all recognize the continuing concern with alloy 600. But not only on alloy 600, the stress corrosion cracking affects materials in general. And we pointed that out because some of the members, particularly France, is very adamant focusing on alloy 600.

There were different perspectives there regarding how to approach these issues. Significant discussion on how, for example, the approach we took in the U.S. to visual inspections of the head of reactors in the 90's, different from the approach taken in France where volumetric inspection was inspected from day one. And in that debate, we presented strongly our perspectives. But at the end of the day, you realize how valuable these exchanges are because you are learning something. I mean, you find the full community there that is a sister community and they think in a different way. So I'm speaking about the benefit of this quadripartite.

I was not skeptical about it but I came out with much more than fulfilling my expectation than I came in with. And I reflected on that quadripartite quite a bit flying back. I mean, I spent a few hours thinking about some of the issues because of this different way of thinking about regulatory approaches.

At the end of the meeting, the ACNW members participated in the discussion of waste management issues. So there was a closure of the quadripartite. And again, valuable meeting and I think that it was well spent time.

Page number 5.

On license renewal this is just an update. We have reviewed three applications since July 2002. That accounts for ten plants. There was Catawba and McGuire, there were four units; North Anna and Surry, four units; and Peach Bottom, two units. So we see how different units on different sites can be effectively covered with an

application.

Page 5, please.

We plan to review five applications in 2003. We have already reviewed St. Lucie. In fact, yesterday, we had a subcommittee meeting -- two days ago, actually.

We are planning to issue our response to an SRM regarding improvements to generic license renewal guidance. We will have -- there aren't many surprises there but there are certain insights. One insight that we will bring has nothing do really with improvement to the guidance but is the future inspection of commitments. We feel that realizing how many commitments are in place to be verified for each application, and realizing that most of these plants would move into the license renewal period in a window of approximately seven to ten years.

That will be a significant demand for NRC staff for inspections as well as significant effort of verification that commitments which are right now, in many cases they are promises, because in many cases they are not finalized commitments. There is a commitment to an action.

The action would have to be not only very ... implemented but also its effectiveness has to be somewhat evaluated. So I think it is going to be significant by way of efforts on the part of the NRC staff.

We have streamlined our review of license renewal applications and we feel very comfortable now. We have gone from two subcommittees and two full committee meetings and two reports per application to one subcommittee meeting, one full committee meeting and just one report.

And as we move into a standardized process, Fort Calhoun will be the first one coming our way, we will consider additional ways of being more effective and efficient

because this is taking a lot of our time. But as you know, this is a statutory activity and we need to perform it. And also, I think it is a significant action and I think there is a value to a detailed report on the docket that addresses our involvement in that activity.

Page 6.

Core power uprates. We have reviewed -- as you know, we are not reviewing any more power uprates up to 5 percent power.

We have reviewed the SRP in its preliminary form before it goes out for reconciliation of public comment. I believe we reviewed it at the December meeting and we are quite impressed with the document. We believe that it will help very much to standardize the process and make it effective and give less importance to our review. I mean, because it will become much more of a standardized process.

We are planning to review seven extended power uprate applications in 2004. We expect to see some PWR applications. We haven't seen any yet.

We will plan to revisit the need for ACRS to review all power uprate applications once review criteria are established and the staff and the process are stabilized because at some point we probably will not have any other residual value to add. This is not a statutory activity.

Page 7.

With regard to future ACRS activities, we are involved currently, as you know, and we will be involved in advanced reactor reviews. Dr. Kress will speak about those.

Certainly, we are ready to participate in the early review of the early site permit process and applications.

We are going to be involved in thermal-hydraulic codes. Again, TRAC-M,

the involvement that TRAC-M is going to have for advanced reactors. But also RELAP 5, a review of important code by a vendor. TRAC-G. TRAC-G is going to submit this code for our evaluation. Also for the AP1000 there is a number of confirmatory tests as well as some of the questions regarding passive features that require thermal-hydraulic evaluations.

In the area of risk-informed regulation, of course, you know how committed this committee is to a transition to risk-informed regulation. Our involvement is broad in many ways both in the quality of PRA and in the need for standards as well as individual application. 50.44, we just reviewed that yesterday. 50.46, PTS reevaluation that we consider such a success and Dr. Shack will discuss this later. And then, of course, the importance of development of framework for advanced reactors that is risk-informed.

The reactor oversight process you know our interest. I mean, it stems in part also from the experience of Davis-Besse. We have chosen not to have another Davis-Besse evaluation. There was an intent on our part -- I mean, there have been so many task forces and reviews that we could not add another line regarding specifically Davis-Besse but we have two activities, really. One is technical involvement in the issues that led to Davis-Besse and the resolution of those. And the other one is the issues regarding reactor oversight process. Is there anything that can be done to improve the reactor oversight process?

You have already received a report from us with some recommendations regarding the reactor oversight process and some of the differences we have with the staff. And of those we also have the bullet regarding the cross-cutting issues. And that was really in part a reflection coming from the Davis-Besse situation.

I will not speak about PRA quality. I already mentioned that before. You

know that we are involved in those reviews.

Page 8.

We have activities on vessel head penetration cracking and degradation. We have scheduled a subcommittee meeting coming up this month. And we intend to participate in reviewing the activities of the staff and contribute to that.

We have had two meetings, I believe, on mixed oxide fuel fabrication facility. That facility, the design is proceeding. We are going to be involved in that. Clearly, the risk of the facility eliminated by fire and we are going to be quite involved as the design becomes much more specific and close to the construction.

We have a full plan for security and safeguards matters. We have already had two meetings but we have a number of meetings scheduled for this year. We are going to be heavily involved in that.

Finally, we will plan to review the American Nuclear Society standard on low-power and shutdown risk whenever that becomes available.

These are just some of the measure areas that we see coming from the Commission and from the staff and that we are planning to be involved with.

Let me move on the Page 9.

Under Pages 9 and 10, I have listed some of the criteria we are using to sunset activities. Now, sunset in some cases is not an appropriate word. In some cases, I mean, we just simply go through some criteria. I have listed, for example, on Page 10, to determine what issues that the staff is presenting to us we are not going to review. We now are reasonably selective. We write what we call Larkins grams, which is a brief statement that says that we have chosen not to review some activities and reports and so on. And the criteria I have listed here are reasonable criteria and we try to exercise them as

much as we can.

The examples of activities that we have sunsetted are revisions to 50.55A. We incorporate by reference ASME court cases. We do not review those. Revisions to Part 26, fitness for duty, we chose not to review those anymore. Revisions to Appendix C, emergency plan, we do not get involved in those. Prioritization of GSIs, we do not get involved in the prioritizations of the GSI and minor revisions to existing rules and regulatory guidance documents.

Now, I mentioned before our uprates. That is an opportunity for sunset. And certainly, we will explore it and whenever we can take the opportunity, we will because, again, it is an activity that takes a substantial amount of our time.

