OFFICIAL TRANSCRIPT OF PROCEEDINGS

Agency: Nuclear Regulatory Commission

Title: Nuclear Safety Research Review Committee (NSRRC)

Docket No.

LOCATION: Bethesda, Maryland

DATE: Thursday, May 19, 1994 PAGES: 1 - 254

ANN RILEY & ASSOCIATES, LTD.
1612 K St. N.W., Suite 300
Washington, D.C. 20006
(202) 293-3950

OFFICIAL TRANSCRIPT OF PROCEEDINGS

Agency: Nuclear Regulatory Commission

Title: Nuclear Safety Research Review Committee (NSRRC)

Docket No.

LOCATION: Bethesda, Maryland

DATE: Thursday, May 19, 1994 PAGES: 1 - 254

ANN RILEY & ASSOCIATES, LTD.
1612 K St. N.W., Suite 300
Washington, D.C. 20006
(202) 293-3950

UNITED STATES

NUCLEAR REGULATORY COMMISSION

NUCLEAR SAFETY RESEARCH REVIEW COMMITTEE (NSRRC)

Holiday Inn

8120 Wisconsin Avenue

Montgomery Room

Bethesda, Maryland

Thursday, May 19, 1994

ANN RILEY & ASSOCIATES, LTD.
Court Reporters
1612 K Street, N.W., Suite 300
Washington, D.C. 20006
(202) 293-3950

Continuing members:

Edwin T. Kintner, Chairman

Dr. E.T. Boulette

Sol Burstein

Prof. Robert D. Hatcher, Jr.

Dr. Herbert Isbin

Prof. Fred J. Molz, III

Prof. Robert E. Uhrig

Dr. Richard C. Vogel

Retiring members:

Dr. David Morrison (retiring Chairman)

Dr. Spencer H. Bush

Prof. Neil E. Todreas

New members:

Prof. Anthony J. Barrata

Prof. Michael W. Golay

Prof. Charles Mayo

Dr. Sumio Yukawa

P R O C E E D I N G S

MR. MORRISON: Let's bring the Safety Research Review Committee to order. I appreciate your indulgence for a couple of minutes of allowing us to take the photo so that one of our retiring members could be honored, and we could preserve the moment for posterity through a photo.

This meeting is being conducted in accordance with the rules of the Federal Advisory Committee Act. It has been duly noticed in the Federal Register. The agenda has been published. The public is welcome to participate.

I would ask anyone who wants to make a statement before this meeting to please identify themselves to the responsible official, Mr. George Sege, so that you can be scheduled and properly noted in our records.

The meeting is being recorded, so I would ask anyone that does make any remarks, whether they be at the table or in the chair section, please speak up clearly and identify yourself so that the Court Reporter can identify you name.

With that, I'd like to turn it over to George Sege for just a few housekeeping items and then get back to the discussion of the agenda and some introductory remarks.

George?

MR. SEGE: Thank you, Mr. Chairman. Just a few brief announcements. It's nice to see a lot of faces here

apart from the scheduled participants. If at your convenience you would sign the sign-out sheet that would be appreciated, so that we -- so that knowledge of your presence should not be lost.

The other announcement I want to make is that we have made transportation arrangements for mid-day tomorrow to go to the commission meeting at the One White Flint North Building. We have reserved two vans if it turns out that one van would not be quite enough.

The vans will be leaving at the Woodmont entrance of the hotel at 12:15. It is scheduled to get there at 12:10, so that in a few minutes after 12:10 it will be ready for bc .ding. Those of you who will have luggage that you want to take with you so that you wouldn't have to come back to the hotel in case you're flying out, there will be room for the luggage.

I'll make this announcement again tomorrow morning, but I want you to know what the timing is in any case so you could plan your boarding.

Thank you, Mr. Chairman.

MR. MORRISON: Thank you, George.

Let me depart from my usual tradition and show a few view graphs as the introductory section.

I'd like to start with asking your indulgence. As Chairman of this committee for the last four years and a

member for the last six years I ran across something the other day which I thought put all other things that we've been doing, at least I've been doing for the last six years and many of the members of the committee have been doing for that long -- I think all of us have been involved in the nuclear business a lot longer than that -- that kind of put a lot of things in focus.

While we think we're dealing with a lot of technologically important activities and no doubt they are, there is something that has a real humanitarian purpose. And it came home to me in a book that I recently received a copy of.

I started to look at just a few curves. It's not very well focused.

Maybe this is obvious to a lot of you. It wasn't to me until I looked at it. That the role that electricity plays in our lives no matter where it's used throughout the world. But the interesting curve was the life expectancy versus the megawatt per capita per annum used in various nations throughout the world.

And once you get above a range of about four or five, it's pretty smooth sailing. It starts to be smooth sailing at about one. But a lot of the world still lives down here in this low range which could very much benefit from the nuclear power that we keep talking about in these

meetings.

It's not just that curve -- and you may have a hard time reading this -- you get the same sort of trend which we show life expectancy on the earlier one. If you look at infant mortality rate, again versus energy use, you see a drop and a long tail. These are in tons of oil equivalent. And for those of you that don't keep that number in mind, which I don't usually do, we're at about 3.85, well below the knee of the curve on these

And this particular one is the illiteracy rate versus energy use. So if there is ever a very simple statement of the benefits of electric power and indirectly the statement of what nuclear power has to do over the next several generations, I think these sort of curves at least put it into focus for me.

Well, so much for the sob story. Let me move to the agenda for today.

And it indeed will be a very busy one for us to get through, and recognizing that we have to be prepared for our meeting with the commissioners tomorrow afternoon.

The first topic on the agenda deals with the research program. And this is simply to refresh your memory from the staff requirements memo that was sent to us after our last meeting with the commissioners.

And there were five items identified in that, or

five questions raised. Is the research program doing the right sorts of things, and that's indeed a tough question of for us to answer.

And I would suggest that we also have to look at it in the frame work of current and future, that the research program budget has been decreasing over time and it isn't likely that it's going to increase. So what should the research program do under a decreasing budget scenario.

Likewise, what should the research program do given the rather prolonged drought in the nuclear power industry with respect to new orders. What implications does that have to the content of the research program.

Of course this ties into the question with regard to resources to do what is being done, is there enough -- are there enough resources to do what is being done. The question may be a subset of what research should be doing and are the right things being done now.

The questions with regard to the skills of the staff and contractors, are they indeed at the level or the distribution that is necessary. Again, as one looks at the current and future situation with regard to nuclear power reactors.

Is the program staying ahead of the problems or is it trying to catch up to the problems. A very important issue as well.

And then one that is an introspective one from the committee's standpoint, do we have the right skills around our table consistent with what the commission is asking us to do.

I'll turn it over to Eric Beckjord in a few minutes to introduce the new members of the committee which I think not only bring some new blood but some new skills to the committee. And if we were trying to identify what our needs were, I hope we've answered that question positively. That should be open for debate by the committee itself.

The last item on this list is one -- was not in the SRM that we received earlier. It came from another document that Eric sent to me, and I don't know that we h shared it with the committee.

But the question is being discussed, especially at the commission level and the senior management level within the NRC, is what is the regulatory basis for the research program.

It seemed to me it naturally fit with the other questions, and I suspect in the presentations that Eric and the staff will be making this morning we may get some more insight on that.

Now, if that isn't a heady enough agenda starting with the research program, we're also asked to address the code program within the Office of Research. Similar kinds

of questions, is there a critical mass of computer codes experts available to maintain the existing codes. Which may say -- also coming back -- how many codes should we retain, what kind, how much maintenance is necessary on that.

The limited funds question, where is it best focused. Is it better focused broadly among a number of contractors or should a new approach be taken, that it be done within just a few contractors or maybe even within the NRC itself.

And again, the question with regard to expertise. We're asked to identify in the memo any sacred cows that may be active. And should some of these be closed, given the limited budgets. I hope that we can answer that question very forthrightly by the end of the day today or certainly by noon tomorrow.

What then is the expertise that is unique within the NRC program that absolutely has to be maintained.

A number of you have sent me letters with regard to sacred cows. And even one with regard to a sacred calf. And I've distilled them. There is a rather long list of things. But they come up really in two categories, two broad categories. And this will be open for discussion as we proceed during the day.

A real question of what is meant by the independency that NRC has to have to do its job. We

recognize that NRC does not, cannot, it would be impossible to have all of the capabilities and all of the money and all of the resources to do everything at least we have done.

There is a lot of expertise starting in universities and national labs throughout the world and through the industry itself. But where does that impact on independency? I think this is a fairly critical issue when one starts to look at what needs to be maintained in the research program and where the sacred cows are.

And seemingly at the top of the list of individual activities, the code maintenance activities are ones that we're really going to have to look hard at, because that was in three or four of the responses that I got from the individual members.

The list goes on, going down through the technical disciplines, what are the disciplines that are needed by NRC to respond in a timely manner to the present and future safety and issues, and then how these disciplines compare with the numbers of people required to be able to do that particular job.

At our last meeting or perhaps it was one before that Eric presented a list of technical discipline needs, and we can put these back up as we get into the discussion if that would help it, but he identifies the critical disciplines for some of the emerging areas as been the

digital instrumentation of controls and the associated human interface issues as well as the technology for advanced water -- for advanced reactors including the non-ALWRs.

Among the continuing disciplines there was a range of activities from thermal hydraulics through the PRA into severe accidents and containment performance, materials, the geological sciences, human factors, radiation protection, health, environmental sciences and economic analysis.

So these were the ones that from a staff standpoint ended up as that very list of important things.

I will close with just one other comment. I personally have been involved in a study that the Mitre Corporation is doing for the Environmental Protection Agency, looking at its laboratory complex. And it's very interesting, the overlap and the kinds of questions that are being asked by that agency in this era of tightening budgets and what should a regulatory agency do in the research area.

And that's a fairly difficult question to answer. But during the study, I think I've evolved where I'm comfortable in the principals that ought to guide regulatory research. And first obviously is that anything that is done in the science and technology area that relates to regulations to give a guidance, a study of standards, the compliance and monitoring operations, has to be credible with the scientific community. And I'm also including the

engineering community in that broad context of science.

And it's not just in the development of the information. It's easy to concentrate on the research program and everybody starts to focus in on the development of the science base. It's equally important to be sure that it's used end to end in the process, so when results of the scientific activities are embodied into regulations or get factored into inspection programs that that same sense of quality is factored in, and that's the end to end aspects of it.

I know in looking at the Environmental Protection Agency and getting a lot of comments within that agency as well as their regulated community that they feel a great sense that there isn't the end to end quality. The regulations are being enacted that aren't using the best of the science.

I think we could leave it as an open debate where we feel we are within the NRC standpoint.

Credible science generally is something that requires a lot of time to develop, a lot of patience, a lot of independent actions, a lot of thought and study, a lot of peer review. And that very often is inconsistent with the second principle, that we have to be responsible.

If you've got an industry out there that you're regulating in the Environmental Protection Agency side, you

have deadlines that have been set by congress with regard to having certain standards enacted, and that puts an end point on the science development activities. And how much that should shift or should it shift or where is this balance between the responsiveness and the credibility.

For any regulatory agency that's involved not just in U.S. problems but looks at it world-wide, credible science and even the responsiveness itself needs to involved nationally and internationally recognized scientists.

I'm not saying that they have to be within the agency. Certainly they have to be accessible to the agency. And there has to be the mechanism whereby these people can be brought into use. Because at the end of the day if you end up in some legal proceeding or some quasi-legal proceeding, it's my scientists against your scientists, then this credibility in having national recognition is an extremely important aspect of it.

And then the final one is that -- I can't stop -- public trust that is built into regulatory agencies in my mind requires that there's a continual look at this information base. I'm saying if I understood all of the problems that I thought I understood several years ago, have I made all the adjustments in any of the standards or regulations that I should make.

And that's a commitment to an expansion of the

information base.

I'm only talking about these as principles. I'm not talking about how they should be weighted, how much should be in any one area. But I think in any research program for a regulatory agency, if you're missing these four principles you're falling short of the mark.

So that's a challenge for us, I think, to come back and look at the questions that the commission has asked us and to address and see whether we're comfortable with these principles and whether they're begin fulfilled.

Well, Eric, I mentioned that it's probably time to introduce the new members, and if you'd be so willing to do that I'd certainly appreciate it, and then we can turn the agenda over to you and the staff.