I would like to say, however, that we are involved in proactive activities. Some of them are time-consuming and we have some reports that have been in creation for months now and having full debates, whether or not to issue or how to issue. So, I think although we have a reasonably full plate, I don't think that is an impediment to the initiatives that we have underway.

And this completes my presentation.

CHAIRMAN DIAZ: Thank you Mr. Chairman, you want to continue?

DR. BONACA: Yes.

And Dr. Kress now will have a presentation on advanced reactor designs.

DR. KRESS: Thank you, Mr. Chairman.

I plan to give basically a status report on some of our activities with respect to advanced reactors.

On slide number 12 some of our recent activities have involved the early site permit process, options for resolving policy issues, and the AP1000 certification review.

So I will say a few words about each of those in that order.

Page 13, Early Site Permit activities. Our first meeting on this was back in November 2002. It was a particular briefing to get us started in this area. We heard from NEI on their approach to early site permitting which I could conceptualize as being the plant parameter envelope concept. And we also heard from the staff of what was their early thinking on how they would go about developing a review standard for these. They had not gotten very far on that yet. So this was a briefing only and no report.

Subsequently -- next slide, please -- we had a full committee meeting not too long ago, March 2003, which we did have a good final -- it was not final but it was a good draft of the proposed review standard from the staff. And we did have a report on that.

And in that report, we were very pleased with the standard. We thought it was very appropriate for reviewing the ESP applications and that it would give the staff the information they needed to make their assessments. It would also accommodate very nicely the industry's proposed use of the plant parameter envelope.

When we reviewed this standard, we were particularly interested in determining whether or not the ESP would limit the site to an advanced reactor or could an ordinary current LWR be built there, and our assessment was that it would have to be an advanced reactor. That it would be limited to that.

We also were particularly interested in whether or not sites that might be marginal from the standpoint of population changes, population distributions or emergency response could be identified in the process and perhaps care taken as to whether or not that site is really appropriate. We think the process along with siting regulations we have will identify those. So they alleviated our concern in that area.

Slide 16.

The next activity we were involved in is policy issues for future non-LWR reactors. I believe you just recently received the SECY on this outlining the staff's position on these. We had an earlier draft of that SECY. It was pretty much the same. It had not changed much since our earlier draft.

I don't really think we have time to go into what each of these policy issues are but as a summary of our report that we wrote in December of last year, we thought this was a very thoughtful, good effort by the staff. That they had identified the key technical issues that would arise in the certification process of the non-LWRs and in particular the HTGRs.

And they had a number of preferred options on how to deal with these policy issues and we very much liked those. I guess it was because they reflected positions that we had previously expressed on those kind of issues in various areas. So we did like that.

Third area was our activities associated with certification of AP1000. There is no need to remind you that it is being done in three phases. Phases 1 and 2, our reviews associated with those are complete.

Phase 2 was to look at a number of key issues associated with certification that the staff and Westinghouse had identified. We agreed that these were the key issues.

We added another thought and raised a flag on the issue of scaling. Scaling of the tests to validate the codes and scaling of the codes and the tests with respect to the full prototype size. That had to do with the use of PI-groups ranges in deciding that the scale was okay. We have yet to see a good technical justification for the range used although it was intuitively very good. So we asked staff to do some confirmatory work.

This is not an issue that we thought would be conditional for either the

AP600 or the 1000 but would be a confirmatory issue that confirms that this range of PI-groups are appropriate to say that the scaling is done correctly.

We are now in phase 3 which is the actual design certification phase. And we met with Westinghouse in November of '02 and we had a PRA subcommittee in January. And we thought -- it was our opinion that this was a very good PRA, a good quality PRA. So we did not have a lot of problems with it. We thought it was appropriately used and that was the appropriate level.

The one issue we raised was they had a reliability value for their ADS-4 squib valves operational. We think it's very important that the ADS-4 valve work correctly. Not go when you don't want it to and to actually go when you do. So we questioned the database behind them and Westinghouse has promised to get back with us to show us the database which is based on the reliability data -- we have yet to hear about that.

In our thermal hydraulic subcommittee, we agreed with the staff on three issues that need to be further explored. First one was the entrainment of liquid as the ADS-4 valve depressurizes the system and train it through the valve itself and off the top of the core as the water level decreases.

The more entrainment you get, the lower the level of the water goes in the core. We did not think they had appropriate entrainment models in the codes. There were tests being done at Oregon State. We are very interested in seeing the results and how they factor into this. We have yet to see those.

We think this is a very important issue because some of the calculations show that the water level in the core does decrease significantly. It uncovers a considerable amount of the core in the AP1000 because of its higher power. And the calculations with the codes show that this is not a problem from the standpoint of cooling

the core. This is the collapsed water level is pretty low and there is water at various quality levels higher up and the cooling is, according to the codes, is effective in keeping the peak plant temperature below the regulatory requirements.

But it is close and we would like to -- and it's sensitive to this ADS-4 and the top of the core entrainment. So we want to be sure that that is dealt with very nicely and that the uncertainties are dealt with.

The other issue which was raised, not by us but by the staff, was the potential for boron precipitation. As you blow down through the ADS-4, you really concentrate the boron back in the water that's left. And you can concentrate it to the extent that it will get saturated and precipitate out and can cause lots of problems. It can plug up the cooling passages, can plug up values and can do things that you don't want.

And the question is how are you going to deal with this issue. Is it a problem? How do you calculate it? And it may not be easy because you can scope the range of possible concentrations you get but it looks like you will saturate even with that range. So the question is where does it precipitate out? Where does it go? Does it stick at various places?

So I think it is an issue that needs to be dealt with. As far as I'm concerned, it's those two issues there that are at the moment the real issues that we have to deal with for AP1000.

We also raised the issue of sump strainer design. I don't think it will be much of a problem because AP1000 is very careful to use reflective insulation but they do have paints that can flake and we are interested in the sources -- what are your full sources of debris that could block the strainer and how have you dealt with it in terms of sizes of strainer or other ways to deal with it.

We plan on having some additional meetings to deal with these particular issues and talk about containment, materials and other items. The next one would be in 7/03.

If we don't think these issues that we still have are dealt with appropriately by the end we will write an interim letter -- if they are dealt with appropriately, we may not have such an interim letter. We are expected to have a full committee, final report in 7/04. So we will certainly meet these schedules.

With that, I will close and turn it back to you, Mr. Chairman.

DR. BONACA: Next presentation is from Dr. Shack, Pressurized Thermal Shock reevaluation project.

DR. SHACK: The pressurized thermal shock evaluation has been a major effort by the research staff and an important technical review for us. Pressurized thermal shock is an issue that arose in the early '80's. It arises because the reactor pressure vessel becomes embrittled by radiation and when it is subjected to an over cooling incident, the rise is the possibility of a fast fracture or a brittle fracture of the pressure vessel.