MR. BECKJORD: We have already recognized Spence Bush and his service to the committee and to the commission. Also as you know Dave Morrison and Neil Todreas who are with us today will be leaving the committee, all three of them after six years of service for which I am very much appreciative.

And because as Dave has noted, the committee goes on, it is now time to introduce the new members. There are four of whom three are here today. And I will ask each of them to rather than my give a summary if they each could give a brief comment on their experience by way of

introducing themselves.

Dr. Sumio Yukawa is a materials specialist of many years experience with the General Electric Company in the steam turbine and other divisions. He is now a resident of Denver, Colorado. And Dr. Yukawa, would you give the committee a few words on your interesting experience.

MR. YUKAWA: Well, first just a small correction. I live in Boulder, Colorado, not Denver. Boulder is depending on which way people think of it, it's either a subset of Denver or it's a completely different country, it doesn't matter.

Anyway, I live in Boulder which is about thirty miles away from Denver. Eric summarized it very well. I spent many years at General Electric in their power generation business, both at rotating machineries and the nuclear power end of it.

I've been involved in many areas, but mostly now my private time, I've been involved in pressure vessel cooled and the pressure vessel research committees. And that's what keeps me busy these days, I think.

MR. BECKJORD: Well, we're very glad to have you join the committee, and appreciate your willingness to serve.

I'd like to introduce now Dr. Charles Mayo who is a professor at North Carolina State University. His

specialties include instrumentation and control and reactor kinetics. He has had both industrial and academic experience. And Dr. Mayo, would you give us a word?

MR. MAYO: Thank you. That summarizes it pretty well. I worked five years in the lab building at a coal unit. I spent eleven years with a service contractor working for EPRI/NCR contractors and utilities. And since 1991 I've been at North Carolina State University.

MR. BECKJORD: Thank you. We're very glad to have you join the committee.

I'd like to introduce now Professor Michael Golay from MIT. Professor Golay is a -- had extensive experience in thermal hydraulics. No severe accidents. Has a lot of interest in systems design, especially as applied to advanced reactors.

Mike?

MR. GOLAY: Well, again, thank you. That was a very good summary. Yeah, basically for -- I've been at MIT over 20 years and mostly have worked in thermal hydraulics. For the last ten years a lot of this has been focused on the project that we have on advanced reactors where we're worked, a group of faculty, whom I've been leading and coordinating the last five years or so, where we've worked on all the different advanced reactor concepts.

And I would say partly driven by the systems

analysis aspects of that. My work in recent years has actually shifted away from thermal hydraulics and moved more toward some of the systems aspects. The current projects for example are on safety related software, validation and verification. And also human reliability improvement.

And so I'm sort of starting a new phase of life, I would say.

MR. BURSTEIN: He also writes well.

MR. BECKJORD: Mike, we're glad to have you join the committee.

MR. GOLAY: Thank you, I'm pleased to be here.

MR. BECKJORD: I had hoped to introduce to you this morning Professor Tony Baratta from Penn State University. He called me yesterday morning. He is suffering from an extreme case of the flu, and he is just unable to make it. And he was very sorry about that, but he will be joining you at our next meeting.

Well, I think that Dave Morrison has given you the plan for the meeting. And I just wanted to make a comment on it. That the outline that he gave of the questions and his views on those that the commission had asked the committee to comment on is really taking a precedent in this meeting.

And I think in normal circumstances with a number of new members joining us we would be devoting this meeting

to a -- giving them some orientation both on the research program and on the reviews that the committee has conducted in the recent past.

So this makes something of a problem, but I've found this committee to be very flexible in tne past and I am confident that it will continue to deal with upsets and transience along the way.

As a consequence of this we will as Dr. Morrison said be devoting a lot of attention to the commission's questions. I think that this will help. It will certainly help give the new members a sense of the kinds of things that the committee has done, even though we won't be reviewing each of the research -- any of the research programs in a lot of detail.

But I think that it will give you as new members an overview -- a brief overview -- of research, but it will also give you I think a very good introduction into the ways that this committee has developed for its reviews and of the matter of preparing for the commission meeting tomorrow in order to respond to that.

So I -- if we could have arranged this so as to give you first a briefing on the research activities and then come on to the commission meeting we would have done so, but it wasn't possible on this schedule.

So we will do the best we can and I'm sure it will

all work out.

I have about one hour, and I would like to be complete with my introduction in that one hour. I'm going to run through very quickly the program and some issues that are of particular interest now. And the purpose of doing this is to provide you with the most recent information on plans and programs.

I'm not going to attempt to review any of the programs in detail. The members of the committee who have been with us I think are well-acquainted with these programs. But perhaps not acquainted with the most recent information on the budgets and that type of thing.

So my purpose is to go over the program briefly, keeping in mind the questions that the commission has asked of the committee. And the questions you would ask, that's important.

I think we deal -- we have thought about all of those questions, and dealing with most of them in the course of this introduction and one or two others, we're prepared to discuss with you -- if you have questions during this brief introduction please ask them.

I don't intend to talk for a straight hour so I do expect discussion during that time.

The elements of Dr. Speis' program is a list, and also prepared by the senior staff, in order to respond to

any questions of a more substantive nature that you would like to raise in connection with your review.

As I said, I don't think we have time to go through any of these programs in great detail, but there may be important and very focused questions that should be addressed and the staff is here to do that.

George, let's put the list of topics that I was referring to -- some are briefer than others. And the major high priority search programs are also in here. The reactor aging, accidents, the thermal hydraulics program for the advanced light water reactors.

And I should say that I'm going to talk about the aging as one topic here, both primary and secondary auxiliary components. The support for the passive light water reactors, I'm going to talk about that and ROSA at the same time, sort of treat it as one topic.

All right, then, I will discuss briefly the situation regarding CANDU. Final decisions have not been made on CANDU and I will bring you up to date on that and to respond to your questions.

I will give you the personnel statistics on the office of the -- statistics for the current year, and to comment on where we stand with respect to the topics, whether we are ahead or behind.

We will then raise questions about the seismic

hazard analysis the codes and the waste research, the university participation and future safety concerns.

So the first two slides are reactor pressure vessel aging and aging of other components, mechanical and concrete.

As you know, the main focus on the pressure vessels has been on the embrittlement of reactor vessels, the possibilities for pressurized thermal shock, regulatory divisions, the fracture mechanics and then some more recent questions have come up concerning the cladding, and the effect that that cladding has on the crack propagation in the pressure vessel itself.

These activities, pressure vessel activities now in this fiscal year require eleven million dollars total over the next two years. Many of the activities that are underway now will be completed and we'll be phasing out of them and bringing that program down to a technology maintenance level in 1997.

I expect that the -- what we're thinking of is an expenditure of about seven million dollars. That is the situation with the pressure vessels.

MR. KINTNER: What you're saying is, seven million is a sustained effort on the pressure vessels that will phase down from 11 to seven and will hold there. But that much is required as a continuing supporting program.

MR. BECKJORD: That's my expectation, yes.

MR. BURSTEIN: Eric, may I give you a little pet -- what I keep hearing about it relates to what the chairman referred to as one of our sacred cow issues. Namely the independence of RES efforts.

There is in the last paragraph on this slide in the third line from the bottom the statement that the regulatory staff needs methods to predict behavior. And integrity. And I would submit that that's where part of the argument begins, and I would suggest for better words which I think are more accurately reflective of your mission, is to assess the predictions of others. Not to make independent predictions. But to be in a position to independently assess predictions.

I would like to hear whether my understanding and yours coincide.

MR. BECKJORD: I think in some ways they do. But in others actually there may be some differences. I do think that this matter of prediction of behavior in pressure vessels has been an interactive process, so with the major group within the ASME that has worked on this, it has come to cases. As you know, the most recent case involving the Yankee pressure vessels, there are some differences there.

We are going back to an attempt to bring into -- to achieve a better understanding of the differences that

came out. In the course of that I can't tell you today exactly where that is, but Mr. Shao I think may have a word on that.

MR. SHAO: Okay, there is differences in the way of analyzing the vessels. The flow distribution, the flow density and how much temperature affects. And so what should be the cladding, how much cladding to have. And so on.

But to answer your question so as -- we don't have too much research in this area. There is a lot depending on our research. The industry have a lot of research, yes. We've gone forward in research. We've gone forward in pressure vessel research. In this area of pressure vessel research somehow they are following our research, rather than have their own research.

MR. BURSTEIN: I have no problems with the gain of knowledge. But I'm talking about how we're going to apply it and use it. And part of the difficulty I've had sometimes as you recall in the past of understanding the -- perhaps the ability to make independent analyses as having one type of requirement versus the ability to assess the analyses that other people make.

Which may require all of the same underpinnings, the same information, but it's in the use and its application that drives me to suggest that we can't afford

always to have completely independent a hundred percent analyses. And then decide which one is the most conservative and flog the licensees with that.

Never mind their virtues. Because that's what's usually happened in my jaundiced past experience. So I guess I'm a little sensitive to that and I appreciate this discussion. I would like to terminate it here.

MR. BECKJORD: Well, okay, we can come back to this. But I do believe that we are working with a group in the industry to review the differences.

MR. SHAO: Right. Actually we are working with --

MR. BECKJORD: Where is that --

MR. SHAO: -- as a matter of fact we had a couple of meetings on this --

STAFF MEMBER: The problem we've got right now is funding has been eliminated for this activity. So I'm left high and dry. We're trying to work with industry but the fact of the matter is we've had a series of meetings looking the differences and initially we focused on computer codes. We're just ready to take the next step and look at what are reasonable modeling assumptions to feed those codes and the idea was that we'd feed some revision to the BTS reg guide.

But it was a series of public meetings and one IFRE gets its money back or Numark does whatever it does,

following that situation we'll get to do that activity. But the intent was to do it in public through a quasi-consensus process rather than just the staff and contractors.

Ultimately we'll have to make the decision about what we think ought to be in it. But the idea was to get the technology in the light of day and afford everybody an opportunity to comment. And that's how we've been approaching the application of all of the pressure vessel research, at least in recent history.

MR. BUSH: Mike, are they looking at the work that's mainly under the pressure vessel research concepts related -- yes, the -- because I think it's directly relevant.

STAFF MEMBER: Yes, we've been looking at that. We've also looked at the combination -- in fact I think the slide makes reference to the biaxial loading and the tests, the most recent one was done just this week. What we find is that in biaxial loading much of the toughness increase now disappears.

So there's a trade-off there, and part of the analysis work is to try and figure out how to model that and do it correctly.

MR. SHAO: Spence, the biggest assumption in the pressure vessel analysis is one-quarter T.

MR. BUSH: That's right, and that's being

reassessed as you know.

MR. SHAO: It's being reassessed and we will do some work on this.

MR. TODREAS: I just wanted to ask the chairman if we could come back to this. It's probably appropriate, as Sol suggests, but the issue is an issue of principle broader than the pressure vessel and the distinctions that Sol made in gathering data and developing separate sets of techniques is something that we should like to discuss further.

MR. MORRISON: I would totally support this, because I think there are some principles here that we need to get back to. You mentioned one. I think another is are we just following the traditional way we've tried to deal with this problem and not looking for other ways.

And that gets back to is seven million dollars right, the steady-state level, because that sounds like it's 30 to 40 --

MR. SHAO: Yeah, seven million for the '96, '97 and '98. After that we drop to three and a half.

MR. MORRISON: Well, that still sounds like about ten people or 15 people, and that's a large number in research. So that's, I think, is the justification that needs to be discussed.

All right, why don't you proceed, Eric.

MR. BECKJORD: The second item on our list, the

piping and fractures, that has been completed this year. And it's going to go down in fiscal '97. What's on the way now is the completion of the upper tubes program.

The third item here is on the integrity steam generator tubes, and because of the advanced performance steam generator tubes -- I'm thinking particularly of the review meeting that the committee had a year ago in April on this topic -- we are -- we have not been spending research dollars on that in the recent past. That funding has gone up to just under two million dollars over the next two years.

I expect it will be about a million and a half or a little more in 1997. That will relate to the work on the most recent phenomenon that have been observed. And it will be directly to that, the development of a rule which NRR has requested for the generator tubes. And following on this list is the total of nondestructive inspection methods and that is holding the cost over the next several years, about a total of two and a half million dollars for both pressure vessels, piping and steam generator tubes.

MR. VOGEL: I'm getting a little bit confused over the seven million dollars that's in the program.

MR. BECKJORD: The pressure vessels -- well, they were just picking a figure two years ahead.

MR. SHAO: 1996, '97, '98, it would be seven

million. Go beyond 1999, it will be -- at the year 2000 it will be three and a half to four million.

MR. BECKJORD: That's when we expect it will be completed by that time, so for the next two years -- I think eventually it will drop to three and a half million dollars.

The next is the aging of electrical, mechanical and concrete components. The program in fiscal 1994 is really five and a half million dollars, four and a half of it for the electrical-mechanical equipment and just under $100,000 for the structural. The work on the electrical-mechanical equipment aging is in the process of completion now.

It will be a figure of two or three million in fiscal 1996 and we expect it will go down after that to a maintenance level over the next couple of years.

MR. UHRIG: That includes the concrete studies?

MR. BECKJORD: Yes.

MR. UHRIG: That doesn't add up -- that's only four-six.

MR. BECKJORD: Excuse me. Not a hundred thousand, just under a million dollars.

MR. BUSH: Okay, I'll buy that.

MR. BECKJORD: All right, I'd like to go now to severe accidents.

MR. BURSTEIN: Excuse me, sir.

MR. BECKJORD: Yes.

MR. BURSTEIN: If there was no license removal activity would there be any change in this aging, if I may use that in quotation marks, research program activity?

MR. BECKJORD: Well, that's a good question. I think that of course we don't really know as yet what's going to happen on license removal, as to how much activity there will be. I think it is somewhat less than expected a few years ago, but I think it's still going to be substantial.

I think that the things that we're working on in this last program apply to both the matter of license removal and to the continued operation through the 40 years of licensed operation for the operating reactors.

So I think it's possible --

MR. BURSTEIN: I'm glad to hear that, because that's what the subcommittee of this committee determined. And for this reason did not feel there was any unique emphasis that needed to be placed on license removal aspects. But we needed these programs to address continued safe operation of existing facilities.

Thank you.

MR. BECKJORD: I think myself that as time goes on -- the situation is that we don't know everything about aging. There are going to be very likely some new matters

that come up which will require additional work, and we'll deal with them when we become aware of them.

MR. BUSH: May I make a comment in that respect. I think the work you've done so far is kind of what I'd call kick-started other use. For example, I would expect an expenditure of several million dollars a year in the aging area, an expansion or extension which you've already got in Japan, in the very near future.

So --

MR. BECKJORD: From discussions you've had --

MR. BUSH: Yes. There's a lot of interest in what you've done, and they're going to be building on that. And so then there should be a feedback which I think is very important.

MR. SHAO: As a matter of fact the Japanese approached us about a year ago to cooperate with us on the aging program. They want to piggy-back on our aging program, and they sent some more work.

MR. BUSH: That's right.

MR. BURSTEIN: We can get a lot -- I think we can get more milage out of your dollars in that respect.

MR. BECKJORD: We've had good cooperative programs with Japan, particularly with the -- their testing organization. But also with the -- as we'll see later with Jerry which I'm going to talk about -- that's a bird's eye

view of the information on aging.

Severe accidents, the comment that I make on that is that we have had underway a number of activities on severe accidents, including Mark 1, which you know all about, the Mark 1 containment liner for containment in pressurized water reactors. Several problems in hydrogen combustion that apply to the severe accidents and the PWR and also to the igniter performance. That's coming along very well.

We have a -- we had a part in a cooperative program on coolability of core degree. We've had our own program on core melt progression and we're involved in a cooperative program on the coolant interaction in steam explosions as well as nuclear explosions, ice condensers with combustion engineering, containments.

MR. ISBIN: What is the specific completion date that you're suggesting?

MR. BECKJORD: Well, I think the design series work is essentially complete, and I'll say essentially because the meeting of the peer reviewers was completed on Tuesday. And that's my understanding, that there are a few questions that should be answered.

With regard to the other containments, the other PWR containments, there are some questions relating to the combustion design, because of the configuration. With

respect to the ice condenser, I think that our view has been that some more work might be required on that. It might be useful to hear what comes from the meeting which was completed on Tuesday.

Farouk, if you could give us a brief summary of what passed with the peer reviewer --

MR. ATOURI: Farouk Atouri from the Office of Research. We had the peer reviewer meeting of the staff and Sandia and I&E on Tuesday. We did a discussion and extrapolation to other designs. We find that the peer review agreed with the process that we established for resolution of the DCH issue, some minor variation about what's in the report in terms of the sequences and the extrapolation.

Most of the concern was related to the extrapolation as far as design and replants. We find the issue is resolved. We're talking about type of plants, so we're talking about 23 of our plants of pressurized water. And the issue will be considered closed, but we have to make some more expanded discussion in the report to make it more defensible. And it would be more easily readable by an outside user.

We have design report, the serial report.

MR. BECKJORD: Are you referring specifically to the design report or are you referring to both reports?

MR. ATOURI: I'm referring to this, also though the meeting was specifically on design reports. The discussion varied over to the other reports, for the process is the same, we take the same approach to resolve the issue, and we analyzed -- both reports will be identical except in the area of the pressurization.

For example, you mentioned the ice condenser plants. We are not planning to do any tests with the ice condenser. We would resolve the issue automatically, so we need to do a more detailed depressurization analysis which we are doing right now to take credit for the probability of the reactor cooling system being at high pressure at the time of a failure. And we need to take credit of that pressurization for some plants when you talk about design and serial plants, our cost containment, and we do not have any problem with them.

Some other containment that might be smaller or have fragility or strength listed in tne design, we need to take credit for some depressurization analysis. The second report will be addressing differently from the first report.

As far as the test program I expect to finish the -- to answer all the peer reviewer recommendations sometimes in August of this year, and will issue the report in final form.

As far as the testing program, we are envisioning

only testing for the CE plants, because as Eric indicated they have different configuration from any previous test that we have done. We start in the design for the test for the CE type plant. We have peer review to review that design and we hopefully will start some testing this summer.

MR. ISBIN: Will you be issuing a report in August; did I hear that correctly? I wasn't quite sure.

MR. ATOURI: Absent any just delay because of summer vacation or something like that, it's August-September time frame the report will be issued for resolving the issue for design type plants.

MR. BECKJORD: In August the report will be issued?

MR. ATOURI: I think both of them will be -- it would be minor modification for the report, the recommendation of the peer reviewers.

MR. ISBIN: I'm going to ask one quick question on the hydrogen combustion.

MR. BECKJORD: Yes.

MR. ISBIN: Attending the CSAR meeting I got the impression that the hydrogen work is ongoing for several more years. So they're incorrect?

MR. BECKJORD: Yeah, the hundred foot shock to Brookhaven has had it's first test. I think it was in the last ten days.

MR. ATOURI: That's correct.

MR. BECKJORD: It's going to be going on for about a year and a half, maybe two years.

MR. ATOURI: Until March, 1995. The test program will be completed by then. Which is the agreement between us and we have to complete that test by March of next year. Whether there would be extension for that work or not I don't know.

The combustion program is just delayed because the Professor Shepherd moved from RPI to Caltech and that has caused delays, so it's still the original test program, the one envisioned a couple of years ago, but then the delay because by moving the equipment to Caltech. And it would be completed in fiscal year '95.

The igniter performance test that we -- we completed the last test this Monday and will be issuing a report about it in the next couple of months. So it's not really ongoing for long period of time. We're talking about less than a year from now. Most of the program that we have will be completed and activity will depend on the research program on the part of any area that we don't understand well, and we might if there is international cooperation, we might try to maintain some capability if the cost of conducting that research is acceptable to NRC.

MR. ISBIN: Has a decision been made on the large

base test?

MR. ATOURI: Yes.

MR. ISBIN: And what is the decision?

MR. ATOURI: The decision that the board meeting met in April and we agreed to continue the test. It's the last test of the existing agreement with the NRC that we have and that test program is going to be sometime this -- December, December time frame.

There was general consensus among the board members that there would be full activity to the base M3 in terms of showing full ability. There would be a need for additional tests to assess the different parameters. There is technical program to develop the test program as all of the existing programs, if M3 is successful.

If m# is unsuccessful then we'll have to go back to the drawing board and see how we can address the issue.

MR. BECKJORD: The M3 test -- our interest in this is a repeat of that earlier test at a larger scale. It will be conducted in about a one meter or a little over a one meter diameter.

The smaller scale test of course was stable and did not collapse and prevented water from getting coolant to the melt. And there's some reason for thinking that it's the size in excess of one meter, the crust will not be stable and it will collapse and the coolant interaction will

take place.

That's December, by December?

MR. ATOURI: Yes, sir.

MR. ISBIN: Thank you.

MR. BECKJORD: Well, overall the severe accident projects that have been underway now for six years I think are moving well. They are somewhat behind the schedule that we set for 1998, but considering the complexity of the questions that arise and the difficulties of carrying out the experiments -- if you may recall, in 1988 we began to sort of -- we did not have a really good scaling methodology to fill up, and that has been filled up and completed several years ago and that's been very helpful in most of this severe accident work.

The funding for accidents in this area is twelve million dollars. That will be going down progressively to a level of about six million dollars, I expect, in 1997. I am not sure what the final level of research will be in severe accidents at the maintenance level. And the reason I say that is that there are a couple of things which -- several things which are going on which may bring new questions on this work.

We will talk about CANDU later so we won't talk about CANDU in this context.

MR. KINTNER: What are those issues? I mean are

there other similar accidents that someone has in the back of his mind, or would require research?

MR. BECKJORD: No, let me explain that. When I come to CANDU I'll talk about CANDU.

With respect to the advanced light water reactors, we already know that phenomenon that are anticipated. It's just a question of accident sequences. We've gotten a quick look to the advanced reactors and we don't see any big issue on it, but that's not to say that, you know, some sequence that hasn't been studied before may turn out to be important, so there may be some additional work there, I don't know. That's the uncertainty that I refer to.

The other thing that I don't have a slide on but I will speak to at the end relates to the reactors in the eastern world, and I'm about to come back to that as a separate topic.

MR. TODREAS: I'd just like to say, one of the litmus tests on advanced light water reactors for Westinghouse is when you confronted with these little SCIs in terms of moving them low enough to move them off the research agenda.

MR. BECKJORD: Well, I think -- I don't want to make a prediction but I will give you something a little less than a prediction. We've had one test, actually the first test was to check the facility out. And they did a

test several months ago to see if they could get a steam explosion with only fifty kilograms of molten material coming down in the pressure vessel. And they did not get a steam explosion.

What they got was a very rapid quenching which took place at about a second and a half and a pressure rise which was consistent with that. If there had been a steam explosion you would have had -- the 600 would have been over and they would have had a shock wave setting up within a millisecond or so. That did not happen.

There was a considerable amount of molten metal and that fifty kilograms -- I don't know, the number may have been -- it was several kilograms, at least several kilograms.

There are going to be some more experiments to change the conditions, to change the pressures, to change the amounts of materials, water and molten material, and to vary the metallic content of it. And I think it's over the next year isn't it, Farouk?

MR. ATOURI: Yes. The current Federal program is going to be completed by December of this year. We are discussing additional cooperative research with a Federal facility, and will be proposing additional work.

We will be looking at the probability of having a vessel-fuel-coolant interaction. We are going to be

discussing with the TRC and ASPRE the potential for some explosive interaction.

MR. TODREAS: If I just may for the rest -- everybody else so that this issue is clear, first, the X vessel is still on the table because of the low pressure. But the reason I brought this issue up in the whole span of things is the general principle that this is a case where you can't run an experiment to prove it won't happen definitively. You can run a number of experiments that always show that the probability is low and never rule it out. And at some point after biting the bullet, and we've been chewing the bullet for twenty years -- and so when I say the litmus test for closing out these, indeed this is a very difficult issue to close out. But it typifies how one deals with the difficulties and finally reaches a conclusion in a regulatory environment.

MR. BURSTEIN: You die slowly by lead poisoning, otherwise.

MR ISBIN: Is that really an issue for you on the events --

MR. TODREAS: No, but it's an issue for me relative to whether severe accident issues can be merely closed out such that the research programs could be concluded and the funding level brought down.