At that time period, we established a rule, Pressurized Thermal Shock Rule 50.61, that I believe did successfully provide assurance that reactor vessels will have a low likelihood of failure due to pressurized thermal shock. Successful in addressing this issue for most reactors during their current licensing period, virtually all reactors will meet the screening criteria that were established that essentially established the degree of embrittlement that could be tolerated by the vessel. They will all withstand that during the current licensing period but a number of the reactors will face a problem in meeting the screening criteria during a license renewal period. So it becomes an issue of considerable importance to those reactors.

The rule did establish a way, once you violated the screening criteria, to go through an analysis to demonstrate that, in fact, it was at least a potential for further safe operation through a reg guide, 1.154. But when people attempted to use that the first time at Yankee Atomic it was not successful. There were a number of problems with it and both the staff and the industry realized that additional work needed be done in order to come up with a viable technical basis to extend the range of embrittlements we could tolerate and still demonstrate adequate assurance of vessel integrity.

The staff undertook a major review of the technical bases for the Pressurized Thermal Shock Rule. To do this they have to look at the events that can lead to rapid cooling of the vessel. You have to understand the pressures, temperature and heat transfers that occur so that it's a thermal dynamic or a thermal hydraulic problem as you look at the response of the vessel to the thermal hydraulic transient.

Once you have established these pressures and temperatures, you have to evaluate the embrittlement of the vessel, you have to understand the flaws in the vessel and the thermal stresses that arise in the vessel. And then you have to be able to combine this whole analysis and integrate it through a probabilistic fracture mechanics analysis that gives you essentially the likelihood of pressure vessel failure.

Next slide, please.

In the current reevaluation studies, the staff established a much more complete description of the sequences leading to pressurized thermal shock. There were a number of insights there. In the original analysis it was thought that main streamline break incidents were the main contributors to pressurized thermal shock and that LOCA was essentially a negligible contributor. A more complete reanalysis shows that main streamline breaks were relatively unimportant and LOCAs were, in fact, the largest contributor to the

over cooling incidents of concern.

They also developed more realistic distributions for the flaw density and geometric to give you a more realistic picture of how the vessel will behave and developed a much improved fracture mechanics code, FAVOR code, through their contractor at Oak Ridge which allows much more realistic predictions of the vessel behavior. Next please.

We believe that one of the most important contributions of the reevaluation product was a much more systematic consideration of the uncertainties and how they affect the predictions of the probability of vessel failure. And they considered the uncertainties both in the frequency of the initiating events, in the fracture toughness of the vessel and flaw distributions that could be in the vessel and in the thermal hydraulic conditions that affect the incident. Next please.

In addition to establishing a sound technical basis for PTS evaluations, they went through plant-specific studies for three plants that included two of the plants that essentially have the greatest degree of embrittlement and the greatest susceptibility to pressurized thermal shock.

They demonstrated, most of us believe, that the current PTS screening criteria are very conservative. The current screening limits really correspond to a failure frequency of about ten to the minus eight per year, when you have reached the screening limit, and of course, much less if you have not reached the screening limit yet.

The distribution of the failure frequencies are subject to large uncertainties. They range over three orders of magnitude. But through the systematic consideration of uncertainties you do have a good notion of what the mean value is, where the 95th percentile is. And you can deal and make decisions in the face of these large uncertainties.

One of the important conclusions is that for plant lifetimes of 60 to 80 years which covers the range of license renewal and even additional license renewal, the failure frequencies are still relatively low, from 5 to 10 minus 8 or perhaps lower. So there is a significant degree of conservatism available.

Again, this is only a technical basis and some preliminary work, the decision has to be made whether to proceed with the revision of the Pressurized Thermal Shock Rule.

We thought it was an outstanding multidisciplinary technical study, very impressed with the staff's work. We believe it demonstrates the utility of systematic consideration of uncertainties when you are trying to have defensible conclusions in the presence of large uncertainties which is a situation we often find ourselves in nuclear reactor studies.

Next slide, please.

And again, because of the complexity of the technical issues involved here, we support the staff's plans for an external peer review of this work and did point out that they do really need to improve and complete their documentation both to address our concerns and to support the peer review.

Thank you, Mr. Chairman.

DR. BONACA: Thank you.

The next presentation is by Dr. Ford, the ACRS 2003 report on NRC Safety Research.

Dr. Ford.

DR. FORD: The objective of the ACRS research report 2003 was to make comments on the RES document, advanced reactor research infrastructure assessment.

This document identifies technical and regulatory challenges which would have to be met as we go forward with certification of various high temperature gas cooled, advanced light water reactors.

As shown on slide 32, we confined ourselves strictly to nuclear reactor safety. We did not touch on issues associated with nuclear materials and waste issues nor safeguards. And we confined some of our comments rather briefly to various management issues such as PIRT and implementation, which are covered in the report.

Our overall conclusions were -- slide 33 -- we confined -- our conclusions were essentially that the report was very timely. All of the reactors which are considered are under currently or due to be either on the certification or preapplication review.

The coverage was comprehensive and covered all the relevant regulatory and technical issues that we could find at this time. We recognize the document is a living document and it will be updated as necessary.

It was an assessment, not a plan. In other words, the document did not put in detailed milestones and resources and things of this nature. Although it did identify in one of the appendices the work to be done in fiscal year '03 in high level milestones.

Since the time we wrote the report, there have been made available to us, but not discussed by us as a committee, the plans out to fiscal year '07 and also some details were given to your Commission last month in the RES presentations.

Reading over those, it seems that many of the comments that we made in our research report have been taken into account in these latest documents.

As we went through our comments, we were very much dominated by -- colored by the fact that we believed by the year 2020 most of the additional reactors would be advanced light water reactors. So this rather colored our prioritization that we made,

even though recognizing that some of the technical and regulatory challenges for HTGRs were very great.

Go on to 34, please.

We concurred with the RES identification of priorities in certain areas as they applied to advanced reactors. And I make that underlying statement because, for instance -- and we agreed with the probabilistic risk assessment of concerns for advanced reactors, although there were more generic concerns which we are covering in other letters.

Our concurrence was not passive. For instance, the materials we agreed with everything that they were proposing but made the recommendation that they do not relinquish the work on, for instance, materials degradation, since that work for light work reactors would apply to the current fleet and apply equally to the advanced light water reactor fleet.

Also on structural analysis, for instance, we recommended that they minimize the effects of work on risk-informed inspection for containment since that os being covered in current ongoing ASME studies.

As I mentioned earlier, we did not discuss in detail the reports on the PIRT process which they have in hand and also the implementation issues which they identified. Obviously, these are important and they have got to be addressed, resources, et cetera. But we did not comment in detail.

Slide 35.