MR. ISBIN: Yeah, I agree with Farouk on the in-

vessel. The problem is pretty well resolved. You have a CSNI report that indicates this kind of research may still continue in other countries with reference to it. But I didn't think that the X-vessel issue was really an issue. If I'm wrong I'd like to understand it.

MR. BECKJORD: Well, the X-vessel -- my understanding of the X-vessel situation is that you're going to get a steam explosion, but the question is, can a steam explosion from an X-vessel phenomenon cause container failure. I don't know of a way that that would happen in the configurations that we've looked at. There is no direct path in the area where the steam explosion might take place to the vessel, in the containment vessel perimeter.

MR. TODREAS: And that should be a base if proven true to conclude that the research program is complete. But will it be. Let's see.

MR. ISBIN: But you have research ongoing with reference to vessel cooling.

MR. BECKJORD: That's correct.

MR. ISBIN: And these are substantial programs.

MR. BECKJORD: Well, the vessel cooling would apply to future reactors.

MR. TODREAS: Yes, vessel cooling outside the vessel is independent in my mind of FCI research.

MR. ISBIN: Yes, I agree, I agree.

MR. TODREAS: I was just focusing on the plausibility and probability that we could close FCI, because if we could do that then that's an indication that we could run through the whole severe accident program in an effective way.

MR. VOGEL: FCI is restricted to nuclear and it seems to me those issues are really not closed, either. That's rough.

MR. BECKJORD: Well, the program that's underway, it is rough. And a possible extension of this we need to put more information on the table.

MR. VOGEL: Yes.

MR. ATOURI: We tried very hard to trigger a fuel-coolant interaction in the facility, we were not able even with a very strong detonator, we would not be able to trigger that system, so that's very important information, that although the previous assertions say that you can trigger a fuel-coolant interaction, but that case using thermite, it has a tendency to react but as a very large source.

MR. BUSH: Out of curiosity, how many molten items go into that before you get to the FCI?

MR. ATOURI: A lot.

MR. BUSH: Quite a few is what I've been told.

MR. ATOURI: Yeah.

MR. VOGEL: With regard to the serious accident, I'd like to make a positive statement. I think the progress has been very good on some of the experiments like this MACE experiment. They're a little bit on the heroic side.

MR. BECKJORD: You mean because of the size?

MR. VOGEL: Scale, yes. Tough.

MR. BECKJORD: Yes.

MR. KINTNER: A question everybody keeps asking is, is this really true? I mean are these various solutions going to result -- it's yes as far as you're concerned barring unfortunate and unforeseen new questions; is that correct?

MR. BECKJORD: Yes. There are two other aspects of it I want to mention.

George, can you put up the information on the severe accident code development and maintenance.

The committee was asking us as well as the commission asking the committee about the severe accident code development, and there are some statistics on it. It's number 16, George.

This is the employees working on each of the five codes, and it totals a significant of effort going into this as you can see, in terms of contract orders, development and maintenance of the codes and assessment of the codes. Also contractors and four full time people at NRC.

MR. KINTNER: Is this a total effort?

MR. BECKJORD: It's a total effort, yes.

MR. KINTNER: So thirty-four and a half full time --

MR. BECKJORD: Yes, and four from NRC. And I don't have the schedule -- let's see -- the completion dates are shown on the last slide for MELCOR work and system five contained in exhibit number six, so I think that we are moving ahead.

Any questions?

MR. KINTNER: Yeah. Is this the code development -- it happens in the code area -- it has to remain, I guess.

MR. BECKJORD: That's correct.

MR. KINTNER: Anything else, any new codes going to be required, or will they be significantly less than -- what is maintenance of a code?

MR. BECKJORD: There is very little research going on with this.

MR. ISBIN: What does that mean?

MR. BECKJORD: Well, I think it's analogous to the coding of thermal hydraulics. There are going to be questions, questions are always coming up that require some kind of response, and it's at a very low level that we think will be ongoing.

MR. KINTNER: You said a total effort on codes

will in fact be decreasing?

MR. BECKJORD: Yeah, I think they'll be going down to something like half. Half of what it is.

MR. TODREAS: The question presumes the answer. And I don't think you can -- we talked about this also. I don't think you can maintain a very strong active group in code maintenance that can respond unless you give them some research.

So that the reason I said that the question presumes the answer is you cut out any research and --

MR. KINTNER: Maybe we're talking about different kinds of research. I was talking about practical experimentation. You're talking about code research as a --

MR. TODREAS: No, I'm talking about physical research that goes along with the code. Whatever it takes to hold a professional group together. You need that.

MR. KINTNER: But there's going to be essentially an end to research in severe accidents. Does that mean we'll do research for accidents for the purpose of making data available to the code maintenance people?

MR. BECKJORD: Well, there are two other items which I have mentioned which I was going to talk about a little later.

MR. KINTNER: We can wait.

MR. BECKJORD: The question comes up, so there is something to say about severe accidents on CANDU, and something to say about severe accidents on the -- in the reactor types which are operating in the eastern world.

I thought I was going to take that matter up last just to --

MR. TODREAS: So you'll bridge this question.

MR. BECKJORD: Yeah.

MR. ISBIN: In this regard, since you mentioned thermal hydraulics, the first concern with ground rules, is the test report been made available to anyone who wants it -- can you mention that at this meeting or not?

MR. BECKJORD: Yes. It's available.

MR. ISBIN: Okay, the test group makes a number of observations at the end of it's report, which is equally applicable to severe accidents. In fact we had a code maintenance program, and they seem to be in a quandary as to what the proper course of action really should be, how to really maintain the expertise that you need, first within the NRC staff as well as contractor staffs.

They have certain suggestions which they're offering, including that not more than two contractors be involved at any one time on a particular maintenance. That these contractors could be a national lab or they could be a university or some other form of contractors, so that

they've been presumably trying to deal with this -- these are difficult problems. And they don't really come up with the final solution even though they have some recommendations.

So it is a task before you which will require considerable effort. And also they indicate direction from up above as to what you can really do to maintain world-class codes if this is really an objective of the commission. So the answer isn't obvious.

MR. BECKJORD: Well, I think it depends a great deal on what's taking place in the industry. But as you know for a long time there's been a contraction underway. I just came back from a conference in the Pacific, Pacific Basin conference a few weeks ago, and that's the first conference that I've heard of for a long time where there was very open and very good discussion of a major expansion of nuclear plants in and around the Pacific Basin.

South Korea, Japan, Taiwan, Indonesia, and the Chinese are talking enormous numbers. The Chinese are talking about an expansion of generation capacity in the next 55 years of between three and four hundred gigawatts of electrical.

They will start out initially entirely coal, burning soft sulphurous coal that they have in large

quantities. But their intention is at this point to build up as rapidly as possible a large nuclear component which on the other end in about 50 years will be supplying the majority of the plants. And they plan to do it based on an industry that they will develop in China, but based on foreign technology.

So I don't know -- from that and other reasons there is a lot of interest in light water reactors and their development here in this country, and -- so that's betting on this, but I see more interest and also more work related to that concept.

MR. KINTNER: Somebody would pay you to do that, having it built in Taiwan? That's hardly a reason for the NRC to do the research.

MR. BECKJORD: That's right, but I can't give a detailed plan as to how that's all going to take place because I really don't know at this point. But I see that those interests are evolving over the next several years, and we're busy right now for the next couple of years finishing up what we've just undertaken. And the advanced passive systems will be carrying on.

MR. KINTNER: I can see some interest there, reality is interesting, eastern Europe or the Pacific Basin, the United States having established a light water reactor technology, having had leadership and regulation for

a long time, may have some reason to continue, to be paid or maybe some other -- the United States maintaining a research activity in the regulatory field to go beyond any domestic need.

MR. BECKJORD: Well, it's a plain fact that the U.S. technology and regulation are regarded as the standard around the world. A lot of people have been saying that that's not so, that we're slipping and everything is going away, but when you go to these conferences you find out what the real situation is, and that is the real situation, imposing regulations and the technology. No question.

MR. MOLZ: We need activity, funded activity to support this code maintenance. We've gone with the idea that you can't trust just anybody in saying your job is to maintain this code and then just sit there and play some games or something. You have to integrate with this wave of development in some way, it will be a way of maintaining the activity level of code maintenance, and maybe some improvement.

MR. SPEIS: One of the elements of a management program, work is to be accomplished some configuration. We have taken the first respondence with the task force, with the elements with our program.

I think one of the elements of the future is foreign activity. The French, the Italians will probably be

selective in their participation and so if we have to we might get some information that will cause a more than equal belief in the United States.

I've talked with some people who know what's going on to be addressing some of these questions, so in fact we're trying to recruit them, too. Transmit to them our experience and our insights of how you define experimental programs, or at least tell them what are mistakes.

And so that's going to be of continuing importance. I think maybe we need a more sustained discussion.

MR. MORRISON: Would you prefer that discussion this afternoon?

MR. SPEIS: Yeah, we could talk about it. We could use that as the basis for thermal hydraulics and Farouk and I can discuss some of our ideas. And Mike and Larry can discuss about, you know, what is there also. But it has to be real, people have to be doing something real in the foreign --

MR. BECKJORD: I think we can spend a limited amount of time on that this afternoon. I think we'd better schedule it at a future meeting to go into it in more depth because of the various other things that we have to deal with. We have a paper on some hydraulics and a few questions we may speak to, it might be useful in questions

that might come up with the commission, but the other areas -- we could define the elements of each of the areas.

MR. ISBIN: I want to share an additional comment. It has to do with these reports to Eric and it also involves the subject at hand, and this involves the time that staff will be devoting to financial matters. The task group addresses this, and again finds that this is a difficulty, a major difficulty. The NRC could maintain leadership in these matters, but these would be conflicting areas.

MR. BECKJORD: Well, I planned to address that, but it's part of the presentation in terms of maintaining the expertise within the NRC staff. What I would say about that issue is that we're in the process of downsizing. We're probably going to go down even further. We'll touch on that a little bit later.

But one of the things which I think is necessary to go along with downsizing, in view of the procedures that are in the NRC manual, contracting and all records, I believe that it is possible to go back and revise those procedures so that we can reduce the paperwork. We can do the essential things that are required by the government procurement regulations, but we can do them more quickly and more efficiently.

I think it's a necessary part of the agenda, and we'll have some discussions at the management level to

undertake review and revision of the procedures. That is something which is going to be -- that isn't going to be accomplished tomorrow. It's an activity which I think will probably take a year to complete. But I think it's necessary. And I think it will enable the commission and it's office to conduct it's business more efficiently, so I'm hopeful about that.

MR. MORRISON: I think you're on the right track. The same issue has come up in the work matters between the Environmental Protection Agency, because there was an internal analysis done or actually a questionnaire was sent out to every individual who was participating in research in EPA, how much time was spent on those kinds of activities. The feeling was it was 40 or 50 percent.

The questionnaire results came out somewhere between five and ten percent. So I think it could be the same thing within NRC, that there's a lot of complaining, but when you ask a person just how much time and effort they're really devoting to it I think you may find it's a smaller number.

MR. VOGEL: It may seem like more because it's unpleasant.

MR. MORRISON: That's true. So I would just say that you go forward in this process you're talking about. It's a good thing to keep in mind. It's reality versus --

MR. VOGEL: It's maintaining the expertise. It's not a new subject to this committee. It's been on for some little time. I'm very pessimistic as this is the end of the 20-year period. If one could do this it might be a good idea to think through, because if we look at it from the viewpoint of the people working on the problems -- it's a pretty deadly thing to ask some capable people to do.

With maintaining expertise I'm very pessimistic that it may be successful, or anybody would be successful.

MR. SPEIS: It's something that has to be evolved. You can't define everything today.

MR. MORRISON: We're coming back to where we started. It would be sort of good to spend a half-hour this afternoon really dealing with that, the principle levels that you're evolving and explain this activity.

MR. SPEIS: We'll make this paper available to you and you can get this basis we're discussing. I think it's with the commission's -- it may be confidential for the committee to respond --

MR. BECKJORD: We can't -- we're not releasing it but we'll make it available to the committee.

Okay, we'll go on to ROSA which --

MR. BUSH: Well, it might be a nice time to take a break here.

MR. MORRISON: A break might be better at the end

of ROSA, we could tie it in here.