I want to make some more specific comments on other areas and they are listed here, generic regulatory framework and so on since we had, as I say, more specific comments in these areas, and I want to discuss these in order which is not a priority. It's

just merely the order given in the assessment document.

Thirty-six please.

Regarding generic regulatory framework. We agree that the current 10 CFR Part 52 Rule is probably appropriate for advanced light water reactor design concepts. And we also agree that there is a need for a new generic regulatory framework for -- especially for the non-light water reactor concepts.

We agree the framework should be, first of all, technology neutral. It takes into account not only non light water but also advanced light water concepts. It should retain some depth and there should be a balance between accident prevention mitigation, et cetera. And there should also, we agree, be regulatory guides which are designe specific.

We do have concerns, and this is outlined in some detail in the report, about, for instance, the use of prompt fatality safety goal as a high level safety goal for these reactors. And we have identified various concerns we have for option three which is predominantly, light water reactor oriented right now. It's a good starting point but we do have some concerns and these have been discussed in early documents and reiterated in this current document.

We recognize that both the framework development and the option 3, use of option 3, development of that, is still conceptual. And we recommend these developments be completed before the certification action for any non-light water reactors.

Thirty-seven please.

In the area of human factors considerations, we recognize that there will likely be applications coming through which will demand lower staffing levels, total staffing levels because of the passive designs, automated instrumentation control which are in

these designs.

RES put forward a very complete description of all the issues associated with advanced reactors and we agree with those. But we advise that the highest priority be given to developing a defensible technical basis for judging the adequacy of the total staffing levels.

Page 38.

The thermal-hydraulic analysis estimate which RES made was extremely comprehensive and we agree with it. We notice, however, the common feature in their planned approach is the use of TRAC-M. And therefore, we strongly advise that that code, TRAC-M, be qualified and used as soon as possible. We note that they do have their Rev 00 coming out at the end of this year and we hope that that timetable is adhered to. It is central to all of their work to do with advanced reactors.

We believe that there will be significant challenges in developing the complimentary data for some of these -- TRAC-M for some of these advanced reactors.

Dr. Kress mentioned some of the issues associated with the scaling issues for AP1000. There are also issues for the high temperature gas reactor on terms of data, gas flow through porous structures, cooling efficiency for fragmented HTGR fuels, et cetera.

Associated with that data collection there will be undoubtedly associated epistemic uncertainties in the models. And given the fact that we are tending to go towards reducing excessive conservatism and going towards best estimate codes, we have got to have a good process for taking into account these epistemic uncertainties in the models.

Thirty-nine please.

We believe that in the area of neutronic analysis that it is extremely

advisable that the NRC maintain an independent analysis capability in this area.

As far as advanced light water reactor designs with passive features, we believe that we should on some priority couple the TRAC-M thermal hydraulics code with the 3-D PARCS neutronics code. And as far as the ACR-700, the modifications will have to take into account the horizontal core design and the associated uncertainty in the thermal hydraulics.

This should not be severely problematical but it will be dependent on getting sufficient design data from the applicant.

As far as HTGRs are concerned, these are issues raised by Dr. Powers in a trip report back in the 2002 era. These issues have been taken into account in the current version of the assessment document, the RES assessment document. There is, however, a critical need for prototypical data from the applicant. For instance, the question of the movement of the angular core in the pebble bed reactor.

Because of stochastic distribution of fuel density, temperature distribution, et cetera -- these are issues raised by Dr. Powers -- these will not be easy to resolve in terms of data. And therefore, we should make it very specific, the NRC should make it very specific to the applicant that the type of data that we need in order to verify our neutronics codes -- to modify and verify our neutronics code.

Slide 40 please.

In the area of severe accident and source term analysis, we believe that the current MELCOR code will probably be applicable to the passive vertical core design, advanced light water reactors. There will be some essential modifications necessary.

The question of efficient product release from high burnup fuel, that is an existing question and therefore, we must continue our interactions on the PHEBUS-FP

program.

The question of the retention of core debris in the pressure vessel remains an unresolved issue from AP600 certification. That has got to be resolved and therefore, it is critical that we continue the MASCA interactions to resolve our unknown questions about chemical reactions with core debris in the pressure vessel and within the core debris.

We have very little experience within the NRC of horizontal core configuration as in ACR-700 -- for instance, pressure tube defamation, et cetera.

Before modifying the MELCOR code, we recommend that we need the data from the applicant relevant to, for instance, fuel coolant interactions, et cetera. We have even less limited experience as far as severe accident analyses for high temperature gas reactors. Again, highlighted by Dr. Powers in 2002. For instant, the analysis of air ingression, fission product release and transport, the severe lack of prototypical data for these types of reactors. And we need that data urgently.

The next -- 41 please.

In the area of fuel analysis, it's very likely that applicants in the future will request the usage of fuels beyond 62 gigawatt days per ton, up to of the order, say, 75. We recognize it is up to the applicant to meet the safety case for his specific fuels under those operation codes. However, we do believe it is critical that NRC have its own independent fuel analysis capabilities.

Therefore, for both the current light water reactor and the advanced light water reactor designs, we must continue with our current high burn-up fuel program at, for instance, Argonne, on LOCA, and Cabri Reactor on reactivity insertions.

The different core configurations ACR-700 do present complications because they use slightly enriched uranium fuel. We believe that modifications may well be

slight to our current fuel analysis codes. However, we do need complementary data from the applicant to move forward in that.

As far as the HTGR designs are concerned, we have, again, limited experience compared to light water reactors for making the safety case for coated fuel particles. Again, limited availability of prototypical data as opposed to idealized experimental conditions. And we should start work now because it is a long lead item that is very much dependent on having a final fuel design from the applicant to work upon it.

The final draft relates to a topic which was not discussed in the research assessment. And it relates to the impact of advanced computer capabilities. We note that over the last few years, three years there has been a marked increase in the computational speeds for computers which are being used and are available at reasonable costs.

We believe that it is highly likely the applicants will be making use of such improved -- greater than a thousand gigaflops -- computer capabilities and we think that, for instance, layout design for more advanced modeling calculations and computational fluid dynamics, et cetera. We think it is advisable at least for NRC to look at the availability of these and inquire as to how that would affect the efficiency and the effectiveness of our doing our calculations as well as communicating with the applicants.

Thank you.

DR. BONACA: Thank you. This completes our presentation.

CHAIRMAN DIAZ: Thank you, Mr. Chairman. I just realized a while ago that this is also your first meeting in front of the Commission. So congratulations, I think. We will see.

Picking up on some of the regional topics that we are always concerned with, you expressed that we are concerned that many times you have too many things on

your plate and appreciate your efforts to start to discriminate which ones should be there continuously with your statutory responsibilities, and those who actually are mature and can actually be moved to the responsibilities of the staff.

I think that is an important issue because we want you to think in broader, more integral and far-reaching terms. And I think that is of tremendous value to the Commission.