MR. BECKJORD: I can cover ROSA very quickly. ROSA is on schedule. The first full test was held in April. There was another test which was due I think yesterday. The test that was carried out in April was a small break in the cold leg which caused a lot of excitement over it, because the first information that came out was that the core had uncovered for about ten or fifteen seconds.

A review of the data has been completed now and the conclusion of that is that the core was subcooled throughout the transient and it did not uncover. There were some other interesting aspects of the behavior which are explained by flashing of the condensation of steam.

I think the test yesterday was to be a test of the automatic depressurization system opened inadvertently. The shock system was thumbs up, so it was as expected, I guess. Pretty much a repeat of what we saw in the first test.

We're all very pleased with that program because it is on schedule and is on budget, too. The commission was very -- really pressed the point about the budget and they accepted a ten million dollar total budget for that program for the expenditures.

As that program stands now it's going to cost a little bit more than that ten million, ten-point-five million dollars.

There are three things that have happened which lead to that increase in cost. One is anybody who has been following the Japanese yen versus the dollar knows about that. The second point is that the applicant has changed the design in a number of respects making it necessary for us to replace piping and some internals, and that was all done. That has been paid for now.

And then finally the Japanese put a tax, they enacted a tax which by their interpretation applies to this. We had to add three percent to the job to pay for that tax.

So what I'm telling from my point of view, gentlemen, it's on budget. The program will be -- there are approximately twelve tests and the first phase will be completed in January of 1995, and there will be a follow these, too, on that program.

There may be some additional tests. I think that the discussions are -- there will be a phase two. That's not the only test which is underway. We issued to Purdue for a test which is called PUMA, a test of the General Electric SPWR system. The contract is well underway now and that facility will be completed I believe early next year and will be getting underway with its testing program.

We have talked about the thermal hydraulic codes and the maintenance thereof, and I think it's agreed that we're going to have a brief discussion on that this

afternoon, so I won't say anything about -- we'll go over the slide and use it in connection with the discussion this afternoon.

If there are any questions on ROSA or PUMA that you want to raise at this time?

MR. GOLAY: Could you tell us what are the kinds of induced motions?

MR. BECKJORD: Lou, would you explain that. It has to do partly with the core makeup.

MR. SHOTKIN: It was caused by the motions across the core that fluctuated because the coolant passed the DP cells rather than -- and the core uncovering, some condensation was taking place at several points in the system within only a few seconds of each other. And a very quick motion was induced as the fluid passed the DP cells. But it did not uncover the core.

MR. MORRISON: If there are no other questions let's break and reconvene at about five after eleven.

(Brief recess.)

MR. MORRISON: We'll go back to Eric Beckjord's presentation.

MR. BECKJORD: I'm going to try to move along faster now to get on with the business. The next slide.

MR. SEGE: It's out of order. Should I put up number five?

MR. BECKJORD: Yes, that's the next one. Perhaps we covered this right before the break. This shows an issue that came up recently for the AP600 and the SPWR in which NRR delayed the completion of the review for certification for both of these reactors, and the dates are shown here.

This amounted to just over a year for the AP600 and just over a year for the SPWR. I know that Westinghouse met with NRR in a public meeting last week to discuss the situation. They reacted strongly to the schedule delay.

NRR had made this decision based on the slip in the submission of test data from both programs to them for review. My understanding is a provisional arrangement was discussed between NRR and Westinghouse that covers most if not all of the schedule. By means of splitting the submission some of the test data will not be available for -- - early enough for the original schedule.

What I want to talk about now is the possibility of two submissions of information which would enable us to -- -

MR. BURSTEIN: Is this the vendor's test data?

MR. BECKJORD: Yes. In the case of Westinghouse it's the SPES test. In the case of GE it's a larger suite of tests that they have. So I pass it on to you for your information because I'm sure you'll be hearing about it. And a decision is in prospect on schedules. This slide

raises --

MR. KINTNER: That doesn't affect our own -- I mean it won't affect our own schedule, will it?

MR. BECKJORD: It won't affect our own schedule. In fact our testing schedule for the AP600 like I said is on schedule.

MR. KINTNER: This raises a point which I mentioned before about which one ought to be done with notice of throttle design approval, it's about -- well, the rest got 15 months, 16 months, but certainly not past 18 months for certification hearings.

There are a number of questions which have not been resolved in terms of a final decision by the NRC which I think are going to be quote, litigated, in these hearings in which research data may be required.

For an example, source term. If they change the source term it's legally required -- this is based on a revised source term, which is a major change. And if the anti-nuclear forces are as smart as I think they are they're going to attack that with both feet.

The certification process hearing is going to run into hard technical debates, and the question is whether the research necessary to support those issues has been done. It's at issue now, but we don't need to answer it.

MR. SPEIS: You know, this is a question of source

term, because they're all source terms. And part of this is working openly with the industry and with the public to codify that.

MR. KINTNER: But I think -- at least it was when I last was involved -- the final codification will come from the certification.

MR. SPEIS: Yes.

MR. KINTNER: And so that the question is the source term and the basis for it will be, I think, if those guys are smart, they'll beat this to a fair-thee-well. And that's just one example of many of these issues we've been talking about.

Core coolability, there are questions of core coolability and the reactors and those are in the hearing process. The opportunity exists to be attacked --

MR. SPEIS: Well, we done -- it's homework and there's no other way.

MR. KINTNER: I'm not saying you haven't. I'm saying that I can see these being major challenges to it.

MR. BECKJORD: We've done work on both issues. The work on the source term is completed. And we did a review of the source term, but we're also involved with a lot of information so we're going to be in very good shape on that.

And I think that this program that we're doing for

both the AP600 and the SWPR will answer some questions related to the reliability of the core coolant performance.

MR. ATOURI: The testing program of the Fed board would affect the assessment of our containment analysis of that. The change in the schedule will have some impact.

MR. BECKJORD: That reminds me of one thing, I didn't mention the testing on containment structures which I had intended to do in the context of severe accidents.

As the ongoing members know, we've had a testing program on containment response to severe accidents. We have some work which is underway in cooperation with the Japanese now. It will be in testing in 1997. That's in the prestressed concrete containment. And also the Japanese are funding a test of a PWR steel containment. I just mention that for your information to say we have not left out severe accident consequences of containment. We have not left that out of the program, that's an ongoing program with these containments and structure types.

Well, I'd like to move then to the next topic which is the I&C. Just to give you a very quick summary on where that issue stands.

As I noted earlier the digital instrumentation and the controls, our current software qualification is over the areas that we're behind in that we have to play catch-up for. The catch-up is really two things. First of all there

is a study which the National Academy of Science will carry out for the committee to produce a workshop on the National Academy Report.

Our schedule for this has been upset somewhat, and I'll tell you where we stand on it right now. I had expected in December that we might have a contract for this study in place by the end of January. It was necessary to delay that for two months because of some internal questions that had to be resolved which we did resolve.

And the National Academy was thinking about the proposal and they have told us in March that they would have a report in our hands in May, at this time. We have a letter for the contracts officer who is the person that we're dealing with right now at this stage informing us that the National Academy proposal would be delayed until their board had approved the proposal, and the board meeting was going to be in the middle of July and we would assume we would have the proposal. Instead of now, in May, we would have it in July.

I told our procurement officer that it was unacceptable, that if the review process which they now are telling me about takes place then it could be till the end of 1994 before we would even have a contract on that because we have explained that what we receive from the National Academy, we intend to review it and may want to make some

changes in the request in order to make sure that we derive from this what we expect to derive from it.

And if we consider this feed-back loop on top of their delay, and then another National Academy review and feed-back and board approval, it could be the end of the year. So I suggested to them that they find a way in their system to carry on theses activities on a parallel.

What came out in the course of the discussion yesterday with our procurement officer is that in fact the proposal is not ready and there was no plausible explanation for its delay. And the reasons that this proposed schedule is unacceptable is that we had planned on having this matter concluded 14 months from last March. And as you can see this completely throws that into a loop, and it would be little if any use for us in certification.

And so I am attempting with our procurement officer to get this matter back on track, and that's about all I can tell you about it now.

MR. KINTNER: Was any excuse given for this? You've been talking to them for months and they seem to have had lots of advance knowledge and discussions. Why haven't they got it started?

MR. BECKJORD: Well, I think there are two explanations, but the first one is simply that their proposal wasn't ready and they didn't tell us until the day

before yesterday. That is in fact what was told to us. They said the review procedure was -- it was evident from discussions that subsequently took place that the proposal was in fact not ready. Part of it I believe is ready but part is not.

Apparently the board -- the requirement for a complete final board approval comes from the fact that more than one commission is now involved in the study and the commission on engineering comprises the instrumentation but not the human factors effort.

The officer there told me how this would take place. And apparently the -- there is a principal commission but there are two others that are involved. And apparently the Academy decided they wanted a complete board review on it before it came out.

So I am sure they will have their board review. But what I am proposing to them is that we undertake these -- the commission review and approval and their board review and approval -- in parallel to one another in a series -- rather than in series. And I hope that will help to recover some of the schedule. We'll have to see about that.

As you know, there is one other matter that you may be asked about by the commission tomorrow. And that is the human factors matter that your committee discussed at length in January.

Subsequent to that discussion I included the consideration of the person-machine interface to be part of the study. The ACRS at their last meeting at about the last three minutes of the meeting, the chairman said to the commissioner, by the way, there are three other matters I want to advise you of. And one of the three was that the ACRS had objected to including this aspect of human factors in the study.

The Commission asked the ACRS to review the study and the ACRS responded by saying they would review the proposal, which they will receive the proposal. I'll make it available to the ACRS for their review.

But there is a clear difference of opinion between the ACRS on one hand and this committee on the other hand as to whether that topic should be in this study or not in this study.

And I talked with Chairman Morrison and Chairman Kintner about it, and that's one of the things we're discussing. And I think it's important that -- I presume from our meeting in January -- I know from our meeting in January that you have a strong view of this topic. And I presume that you still have a strong view of that subject which you may wish to share with the commission.

MR. BURSTEIN: So in addition to the National Academy having its own internal divisions between

commissions, we have it on advisory committees to the NRC.

MR. BECKJORD: Well, my suggestion would be not to -- I wouldn't propose that you would go into the schedule discussion that we're -- I think that's something we have to settle. But I think the other question is something that is certainly --

MR. BURSTEIN: My concern is always having two different groups trying to do some analysis or recommendations on the same subject. There are bound to be differences.

Is it correct, Eric, that originally the request of National Academy included no significant human factors aspects?

MR. BECKJORD: That's correct.

MR. BURSTEIN: And it's now been modified to include them?

MR. BECKJORD: Subsequent to the meeting in January, yeah. I included it in the scope. I included it in the fall of -- I asked them to address it and to give us their best thought of what part it might play in the workshop.

And when we received their proposal there would be -- in the first three months in the evolution and preparation for the workshop we would discuss with them the scope, and to be included, this human factors issue. And

then we would decide before three months was out exactly what would and what would not be in the scope so that they could carry it out.

And of course we can't do that until we see the proposal.

MR. BURSTEIN: It would seem to me that that scope issue is important in determining the duration of the effort, its cost, and what were -- some of the results will be available when you need them. So I think that's an important issue, and I see you're sensitive to it.

MR. GOLAY: What is the basis of the ACR's disposition?

MR. BECKJORD: I can cite the ACR's record. They have reviewed the advanced designs, the ALWRs, including the instrumentation. My understanding is that they were satisfied with the material that had been submitted to them for the purpose of certification. I could stand corrected on the details. But I think that's a general case.

Their issue had to do with the software. Actually I think we have somebody here from -- Frank, do you want to comment on this?

MR. COFFMAN: Frank Coffman, RES division systems research.

The ACRS had initiated their concern and focused on the software. They had meetings on the software.

Separately they had reviewed what -- NRR has developed a program review model which is focused on the integration of the human system interface.

The ACRS -- the full committee had reviewed that program review model and was interested strongly in it as an example of how other integration could take place in this broad area of the human system interface.

So it was in January that they wrote an endorsement of this program review model for integrating human system interface, and I suspect it's on that basis.

MR. BURSTEIN: Are you saying -- if I may, Mr. Chairman -- that ACRS has decided it has resolved the human factors issue and doesn't need to revisit it?