You talk a little bit about the work you are doing in this area on the power uprate and I encourage you to try to stabilize this area. It seems like regulatory instability is a propagating word that is now going into many areas. So that's obviously an area that is important to us.

I think that I agree with you that the pressurized thermal shock is a success story. I think that it was very well done. I even took some time and enjoyed reading the report. I occasionally have to have some fun and I use those moments to remember that I used to be an engineer sometime ago.

In the discussion of the policy issues for non-light water reactors there are things that come up that somehow have our special interest. I keep looking at this issue of containment versus confinement. I know that's been doing around.

Has any additional progress been done in this area to qualify the need for defining the issue at all? Whoever wants to deal with that, confinement verse containment?

DR. KRESS: Well, since that was my subject, I will offer some thoughts on it.

The policy issues SECY paper did identify that as a particular issue. And their preferred option was to go back and rethink defense-in-depth and develop some sort

of a white paper, another one, or a policy statement describing exactly what the philosophy is and perhaps putting it in such a way that it can be limited and can't be arbitrarily called upon.

They also had a separate issue which was related to defense-in-depth and that was whether or not a confinement would be an appropriate way to go as opposed to a full containment. And I think they have the right idea that in the sense that they are requesting or recommending a functional requirement.

And by functional requirement, the purpose of -- one purpose of the containment is, of course, to limit the fission product release. That is basically it. And you can put acceptance criteria on fission product release and say, now, if the whole system meets that function on limiting that release, then the confinement is probably just as appropriate and may even be more efficient than a containment under certain circumstances. We think that is the right approach.

CHAIRMAN DIAZ: I understand. I was wondering whether the staff, after the report, or you have made any further progress that would let the Commission know where do we stand on this issue just as a preliminary indication.

DR. KRESS: I think it's left at that stage where we think confinement would work but it has to be shown and the uncertainties have to be dealt with.

CHAIRMAN DIAZ: We will ask the question in another way.

DR. KRESS: We will also continue to think about it.

CHAIRMAN DIAZ: Okay. Let's see.

In your slide 38, you talk about TRAC-M must be an essential component. And I always wonder whether "essential" is the right word at the present time or this is extremely important. So when you say "essential," you got to have it right now? Is that

what you meant or you mean it is really very important?

DR. FORD: We note that at the end of this year TRAC-M Rev 00 is supposed to be on line. From this point, it must be on line and be used.

I defer to you, Graham.

DR. WALLIS: We have said many times that the staff should have the capability of making independent assessments using its own code. And it does have at the present moment a RELAP code which it's using because it does not yet have TRAC-M. But TRAC-M is being prepared as the workhorse of the future and it's planned to develop it to handle not just light water reactors but all kinds of reactors.

So if that is the only thing the staff has available aew years from now as planed, so if it does not have that, it has nothing. So you could say it's essential that it is going to have a code.

DR. KRESS: Yeah, I hasten to add that in the regulatory area there is a legalistic interpretation of essential and we didn't mean that. We meant very important.

CHAIRMAN DIAZ: All right. I'm not a lawyer but since Commissioner Merrifield is always adding this little important nuance, I decided I would beat him to the point.

COMMISSIONER MERRIFIELD: I appreciate the comment that Dr. Kress has added there in terms of their vigilance about worrying about the differences there. So I appreciate that comment.

CHAIRMAN DIAZ: As you know, the Commission in 1997 approved a five-year plan to do what we needed to do with thermal hydraulic. I think we are now going into the seventh-year plan. We would like to have it completed at the end of the seventh year. I think that is an area that I really strongly believe we need to have regulatory stability

and that's the right thing to do.

In the area of safeguards and security matters, I notice that you been touching on and I didn't know what the committee envisions as areas in which they could support the Commission's decision-making by providing those analysis?

Do you have some specific areas?

DR. BONACA: We do have a full plan for this year. Maybe Dr. Apostolakis would like to expand on this.

DR. APOSTOLAKIS: Well, in the last two meetings, essentially, we were briefed on what the staff has been doing especially in the area of research to support activities in this area. We agreed with the staff that when it comes to research, maybe we will have something to say that would be of value to them. Other areas that are really security related, how many guards to have, we would not get involved in that.

So the meeting we have scheduled for later this month will, again, focus on the activities that are related to research, development of tools to do certain things and the overall approach. Again, should it be risk informed or some other way, high level thinking and integration as you suggested in your opening remarks.

CHAIRMAN DIAZ: I just want one thought on this which I have tried in several occasions to make the staff think about it. I think this is where our best integrated thinking needs to go. It is just not sufficient to look at an issue and say we are going to look at this potential vulnerability of this. It is a security assessment that includes mitigation at the front end.

They cannot be divorced. They need to be together. That is really where I believe your thinking could help us out significantly.

One comment on fuel particle coating. In one of my many lives, I think going

into my 19th life, I used to deal with the issue of fuels and fuel particle coating. There is a significant amount of work that was done for the particle bed reactor. We spent $186 million dollars qualifying that fuel. It was all classified.

I think that there is a wealth of information in there for high temperature use, the safety analysis. It also looked at larger size articles. I don't see why that body of knowledge cannot be brought into play right now. It might help to save some time.

I mean, it's definitely out there and sitting. Experiments were done and it is not only immobile. So significant body of things.

We also did some things in Russia and that might be harder to get but, if you find me a day, I might be able to go some place and find you some information that is rather applicable.

And one final comment. I know that human factors is always an issue. This is an area that we still need to do some learning. I think in the vote that I wrote on the large break LOCA I introduced what I called a universal error learning curve which matches with what people do with human factors.

There are some wonderful books already written on it. It actually brings to bare the fact that technological institutions learn from their mistakes and their learning increases as a function of the importance of the issue and of the value of their technology and it actually brings a compensating factor to the issues of human errors because they are going to happen, as you well know, and then, we learn from it.

The fact -- it is fascinating to see the exponential decrease in curve time after time whether it is in the airline industry, whether it is in laying pipes, people learn so quickly. And in this pressing society with information, learning is faster and faster.

And with that comment, which I like to again thank you and turn to my fellow

Commissioner, Mr. McGaffigan.

As you know, the Commission has for the last few years established a process which I intend to follow in which we alternate who starts first. Since I could not find who did the last time, I took it as my privilege to start first but we will now proceed in that fashion.

COMMISSIONER McGAFFIGAN: Thank you Mr. Chairman. I think it is more random luck.

I'm not going to spend a lot of time on most of the issues you raised today. I want to raise an issue with you that goes to the quadripartite slide in the discussion you had with your colleagues in Japan, Britain and France and other countries, the Germans. I have got to go back to the slide. It was Japan, France, Britain -- Germany. Britain did not participate.

The issue that I think that you guys could help us on, you said at that meeting you talked some about the approach to boric acid control and the fact that the French had decided to replace heads in the early '90's in a systematic way in their pressurized water reactors.