MR. COFFMAN: The scope of the ACRS endorsement as I understand it --

MR. BECKJORD: No, I think -- I didn't hear that. What I understood was that they had in mind what the scope of this National Academy study should be, and that it should not include human factors because it would dilute it and maybe extend it -- a lack of focus.

MR. BURSTEIN: Well, I thought there was another reason which might be that they had already decided that the NRR model which included how to deal with these issues was so well-endorsed that it didn't need to be addressed further.

MR. COFFMAN: They did not come right out and explicitly say that in discussing the scope of the NES study. But they have explicitly in writing endorsed the program review model that NRR has, which has as its purpose the full consideration of the human and human system interface.

MR. MORRISON: Tom Hatcher?

MR. HATCHER: I was going to comment on the process that the National Academy -- most of you may be familiar with that, but -- to propose other staff activity another approval process can be done by overnight mail, fax or whatever prior to a board meeting. But that depends on the board, I guess, the way they're operating, how they feel that should be done.

MR. BECKJORD: Well, the letter that we received referred to a board meeting in mid-July and it said that --

MR. BURSTEIN: They could have a board meeting and they could have it a month late and they could have them by phone, like in ad hoc situations. If necessary they can move -- but I think what you said earlier, mainly that the staff wasn't ready, is really the key to this.

MR. BECKJORD: That is my inference. That's the conclusion that I draw from the discussions that I had yesterday, that the proposal wasn't ready.

MR. BURSTEIN: And you also noted that the

complication of having more than one commission or board overseeing this work adds a complexity.

MR. BECKJORD: Yes.

MR. BURSTEIN: But it shouldn't be altogether three months.

MR. BECKJORD: Well, my suggestion is that this issue is going to be worked out and I wouldn't refer it --

MR. BURSTEIN: Well, if you need any help in that area there are a few people sitting around this table that are just itching to do so.

MR. BECKJORD: Okay, good. Let me find out what the procurement officer has been able to achieve and if it's short of what we need we'll get to you.

MR. BURSTEIN: How do you feel about a study from NAS that excludes this -- the human factors concerns, the man-machine interface?

MR. BECKJORD: Well, I have to tell you that since we had outlined and initiated a study last fall without that, that I was then satisfied that we were getting what we needed. It was clear in January that the committee felt so strongly on this issue that it was on the point of making some decision.

I concluded from that we should -- if this committee felt that was so important that we should include it in the scope, and that's what I did.

MR. BURSTEIN: Is it possible that this could be treated as two separate investigations or inquiries?

MR. BECKJORD: I think that would be possible. I think the advantage of trying to do it together is that if we can't reach an agreement on the scope and get the activity underway -- hopefully a schedule which is more responsive to our needs -- that then we would have a conclusion in the time when it would be useful.

If we now separate the activities, the lead time on it is such that the one would follow the other by at least six months.

MR. MORRISON: I think that that would defeat what I felt the purpose of raising the issue was the last time. Those three -- hardware, software and human factors -- if they stop looking at that system and split a part out you fail to address either the advantages or the disadvantages of the advanced system.

MR. KINTNER: It also seems to me to diminish the intent which has been around since Three Mile Island, to make the man a part of the system and to set up a human factor of organization and research in order to highlight that. And now in view of a number of numerous additional points, the man-machine interface ends up in a tragedy.

With modern electronic equipment now you're going to look at this simply as digital hardware and digital

software, and I'm not saying that that's not an important point. Nor do I think that as a subcommittee that we'd like to take on the ACRS head-on, but it seems to me this is one of those that's going to come back after the burials.

MR. BURSTEIN: I'm trying to get at a means of having our cake and eating it. I think there's no dissent around the table as to the importance of human factors.

MR. MORRISON: Pandora is out of the box, is what Eric is saying.

MR. UHRIG: Isn't this pretty much a one-shot? We're not likely to get a second study coming out of this. We pretty much have one study that's going to go and that will be it.

MR. BECKJORD: I think there is one study which would be useful for purposes of certification.

MR. UHRIG: And that's the main --

MR. BECKJORD: That's right. And there's new information, at least I've talked to some people who feel that this incident in Iraq raises some big questions on the very point that the committee raised in the January meeting. That's happened since January.

MR. BUSH: Just a comment. In the FISC program we finally finished the human factors one, and the obvious answer is to take the human out of the loop essentially entirely. And it go to an automated system because results

were so poor.

If you run into that situation it's going to be a very difficult thing. So where do you go from here?

MR. BURSTEIN: Well, that's not unusual. We have in some European designs, we've had some shutdown or safety systems in which human intervention is precluded for very specific periods of time.

The concept has been addressed. We've adopted a different philosophy here which may have to be revisited.

MR. BECKJORD: The human factors I think are past that at this time, because we just discussed it today. I think we all need to be talking about it at the end of this meeting.

The generic issues slide here -- I put that up because there's been as you know a big effort to resolve generic issues. We've resolved in the past year 14. There remain 19 unresolved, classified according to high, medium, nearly resolved and are prioritized as shown.

And of these issues remaining -- by the way, some very important ones were done last year. I think the most important issue was to the vessel support question which many of you are familiar with, the possibility of embrittlement of reactor vessel supports.

That has been resolved by a piece of detective work which is -- which I can say is widely accepted with the

data that the original concern was based on. It was thought to be incomplete and that the inferences that were drawn from the test reactor vessel were not applicable. And the support issue to make a long story short is --

MR. BUSH: Eric, there used to be a green book on these things, you know, that would tell the status of various ones. I haven't seen anything. Where are these listed in the -- with regard to resolved, unresolved?

MR. SHOTKIN: It's a nureg, 0933, that's published very six months in the sense of an addendum to the book. And that continues in publication.

MR. BUSH: That's the old green book?

MR. HELTEMES: Well, I think they changed color, but --

MR. BUSH: Well, I'm pretty old, you know, colors change. So they effectively show the status there and the bases for resolution, correct?

MR. BECKJORD: That's correct. Of the remaining issues there are probably several courses of action. Some of them -- several of them should be written off because they really -- the conclusion is that they are not really important questions.

Several are being addressed in a different fashion by textbook matters. If there are any questions about that --

MR. BUSH: A comment. I used to chair a committee that reviewed these things back in the late '60s and early '70s. I hope that all those issues have been long since resolved.

(Laughter.)

MR. BECKJORD: We have made a determined effort which I think as this page substantiates has paid off. And this activity is phasing down rapidly. Joe, when will be able to say that we're done on the issues that are outstanding?

MR. SHOTKIN: Well, of the list that you have here of the 19, about seven of them are at some state of near completion right now. Either a draft rule will be issued for comment which would go all the way through the process, some of our technical work, or we found we have some of them that are over ten years old. And so we've gone back to the originators of the generic issue as time passes by.

One of them for instance was an ECC thing. I would hope that one of those revisions solves the problem. So we're in the process of going through that just now.

There is one on the list here that has just been prioritized, the one on safety of valves.

The final paperwork to get it resolved, the final memo of these actions will be forthcoming.

The second one is the after-coolant seal, where a

proposal will be sent to the EEO hopefully within the next week. This has been a long drawn-out thing. This would be a performance based rule that gives the option of showing that the risk from pump seal failure is low, providing coolant to the seal.

And then the third one is a new one that was just prioritized a few months ago on spring-activated safety and relief valve reliability.

And with that one springs fall in essentially -- there's been a standard assumption made in PRAs that goes all the way back to 1400, which says if your -- if a connecting line to a system is less than one-tenth the area of the line that you could ignore it, because you wouldn't have diversion. And I'll take the credit for making that assumption in 1400, so it turns out as a bad assumption.

It's a good assumption if the pressure drops the same, but if you get a situation where you get a 2,000 PSI line leading to a tank that's at atmosphere pressure it's a lousy assumption.

And so there are places in PRAs where the assumption has been -- where the failure of a relief valve can disable a system by -- a bypass flow can disable a system and occasionally in some systems that can defeat, you know, the independence.

So this is to go back and look at this to see how

big a problem it is.

MR. BURSTEIN: Discharge piping?

MR. SHOTKIN: Yeah. Well, the problem is that if the relief valve fails to open on things like a high pressure CCF line, then you wind up with a diversion going back to the refueling water storage tank instead of going where you want it.

MR. BUSH: Bypass flow problem.

MR. SHOTKIN: Yes, bypass flow problem. We get a very conservative prioritization which gave us -- as a matter of fact the screen -- we have started that investigation now. We're starting off with a relatively small step to look at the data associated with valve failures to see whether the failure of the valve as such is a problem. Because what we're finding is you go to MRPS and you say what's the probability of a valve failing open. They include the fact that it cracks.

And that's -- we're really interested in something that fails open so you get a large diversion of flow.

MR. BURSTEIN: Have you talked to the national --

MR. SHOTKIN: I'm not sure who they've talked to.

MR. BUSH: The national board would be the one to talk to, because they do most of the valve testing, et cetera, and I think they have the statistics, the ones that you want as contrasted to the MPRDS. Now, that would

include nuclear and non-nuclear, but I think it will give you what you really want.

What you would like to do is to come up with a probability of failing and remaining open. And then see if the number is too high to be palatable.

MR. SHOTKIN: Yes, exactly.

MR. BUSH: My guess is it's about ten to a minus two or ten to a minus three.

MR. SHOTKIN: For our prioritizations we use MPRDS and I know that's a conservative number.

MR. TODREAS: Is it always a two-phase discharge or a single-phase and two-phase, because it makes a difference.

MR. SHOTKIN: I would think you probably have to look at both in terms of the -- but those are the three highest.

MR. BECKJORD: Well, just to say that this program is moving along towards completion.

MR. SHOTKIN: I think it's moving well towards completion. So that brings us down to the -- I think we're progressing right along.

We have I guess four items that are not prioritized yet. We're in the process of doing that now.

MR. BECKJORD: Any other questions?

MR. YUKAWA: How many new ones come up per year?

MR. SHOTKIN: We're probably getting four or five new ones to prioritize and on that prioritization we may end up with may two, two or three.

So as far as budget projections we're assuming that we prioritize five and do two. That's about what the historical record shows for the last year or two.

MR. VOGEL: You're resolving two and --

MR. SHOTKIN: Well, we'll be resolving two to three -- what I'm saying is we get about five in and we resolve two to three, and then you know, hopefully we will eventually get to the point where we resolve two or three, too. You know, this last year we've been dealing with 14 or so. But we're still quite honestly working off a backlog from TMI.

MR. ISBIN: Mr. Chairman, I would really like to compliment them on this one, because this problem has been with us a long time and there's a tremendous backlog. To see how much progress has been made I think is a major milestone.

MR. BOULETTE: I'd like just to clarify, the backlog is not growing; is that correct?

MR. SHOTKIN: Well, the backlog is not growing. It's -- the backlog right now in terms of prioritization is down to four. We only have four that are unprioritized, and of the 19 that are going I have -- eight of them are almost

out the door.

MR. BECKJORD: Well, it seems to me that the backlog in 1988 was close to 250.

MR. SHOTKIN: Yes. We've been driving it down pretty good.

MR. BECKJORD: Okay. The next one is CANDU. I'll just speak briefly about this to bring you up to date rather than try to explain the issues. The atomic entity of Canada has established a U.S. subsidiary that has been acting for perhaps three years now, really since 1990, in prospect of the licensing review of the CANDU 3 reactor for application in the United States.

Because this work was considered to be a pre-application review which is what EEC originally requested it was not on a very high priority with the agency. This spring EEC advised the commission in a letter that they would apply for certification, and that application will come in in late September or October of this fall.

We together with NRR have prepared a commission paper on what this means in terms of NRR resources for review and scheduled for that review, and in terms of research required to answer questions on the applications and research that is of a confirmatory nature.

That paper is before the commission now. I think that will act on it -- undoubtedly act on it sometime this

summer before the application itself is received.

I don't know exactly what the commission decision will be. The matter is a very complex one because of the considerations of the Free Trade pact that we signed several years ago, but also because of the fee issue. There are some differences between the situation with respect to advanced reactor certification between the applicants within the U.S. on the one hand and the ECL in Canada.

The principal one of course is the fact that much of the work related to U.S. applicants is generic in nature, applicable to other reactors in this country, whereas by and large I think the questions that arise with CANDU or CANDU 3 are not generic.

So there's a question of how this review would be paid for and how the research might be paid for, and the research is considerable.