I have been here now six and a half years and I get most of the information about where we differ from the Europeans from reading Nucleonics Week and Inside NRC. And I think that you all, and maybe in this annual report on research, although it is not really research related, but I think you all could serve as a sounding board for telling us where there are deltas between us and other regulators. And tell us whether you think we should be doing something about those deltas or whether you feel comfortable with where we stand in terms of the differences.

And some of these, sort of a third rails. The ICRP 60 there's a difference in

the Commission -- you don't particularly have to highlight that but everybody else has gone on and implemented ICRP 60. We have not. It is just a fact that the majority of the Commission believes we should wait for the next academy report and next ICRP report. And that's fine. Safety culture, there are differences. I think we can justify why there are differences between us and the Europeans. It goes to fundamental ways to the trust that European countries seem to have in bureaucrats interfering with the decisions of companies. I mean, the sort of how many people to have. In Britain at the moment if you are going to decrease the number of people in your work force at a nuclear power plant, you have to get permission from NII. I don't think that such a rule is probably viable in this country.

Containment, Dr. Powers said to me one year in response to a question here that in designing the EPR, the Europeans had a de facto or perhaps explicit lower tolerance for early release or for release, period, late releases too. And that they probably have something like a ten to the minus seven LERF number as the de facto number that they use.

I think Dr. Powers said in that discussion a few years ago that that probably reflected greater intolerance for land contamination in Europe compared to the United States. I'm not sure we thought through that we have a larger tolerance for land contamination in this country as opposed to Europe.

KI, we had a difference with the Europeans for many years. We no longer have a difference with Europeans in terms of using potassium iodide prophylaxis as an additional measure in, as a supplement to evacuation and sheltering.

I read in Nucleonics Week that our French colleagues are giving the fuel manufacturers a much harder time with regard to some of the advanced fuels than we have

thus far. And I'm not the person to judge as to whether which approach is the more rational.

I toss all that out. You can have any response to any part of it. But as I said, what I think is lacking is some sort of systematic discussion about where we differ from our European and Japanese colleagues and why you believe that we should either tolerate those differences or why you believe we should do something about those differences. And I think that it's sort of like gap analysis or something. But I as I say, most of what I learned, I learned from reading Nucleonics Week and Inside NRC. And I think I would prefer to read it from a thoughtful ACRS report produced on a periodic basis.

So any reaction would be welcome.

DR. BONACA: I think that is a very good suggestion. Again, I expressed my surprise at the end of the quadripartite. First of all, some defensive reaction on my part, simply I am bought into the way of thinking about certain issues. For example, the tolerance of leakage that we had from CRDM cracking as a means of provisional inspections and so on. And, of course, the French work very hard on their position in defending that and saying that our approach is not conservative.

Reflecting later on, I was thinking about the environment that the approach they are taking creates. It creates a more higher exposure because that would depend very much on the licensees to inspect and to look. The French are taking an approach where they don't trust the visual inspections and so they taking a very hard position.

We discussed for example, the tolerance of leakage in steam generators. We do tolerate and they do tolerate that. So there was a long discussion about how different it is the head from the steam generators and you could argue about that for a long time.

What you are left with, however, is a reflection on how maybe the approach was too cascaded into a series of events that -- and probably if we had to repeat those decisions, we will repeat them again the same way. And fortunately, we didn't have an accident resulting from that.

But there is lot to be learned from those perceptives because some of them are not necessarily arbitrary decisions. They are just a different attitude this commitment to defense in depth -- for example, that seem to be -- you can't discuss with any commitment already made. It is there to stay. There is no PSA argument that can really deter them from implementing their defense in depth.

So, yeah, and I agree, there is a lot to be gained and I think we could be -- we do have some interactions with foreign counterparts and we can provide some insight to the Commission.

COMMISSIONER McGAFFIGAN: You say they didn't trust visual inspections alone. We don't trust as -- of a few weeks ago, we don't trust visual inspections alone either now. So to a layman it looks like we are about a decade late in terms of getting to where the French were in requiring the volumetric inspections.

DR. BONACA: I think among this committee there is some perspective that we believe that maybe that first step was part of the root cause and has not really been defined as such by the task force or anything. But yet, there was an element of that because the commitment to allow visual inspections will require also very strong commitment to actual inspections. And in the case we saw the three top nozzles were not really inspected.

So the recent vulnerability comes from some of the approaches we are taking.

COMMISSIONER McGAFFIGAN: I'm going to turn it over to Commissioner Merrifield. I do think at some point, and I'm not sure whether you're the right body, it could be the staff itself, because you don't have -- you're not interacting -- we read in the Nucleonics Week that Mr. LaCoste a month ago said, gosh, we been talking to the staff for decades about this stuff.

He didn't talk to Commissioners. I don't ever remember him saying, gosh, you guys should be replacing your vessel heads in the meetings I had with him. But assuming that he said what he said, the staff should have been thinking about that. So I think they are today.

I saw Brian Sheron at a meeting recently ask the industry -- I think it might have been with regard to this fuel issue or whatever, what is it the Europeans know that we don't. He was asking that question of the Westinghouse owner's group.

I think that's a good question. I think it's a good question for the staff to have in the back of their minds at all times. We don't have all reactor knowledge. We have about one-quarter of the fleet, a little less than a quarter of the world fleet in the United States. And there is a lot of people learning a lot of things and we have to understand those decisions.

I think you all have a role. I don't think it's perhaps the only role but we don't look good as a regulator, at least when folks can very strongly say we told you so. And we get a major event.

CHAIRMAN DIAZ: Let me just add a comment. Andre LaCoste is coming next week. I understand that he has made some small changes to his thinking in the fact that risk in size is good. Just not wholesale and we -- he will be here next week. We will talk to him.

I also want to mention, although in no way am I encouraging ACRS or the staff to travel internationally, that there is a meeting in Switzerland at the end of June on the issue of the large break LOCA. It should be a very interesting meeting in many senses. And if your budget allows, which I don't know whether it does or not, maybe one of you guys could go out there because it's supposed to be -- I think there is going to be some meeting of the minds and there is going to be a variety of opinions which I think is a wonderful thing to happen.

COMMISSIONER McGAFFIGAN: Before I give it up, let me just ask one question. The expectation for an enhanced safety issue that came up as one of the issues for advanced reactor designs, just for light water reactors, have you all looked at what the requirements document was that the French and Germans came up with, the European pressurized reactor and how that differs from what we are requiring for just advanced light water reactors? And whether there is anything in what they are requiring for their advanced -- for the EPR that we should have thought about requiring for our advanced light water reactors?

DR. KRESS: The short answer to that is it has been so long ago that we looked at that that we need to revisit it. But we have also looked at the utility, the requirements document in this country. My memory is a little hazy on this but I think they were pretty close to each other in terms --

COMMISSIONER McGAFFIGAN: What the utility requirements document in this country was and what the requirements for the European pressurized were?

DR. KRESS: My memory is hazy on that.

COMMISSIONER McGAFFIGAN: I know they have a better containment than we do. Dr. Powers told me that a couple of years ago. They have a double hull

containment with a steel liner inside of it --

DR. KRESS: Yeah. I think the major difference is that the Europeans are looking for a system where you have sufficient containment that you don't have to evacuate.

CHAIRMAN DIAZ: There is a population issue also.

DR. KRESS: They have greater population density, too. That means they have to really be more stringent.

So a LERF of ten to minus the six, which is what was in the utility requirements document of this country would not make that criteria. I'm pretty sure so it would be different.

But my memory is hazy on what they have.

CHAIRMAN DIAZ: I think Dr. Apostolakis has been trying to add something.

DR. APOSTOLAKIS: I do appreciate the recommendation that we have to be aware of what others are doing. But I have had the opportunity to interact with Europeans, especially Germans the last few years, and let's also bear in mind when you talk about strong containment and so on, that they never ask the question, is this a necessary burden.

We have stated that we want to use risk assessment to investigate that to see whether this burden is justified. So they are doing certain things right but I'm not sure all of the things they are doing are right.

And the climate, for example, that exists right now in Germany between regulatory authorities and the industry is not very good. So, I think some evaluation --

COMMISSIONER McGAFFIGAN: That's what I'm asking for. I do think that

it was during a time that there was a relatively conservative government in Germany that the requirement is safer -- the containment structure and all that. There was conservative governments in France and Germany and they came up with that number.

COMMISSIONER MERRIFIELD: Conservative for Europe. I wouldn't necessarily judge them in those governments, Helmut Kohl, as being "conservative" in our mold but the point is well taken.

DR. BONACA: One thing that is important to -- I think much of what has happened there is tied to the consequences of Chenobyl. There was extensive land contamination. There were sectors of the population in Europe that never were interested in nuclear yes or no. They never -- the farmers, et cetera, suddenly created very strong opinions about nuclear because of the issue of distruction of livestock and extensive amount -- there was a huge impact that pulled in public opinion to a level that they felt compelled to make statements such as we should never have a release of something of that kind.

I think that drove this to the degree right now, that they have to be able to sustain those kind of statements in front of their technical communities. That is not easy to do so.

So that, you know, that those areas apparently, regulatory burden is not an issue.

CHAIRMAN DIAZ: Life would have been different if Chernobyl had had a containment and that's why confinement versus containment becomes a real issue.

Commissioner Merrifield.

COMMISSIONER MERRIFIELD: Thank you, Mr. Chairman.

Just so that the panel does not think the Commission necessarily speaks

with one voice on this issue, I want to also go with this issue of the quadripartite meeting. And I have got a couple of observations on it.

There's been a lot of discussion of what the Europeans are doing lately. I accept very much the comments of Dr. Apostolakis.

You sort of see these bricks being thrown your way. But sometimes one should be careful about throwing bricks when one has a various portions of glass in one's house. I know by experience, for example, in my old career and certainly this carries over into the current one, I think we have a great degree of vigilance in this agency of establishing risk-informed regulation and following that up with rigorous enforcement. That is not the tradition necessarily in Europe.

You may see something on the books that is quite stringent but when you peel the onion, so to speak, to find out are those standards being enforced to the degree of vigilance that we would expect in our regulatory agency, you do not see that systematically across some of our European partners.

There are questions about the rigorousness of some of the inspections that we have done and we have things, obviously, that we need to look at relative to Davis-Besse and others. I'm quite proud of the fact that we have resident inspectors at the site who are inspecting our reactors every day of the week. That is not necessarily something that all of our European counterparts can compare with.

So I do think that there are pluses and minuses. And we should look to our European partners and others to make sure that we can borrow those best practices. But I think we should be mindful that we do bring substantial part to the table as well and have many significant capabilities that are, frankly, I would say, better than what they have.

On the quadripartite meeting, you have got to -- this clearly has a European

tilt to it. I want to at least put out for the ACRS' consideration we have significant -- I think there is a significantly greater presence and activity in the Pacific Rim. And I think that the committee should strongly consider, for example, South Korea which has a significant expertise with two reactor designs that originate here in the United States. And frankly, given where we are going with the AP-700, potentially having to take a look at that -- not the AP-700, but the advanced CANDU-700, I think we should be thinking about experience and expertise that they have in South Korea with codes and our understanding of the -- and how that works to enhance what we can do here.

So I think that I would encourage ACRS to look in that direction.

Similarly, former Chairman Meserve recently came back from India. Now, obviously, we have to work quite carefully within the governmental structure in terms of engaging with India. But I think one of the things that came out from that trip and folks -- and our research folks indicate this as well, there is a significant amount of information that they have in the utilization of the CANDU designs and that may well be an area where we can reep some significant scientific and technical understanding of how that works and help contribute to the work we may have to do in our review.

Again, that is an area I think the ACRS should be mindful of and consider. Obviously, there are some opportunities there where we can engage with our India counterparts.

That's more of a statement but obviously if you would like to make a comment, I would like to give you the opportunity to do that.

DR. BONACA: Actually, yesterday in some conversations we brought up South Korea because, again, they have a significant problem and they are not represented here.

DR. APOSTOLAKIS: I fully agree with you. I think we should, as a committee, think about it and establish a way to interact with our international colleagues that would take into account cultural differences and so on because I'm not convinced that the forum like the quadripartite meeting is the best one, especially if you bring people from Korea and the Orient. And we already saw that the Japanese are not the most active participants in this quadripartite meeting for a number of reasons.

So I believe we have to figure out how to best interact with the regulators in the other countries, some countries in one way, other countries in a different way so that we will be able to do the evaluation that Commissioner McGaffigan mentioned.

But you are definitely right, that a lot of the emphasis is in the Orient, which in many ways is good. I mean, if you look at Taiwan for example, all the senior regulators they might be graduates.

COMMISSIONER MERRIFIELD: I will either positively or negatively react to that comment.

DR. BONACA: I think that there is a very strong negativism towards use of risk information to reduce regulatory burden.

I believe that the list for the cases that I have seen both in France and Germany really are preconceived notions and really the reluctance to attempt to think about what we are attempting to do is really prejudicial in many ways just because people have not looked at them.

So they created a barrier that says you should not attach this defense in that issue.

I mean, there are those who would be willing to listen but they are not right now in any positions of decision-making. So you hear only their perspective and then when

you talk about it, you see that they really have not thought about how you can do it.

There was a way and there is also a conservative way of going with risk information and taking -- removing some of those -- so there are those perspectives that are really preconceived notions right now.

COMMISSIONER MERRIFIELD: Despite any temptations I will avoid any comments castigating our close German and French allies.