We have estimated that over a five-year period it could amount to eighteen million dollars of effort based on our estimates. Now, of course the decision will consider various -- the research could be done in various ways. It could be done entirely in Canada paid for by the ECL. It could be done entirely in the U.S. paid by the U.S., although I think that would be unlikely. Or then it could be some combination in between, and because of the differences in the reactor technology there are really two

problems.

One problem is that the NRC does not have experience in licensing the reactor, the CANDU, which everyone thinks has a horizontal core and a positive void coefficient.

And then there are related to the two things that I mentioned the possibility of more extensive research, for example the positive void coefficient which does not generate well at all. It's not generally well-known that a header break with a failure to trip the control rods, reactivity control systems, that a failure of those systems, there would ensue a serious severe accident.

And of course the ECL is well aware of this and has satisfied themselves and their regulator with the proficiency of their reactivity control systems which they maintain are extremely reliable.

In the case of the U.S. I think where the questions would arise is the following one: For U.S. reactors the -- accidents of this kind -- how the commission would deal with this question I really don't know. I can't tell you what the answer to that question would be. But it certainly is one that will be looked into and as a consequence it could lead to substantial research effort.

The commission is going to be deciding this summer, and what I said earlier in severe accidents that

there were a couple of activities which might bring up a new agenda on severe accidents and CANDU is one of them.

And that's really about all I can tell you now except to say that that effort could be substantial as indicated here.

MR. KINTNER: I'm very interested in why does the ECL want to get NRC certification? It's obvious -- I think they're not going to sell them in the United States. Is this the beginning of what we were talking about earlier, the NRC being mercenary, a hired --

(Laughter.)

MR. BECKJORD: Well, I think that I can give you two answers. One is the AECL has said that they intend, they believe there is a market for their plant in the U.S. And that they're working on developing it. So that's their intention.

My own view is that in addition to that they are undoubtedly interested in the U.S. certification because of the international market. But that's my personal opinion.

MR. UHRIG: This is CANDU 3 with 450 megawatts?

MR. BECKJORD: Yes.

MR. UHRIG: There was talk of going up to 600.

MR. BECKJORD: I think they were looking at, you know, upgrading.

MR. UHRIG: They were talking of going up to 600.

So it would be 600 --

MR. BECKJORD: But the certification as I understand it, their application would be the CANDU 3. I mention this because this is one of the -- the point of the discussion being that there are possible additional calls on research which would if they are realized in whole or in part require research effort that would be available at the kind of funding level that we've had for the last few years because of other programs phasing out.

So then it becomes a question of if the commission decides -- depending on what the commission decides how that would be paid for. That's a major issue.

MR. BUSH: Eric, it sort of seems to me that the hidden costs of the FTEs would be a tremendous burden.

MR. BECKJORD: Well, that's right, because it's not -- I didn't -- I haven't given you the NRR numbers yet.

MR. BUSH: I know, I'm just saying that these are what I would call the ones that are under the table, but --

MR. BECKJORD: Yeah, this is not a complete setting forth of the costs. Those are outlined and we can provide you with the commission paper. I think those say it all.

I'll mention briefly -- I'll say briefly because I'm running beyond, but I think we've had a good discussion on these issues -- here are the personnel projects based on

-- for the division of research. I should note that there are four divisions here shown.

We have submitted -- discussed with the committee earlier a reorganization plan which would move into a three division organization for research which is consistent with the downsizing which is in fact underway right now. And which I think I expect further downsizing in accordance with the presence of the executive order.

So out of those numbers it would amount to another ten percent under some possible sequences. What we have to do is to cut the management overhead and the direct overhead to maintain these numbers at maximum effect of work force. And we have submitted a plan which asserts that process to the commission, and the commission approved it for purposes of discussion with the union which we -- that was again yesterday. If things go well there we could be operating in this reorganization by -- it could be approved for implementation in the fall.

But there are ramifications beyond the reorganization in the fall. We will be undertaking a gradual change in the management within the office of research, which by the way will be taking place in the other commission offices to address the issue of the working staff, the managers, which is now between three and four up to a target of about nine in the next five years.

So that we'll have important ramifications. I think we can accomplish this if we can at the same time accomplish what I referred to earlier which is a careful review and revision of the manual chapter requirements. Things like procurement, project management, accounting for the projects in both national and international laboratories.

I think we can do that and maintain our effectiveness. One of the things that we have to do because we are now in the mode where attrition is beginning to increase again, we have a number of people who are approaching retirement, and if I look ahead say five years there at the end of five years there will have been an opportunity to bring new people into research in fairly good numbers.

We need new people. They are available on the market from the young and inexperienced with degrees to people who are career people. The problem is that over the next five years what I have in mind doing as soon as the organization question is settled is to request the approval of the executive director to hire people in specialties that are urgently needed to take people over our authorization, because in a few years time, certainly within five years through the attrition that will take place that will take care of the staff openings.

And personally I think that we'll get approval to do that. I can't do that before it's approved, however, so hopefully by this fall we can accomplish that.

MR. KINTNER: Attrition is going to be more than five during this year, isn't it?

MR. BECKJORD: Yes. I'm saying attrition is increasing now.

MR. KINTNER: That's what I mean, so even with this set of numbers you have the opportunity for some new blood or --

MR. BECKJORD: I hear you, yeah. But I'd like to get five as soon as possible over authorization because the excess will be worked off pretty quickly and we'll be able to pick up more, but with the current situation -- I can't get approval to hire. I have to get special approval to hire. See, we're about four or five over authorization now.

MR. KINTNER: In fact you're three under, aren't you?

MR. BECKJORD: Well, on board is 229. I'm authorized in fiscal '95 is 224, so I'm five over that.

MR. UHRIG: Well, the overage can stay in the positions and the rest of them are pretty well in balance.

MR. BECKJORD: Yes, but the office gets to looking at it as a whole.

MR. SHOTKIN: Twenty percent of our people are

eligible to retire today. And additional 17 percent would be eligible for early retirement if there were some kind of authority to give it.

MR. TODREAS: What percent?

MR. SHOTKIN: Seventeen additional percent, so we're talking 37 percent are eligible for one type of retirement if it were available now. What's happening is very interesting. This has not changed a lot over the past three or four years. People are staying on and working later. It's probably happening in the private sector as well, and so it's just very difficult to -- as Eric said, our attrition is relatively low. It still stays between three and four percent a year.

What we're waiting for is the big one when everybody is just going to say the heck with it, we're leaving, or we're going to go -- it just hasn't come.

MR. BECKJORD: But attrition is picking up, though. In the last -- since last fall some of the senior executives have been leaving.

MR. KINTNER: The high degree factor ought to be at work by now.

MR. BECKJORD: I'm personally setting an example. I'm stepping down. I've advised the commission that I am stepping down early next year.

MR. KINTNER: Well, that'll help.

MR. BECKJORD: That'll help.

(Laughter.)

MR. BECKJORD: And I should say there is one important -- one of us is having his last meeting with you, who is seated right here at the head of the table. Jack Hallerman is retiring as of the 4th of July. And I certainly want to say a word about -- well, of course he's also setting an example.

Personally it's been a great pleasure for me to work with Jack. I've known him since I came to the agency. We have worked together from time to time until a few years ago when he came as a deputy and he's done a magnificent job. And I'm very sorry to see him go, but I wish him well. And I wanted you all now to know that. He will not be meeting with us in the future.

MR. KINTNER: I'd like to make two comments about that. First of all, Jack Hallerman, every time I've seen him he looks younger. You talk about him looking -- once he's in retirement -- it's impossible to believe he's old enough under anybody's retirement system to retire.

The second is a story I may have told you before. I was acting head of -- director of development. A commissioner, Anders was his name, called me up and said -- he had just arrived as a commissioner -- and he needed a bright young fellow to come out and get him organized and

headed in the right direction, somebody who really knew how the development system works and so forth.

And he was going to be as a commissioner responsible for reactor development. I said well, we've got a person like that, you know, who will do you a lot of good but we can't spare him. So he got the name of this man, and I said we really can't spare him. He said well, let him come up here for two months, and in two months you'll get him back, absolutely.

Well, after three months I went up to see Anders and said what about this promise that you were going to send us back Jack Hallerman. He said, now you know what kind of a person I am.

(Laughter.)

MR. BECKJORD: Well, I guess there we are on that.

Let's go the budget, we can pass through it quickly, and see about fiscal '94.

The research funds, 92 million; our request will be just under that for fiscal '95, which is up before congress now. And the authorized is 224.

You can see from these figures by the way what I've already said about work which is in completion, and there is going to be -- one of the things that's going to happen, I think there's more work coming in to maintain the budget at that level, or it will continue to decline.

Any questions about the budget?

MR. KINTNER: Say that last thing again.

MR. BECKJORD: For some time the budget has been at a level of -- until this year -- of about a hundred million dollars. A couple of years ago -- about five years ago it took a dip down to 89 as I recall. But it's been including the research on reactors and the high level waste component which comes under a separate budget, I mean they're not in the same budget, but together which the two of them comprise the resources available to us. And it's been steady at real dollar level of one hundred million dollars.

We have taken reductions. We're in the course of reductions now. '94 is enacted in '93, and about the same in the fiscal '95 request, and if we -- a continuing budget at that level -- what I'm saying is that there is room for new projects. And either one of two things will happen.

We're going to have some new projects, some of which I've described. Or the budget will decline. We are under a lot of pressure to reduce the budget because the agency is --

MR. KINTNER: Is this from '94 -- is '93 or '94 a real reduction of ten percent; would you say three percent or --

MR. BECKJORD: Well, not quite.

MR. KINTNER: So my question here, what do you really think is going to happen to this budget overall, does the commission's budget as a whole go down in the same way that your budget as a whole goes down or does that reduce with the rest of the commission? What do you really foresee?

MR. BECKJORD: Well, the pressures are there. The pressure -- well, they're from the commission, they're from congress. And the most vociferous are the utility applicants, the utility license holders who hold the -- who will pay for most of this.

Congress is continually raising the research. There is less discussion of the question for the last couple of years because the budget has been reformulated. They generally reformulated it so that the research really doesn't appear directly. It's shown in the budget as support for operating reactors and support for standardization which is a very logical thing, and you know, that's how the money is spent.

And as a consequence of that the issue has now received as much discussion as when it appeared as a separate research budget item. But there is continuing pressure to reduce the expenditures for regulation on the part of congress, and I think the commission is very anxious to see programs completed.

At the same time I believe that the commission will support -- maintain a strong research budget. If there's going to be any question it's going to be what amount it's going to be to do that. Is it ninety million dollars, is it three hundred million dollars or --

MR. KINTNER: Does the commission feel if you know that research had been going down faster than the rest of the commission staff, or equal to it or should it be protected more than the remainder of the activities. How does the commission feel on this thing?

MR. BECKJORD: Well, I think the individual commissioners have views on -- the commission's view is expressed in the budget. But the individual commissioners have views on this, and I know that there are real concerns about this and long term stability of the research budget. And that's undoubtedly why they will ask you think the needs are. I'm sure that's why they asked the questions they did in that letter.

If research is conceived and funded and carried out the right way I think that -- I'm going to give you a thought piece on the subject later this afternoon to take a look at. I can't make it available because it has limited distribution, but it's an essay by one of the commissioners.

I did have something to say on the question myself. It's in a later slide.

MR. ISBIN: Before you go to that, do these graphs represent a reorganization or is it a continuation of the present organization. The punch line there --

MR. BECKJORD: Well, the last chart which is the personnel projection shows the current organization in the office as it now stands, but a paper has gone to the commission and the commission approved or -- for purposes of discussion with the union a research reorganization which goes to three divisions.

I didn't put that in a piece of paper here because it isn't approved yet. But I think there's a reasonable expectation it will be in effect before the end of the calendar year.

With respect to the budget, the budget is really an activity budget and that's the budget that we will have and the change in the organization doesn't affect that. The budget is not affected by the change in the organization because each of the components -- every component and activity that now is -- for which divisions have responsibility now will appear in the new reorganization. We're not cutting out an element of research because we're doing it individually.

MR. BUSH: Eric, what's the explanation for the jump in the nuclear materials? That's a pretty hefty increase.