During the past few years, ACRS has been engaged in a significant number of reviews. And I think you have really -- and I commend you for this -- really tried to become more effective and efficient in completing the reviews and attending to the needs of the Commission, the EDO and staff.

In the slides that you had, in slides 4 through 8, there was a significant number of opportunities you have to be involved in oversight and providing guidance to the Commission. As I mentioned in the presentation I made in front of the 500th meeting, I mentioned that given the budget vagrancies that we are all under right now, we are not subject to getting a windfall of additional money. So that means, obviously, we have to do more with less.

So I'm wondering how you are grappling with what is potential increasing workload and challenges without having any guarantees of having additional staff or members to grapple with it?

DR. BONACA: Well, I don't believe we are stressed to the point where we cannot make choices. There are, for example, the next two meetings we have quite a bit of time to think out of the box. And, in fact, we are going to have a meeting with the industry, INPO, and so forth to also review some of those issues of safety culture or cross-cutting issues in the June meeting just as a way of getting informed and understanding what is

moving in the industry.

So I think we are now managing the workload, I believe, in a way that we have sufficient time to look at some of the initiatives that we could have.

As I mentioned, power uprates, if you look at the seven power uprates in 2003 -- 2004, that is a significant commitment of resources. That will give us an opportunity for reducing effort.

In many other cases if you look at the initiatives that I mentioned here in pages 7 through 8 or future activities, many of them are really the result of our interaction with the Commission or the staff. Now, we are trying to be selective. And almost -- if you look at the IPMP minutes, many, many items we assigned to individual members to decide whether or not we are going to review those items. And more and more the answer is no, we are not going do review this item and particularly if it is a process item or if it is just changes to regulation with no significance to safety, we are not going to do that.

We are going be sensitive to these comments by the Commission.

DR. APOSTOLAKIS: I think that the single item that is the greatest burden on the committee is the research report. And I have serious doubts in my own mind that the cost benefit relation there is favorable.

I know that especially you, Commissioner Merrifield, in the past has requested specific things that we do and I think that's great because that means the benefit goes up. But going through this pain every year is really something that we have to consider and maybe communicate to you that -- I think it is unreasonable.

So somehow we have to come up with an understanding so that we would write a report that will be useful to you but will not go into a lot of issues and descriptions that perhaps do not add much to your deliberations. Now, do I know what that is? No, I

don't.

I just want to point out that in speaking as an individual member, I just didn't enjoy seeing the pain on Dr. Ford's face for a number of months when he was struggling to make the rest of us focus on and contribute and edit and all that. And this is an annual ritual which I don't think is useful.

COMMISSIONER MERRIFIELD: These are statutory requirements, though. And obviously the Commission is going to be mindful of that.

COMMISSIONER McGAFFIGAN: The statutory requirement was amended a couple of years ago. It used to be an annual report to the Congress. The committee has chosen to continue the annual report to the Commission. The Congress told us in part of the Levin/McCain roundup of all the reports we don't read and not ask for them anymore thing, that this was one of those.

So the statutory requirement went away around calendar year 2000 is my recollection.

And I personally think that Dr. Apostolakis is onto something here in terms of the letters that you all write and the reports that you all write. I think a periodic look at the research program is appropriate but I don't think the period should be one year.

So you get you get a vote here for that on this side of the table.

CHAIRMAN DIAZ: We are not voting now.

DR. FORD: If you look back at the reports to Congress, they were much briefer than the ones that we have been submitting to the Commission.

COMMISSIONER McGAFFIGAN: In some ways. They got rid of the Congressional requirement and the report got longer. And that's a choice that they have made perhaps it's a choice that --

COMMISSIONER MERRIFIELD: Dr. Apostolakis has pointed me out as being somewhat responsible for that and I take that responsibility. And part of that I give great credit to Dr. Powers who I challenged to look at the research program in a different way and not only look at what else we need to do but what are we doing that we can cut off.

And I have great value from that report and it contributed to some important budget decisions that we have to make on a regular basis. But I think it's worthy of discussing. Without taking any determinations here I think it is worthy of talking about some more.

DR. POWERS: I want to interject that Dr. Apostolakis spoke only for himself.

COMMISSIONER McGAFFIGAN: Take votes on both sides of the table.

DR. APOSTOLAKIS: The point is, though, that we should take into account that the time scale in which research changes. And I think that is a important thing. So perhaps if rethinking the period of our report -- things don't change in three months.

COMMISSIONER McGAFFIGAN: Or a year.

DR. APOSTOLAKIS: Or a year.

COMMISSIONER MERRIFIELD: Let me make one last quick question and the Chairman would like to leave off.

On page -- turn to page 21. You have got some issues here relative to AP1000 that you talked about, Dr. Kress. Entrainment of liquid, potential for boron precipitation, sump strainer design.

Could you repeat for me -- you may have mentioned before -- what your time line is to resolve the position of the committee relative to these issues one way or the

other? Are you getting the information you need to make that decision and are any of them on a trajectory at this point where we would come to the conclusion that those would be critical issues so-to-speak?

DR. KRESS: I really don't believe there are going to be show-stoppers. We have been putting a lot on this 7/03 meeting that we hope to get most of the information by then and definitely by the time the 9/03 interim report we have on slide 22 -- we think we will have all the information we need to make judgments by then. DR. FORD: Let me interject here. I'm not sure that I'm so optimistic because it depends a lot on the applicant providing the right information. I can't really tell what they are going to do.

We can schedule the meeting. They have to come up with the convincing evidence.

DR. KRESS: But that's, of course, always the case. We have to rely on the applicant to bring us this information. I think there is significant information out of Oregon State test on the entrainment issue. Hopefully, that is one of the major ones.

I really -- the Boron precipitation issue is a recent one and I don't think the staff or the applicant has given it a great deal of thought yet. So that is the one that worries me about timeliness.

COMMISSIONER MERRIFIELD: I want to make one last quick comment. The question I needed to ask was regarding our Appendix B programs.

I know I have commented in public previously the fact that many industries in the movement to ISO-9000 in the -- approach, the distinction between commercial grade and nuclear grade which was obviously apparent and relevant back in the early 1960's during the days in which Appendix B was being put together, certainly is challenged and that delta I think has been significantly reduced between what one considers commercial

grade and what may be appropriate. That is something I would like to dialogue further with the ACRS on.

Thank you, Mr. Chairman.

CHAIRMAN DIAZ: Thank you, Commissioner Merrifield. Thank you all for an excellent briefing. I almost enjoyed myself.

I really -- I didn't get on you this time, George, but I promise you next time I will.

I truly believe I speak for the Commission when I say that we truly appreciate your work. You provide us with special council that the Commission uses in its deliberations. We continue to look forward to working with you and tightening this relationship for the benefit of the agency. There are many important things that always come up at these meetings and we probably will follow through with them.

If my fellow Commissioners don't have additional comments, this meeting is adjourned.