MR. BECKJORD: It's on paper 11 here, first page. Well, we've got more requests from Material Safety and Safeguards as user requests. Many of these are related to the kinds of things that we've done in the reactor area. It's related to both rule-making and things like inspections that they carry out. And they look at human error in the context of material safety. So yeah, it's a big increase.

I don't expect -- I mean that's not going to go galloping, and that's not going to take over the balance of the budget.

I don't know what to tell you about high level waste.

MR. BURSTEIN: Neither does anybody else.

MR. BECKJORD: I think myself with the kinds of delays that are in prospect, you know, my expectation is, that budget is going to go down over the next couple of years unless something changes.

MR. KINTNER: Everybody's pressing for more research and nobody's spending on the other side. They should double the funding from the EEC side.

MR. BECKJORD: My proposal -- I heard in the last few days there's a proposal coming before congress to change that and to put that money in an escrow account so that it is not available for the government to spend until they come up with a schedule that is credible.

So the effect of that would be to bring a lot of pressure to decrease funding all the way around.

MR. VOGEL: The letter is related to waste?

MR. BECKJORD: Yes, waste. High level waste.

MR. BURSTEIN: We seem to be spending as much money in low level waste activities as we are at the high level. The high level waste program was one of gearing up from essentially ground zero to a competence level at Southwest, primarily.

What is the explanation for the low level waste side?

MR. COSTANZI: Well, actually they're very low level waste numbers there. There are two components. One is low level waste, the other is decommissioning.

MR. BURSTEIN: Decommissioning.

MR. COSTANZI Decommissioning. And actually what you see in the increase there is primarily exclusively decommissioning. And the actual low level waste component of what's called low level waste there is in the neighborhood of a little over four million. So it's really -- it's about two million in '95 in decommissioning. And that's dealing with not just the issues like decommissioning, but related issues like recycling. And that's supporting not only research but also other things as well.

MR. BURSTEIN: That's another area of the low level waste sites where as I recall there are no applications before the commission. Like advanced reactors and CANDUs and all these other things that we're spending money on in anticipation that someday there may be. But so far there isn't.

Is that correct?

MR. BECKJORD: Well, a fair share of the low level is in support of state regulations --

MR. BURSTEIN: But they haven't built any, proposed any -- well, they've proposed one in California that the federal government has decided it doesn't want them to have there -- but outside of things like that there aren't any low level waste compact arrangements that have produced a site.

One of the questions that's going to come up in our budget is, where are the customers? You know, we're going down the road to advanced reactors but there isn't a single utility out there or group that has announced as soon as you certify I'm going to come in with an application.

There is no low level waste sites. There's only one deal we -- Yucca Mountain site -- and we don't even know what the hell the standards are for that yet. I don't know why, you're doing research or something, that may change tomorrow.

All of these things bring up the stupid question, where are the customers? And who's benefit are we doing all this for?

MR. BECKJORD: That's a good question.

MR. BURSTEIN: I am not expecting a short answer.

(Laughter.)

MR. COSTANZI: I think there are a couple of things that -- sites where low level waste is being disposed of, not just at the sites in Hanford and --

MR. BURSTEIN: Barnwell and --

MR. COSTANZI: -- Barnwell. But also there's Envirocare disposing at the site in Braswell, and that's a very serious application.

We have been developing tools to do what I'd call more realistic assessments of low level waste performance or expected performance, trying to incorporate the various engineering aspects which states seem to be leaning to, to designs for their low level waste disposal facilities.

There certainly exists sufficient tools today to do the licensing of the low level waste disposal facilities. However, the difficulty is in recognizing that we do not have the Blue Cross index of the particular features of the site, to particular tools, and as a consequence the staff is of the judgment that if we were to have an application today as -- or be asked for assistance from a state, to be in a

position we would have to do some very conservative assumptions which would translate into limiting the capacity of the disposal facility.

In addition we have requests from the states under the aegis of the Nuclear Waste Policy Act, that low level policy act, for us to provide support to the states for technical support primarily in the area of assessing the performance of low level waste disposal.

So that's really the -- what our mission is, what we're trying to accomplish.

To recap, yes, you're quite right, we don't have the licensing prospects coming in to the NRC at the moment. Two, we do feel we have an obligation to the states to provide them some level of technical support. We are doing that.

However, having said all that, there is another issue before the commission which we are addressing and we are addressing it in the low level waste research program. And that is the SDMP sites.

MR. BURSTEIN: Pardon?

MR. COSTANZI: The Site Decommissioning Management Plan sites. These are the sites that have been identified as particularly thorny technically to proceed towards decommissioning and eventual resolution of what to do with the sites.

Much of the low level waste research is applicable directly to those kinds of problems, particularly the sites where we have very complex geology and hydrology, and very complex source problems. A mixture of different kinds of radionuclides and different chemical and physical combinations.

So this work is also supporting that. And perhaps the SDMP and decommissioning work that will be supported by the low level waste program deserves equal billing, it's just not getting it.

MR. KINTNER: Just one more question. Is the NRC -- does the federal government have any final regulatory authority over low level waste matters?

MR. COSTANZI: Absolutely. Yes.

MR. KINTNER: I mean after the state approves then you have to approve --

MR. COSTANZI: No, no, no, no. Okay. No. I misunderstood you at first.

The states can if they choose become agreement states and license low level waste disposal within their authority as agreement states. Nonetheless, in order to assure the adequacy of the agreement states programs for protecting the public health and safety and the compatibility of those programs for the national radiation protection program we do have -- we are -- the NRC is

obligated to provide certain standards and guidance that these states would have to follow as a minimum for adequacy and perhaps follow exactly for matters of accountability.

So even if we don't license a low level waste disposal site, one, we still are obligated to put forth standards and guidance to be followed for the national efforts.

MR. VOGEL: Do you have to have an enforcement activity on that?

MR. COSTANZI: No. We would not. But we would as part of the compatibility and adequacy as a state program review their enforcement programs.

MR. VOGEL: The state enforces them?

MR. COSTANZI: The state would be the enforcer.

MR. HELTEMES: We have to make a finding of compatibility. If we cannot make the finding the logical consequence is we would have to withdraw the arrangement.

MR. VOGEL: Is the NRC involved in decommissioning of the gaseous fusion plants?

MR. HELTEMES: Not decommissioning, no. We are involved, but the regulation -- not in decommissioning.

MR. MORRISON: This seems to be a good time to break for lunch, and we'll come back after lunch and pick up on the remainder of Eric's presentation. And with that too the questions that we need to address with the commission.

Let's get back at 1:30

(Whereupon, the meeting was recessed for lunch, to reconvene at 1:30 p.m., this same day.)

AFTERNOON SESSION

MR. BECKJORD: I'm going to try to finish again quickly so we can go on into the discussion for the commission.

One of the questions that I was asked related to the letter that I sent out earlier this year. The question was, where are you -- are you ahead or are you even or are you behind.

And I believe that the -- I took another look at that letter and that letter is still valid. The next couple of slides here -- A, B and C -- will remind you of what the letter said.

The first, the research, I believe it's a program that is world class, and it's ahead. Thermal hydraulic research I think has come back from a period of retrenchment in the mid-1987 period. We had completed the effort on appendix A, which was incorporation of the advanced codes for purposes of calculating the consequence of accidents, and this was a rather important bit of work.

Research had been impossible to come to a conclusion and we phased a lot of that out and reduced the expenditures, which were considerable at that time.

Then about 1989, you can see that the advanced reactors, ALWR, we had to get ready for that and the preliminary research programs which are now underway plus

experimental, and I think we're -- in thermal hydraulic research I think we're ahead.

Applications and methods, I think we are clearly ahead in that. Not only with the completion of 1150 several years ago but with the work that's been done on low power and shutdown conditions. The PRA methods are being applied now in just about every plant with one exception, and that's -- our problem is problemistic risk assessment for the controlled plant examination. The advanced reactors are all getting a careful analysis.

It has been suggested to the commission they should develop the codes for risk based regulation, and that's underway. Applied conditions will provide a new way -- well, not really a new way because it wasn't just thought of, but it will -- it should put both the operations of the plants and the regulation of the plants on a risk base which I think would be good.

MR. GOLAY: Is there any research to support that evolution?

MR. BECKJORD: Yes, there is a -- we're doing several things. We have prepared a -- we've had an effort underway for two years now on the methods of the study of what PRAs are being used for and what are the appropriate methods to use for these various activities. The study which was done, they had a review group, it was John Garrett

and others, peers in that field, and that work is completed now and we have a PRA plan which we could make available to you, a plan of action. We'll get that to you.

MR. ISBIN: At the New Orleans meeting in June of this year they're going to give the risk based regulations that the U.S. Nuclear Regulatory Commission favors. Could we get copies of --

MR. BECKJORD: Sure, yes.

MR. BUSH: I might comment, there's the other activity again that was initially sponsored by the NRC and is active participation of passive components. And in fact last week were preparing a code case to go in on piping which we used a risk base -- the basis on getting it together.

MR. BECKJORD: Yes, it's finding its way into inspection and maybe it might be a good idea to have an early meeting, subcommittee or a meeting of the status of PRA.

Well, the other things that I include on this list are shown here. The vessels and piping and the aging research, I mentioned the containment, the safety margins. And we have a little bit of information to show you in a minute on the seismic hazard analysis, and when we get to it I'll ask Larry to comment on that.

I think that that's our list of things that we're

ahead on.

MR. UHRIG: You've got your aging and electric-mechanical components. How about cables? Are you ahead on that?

MR. BECKJORD: No. The cable is on the behind list.

MR. UHRIG: Oh, I'm sorry.

MR. BECKJORD: I haven't got there yet.

MR. BUSH: The external events, we've been over that, that one's come up again and again for what, twenty-odd years. What new stone are you turning over this time?

MR. BECKJORD: The new stone is really in number 13 on seismic hazard analysis. There are some changes forthcoming in the requirements for the individual plant examinations for external events. And that work is underway not following the resolution of the seismic hazard. There is agreement now, whereas there was not agreement as you know in the past couple of years between APRE and the Livermore hazard group.

MR. BUSH: So this would be a post-seismic examination type of --

MR. BECKJORD: Yes, yes.

The next slide is even -- I guess I should -- we rate the AP600 work as we're up to speed on that. And particularly in view of the experimental programs, I fully

expect that we will be leading in that work in the next year, next one to two years. Given human factors research I think we've discussed, I think we're even on that, and on waste research as well.

Containment corrosion is the fourth item on that list. Corrosion of containments has been a problem, it's turned up in 20 plants. And it is getting more attention, and we're doing some work on it now.

Larry, you might say just a word about that.

MR. SHAO: A lot are experiencing corrosion now. The thickness of the containment shell, it may be about one and one-half inches, to maybe a quarter-inch away to half-inch away in local areas. But the corrosion is coming from contact with the water that's inside the coating, the containment coating. So that can be a major issue, because in one case -- it also affects the thickness but it's only localized. The continued corrosion is going on. And also we see some evidence of corrosion on the liner tubes. So there is corrosion going on in containment vessels.

MR. TODREAS: Is this inside or out?

MR. SHAO: Some outside, some inside.

MR. TODREAS: So it's both.

MR. SHAO: Both, depending on what the corrosion agent is. It also happens outside the shielding, so the area is not very accessible and is contained on the inside.

MR. VOGEL: Are the corrosion problems greater on -- for the reactors on salt water or --

MR. SHAO: No, not really.

MR. BUSH: I think this is mostly concentration salts.

MR. SHAO: Right. Most of them are contained in the ice condensers.

MR. BUSH: Highly localized in nature. This is the one where you get the moisture and then you get the oxygen concentrations --

MR. SHAO: Sort of like it secretes -- when they made the concrete they left some sand there, and the water gets in to the sand and the water in the sand corrodes the outside shell.

MR. BUSH: I hadn't realized it had happened between the concrete and the shell in the PWR. Are you telling me they're getting that too?

MR. SHAO: They're getting some corrosion on the liners, too.

MR. BUSH: This water that got is this trapped water in the shell?

MR. SHAO: Trapped water, the local trapped water, yeah. But I'm even worried about it more, because you know the liner is only a quarter-inch thick.

MR. BECKJORD: Okay, the other two on that list

are valves, motor operated valves and the qualification for advanced instrumentation and controls.

We've had a major valve testing program and we'll be finished with that, I think -- Larry, how is that --

MR. SHAO: The valves, yeah, we've --

MR. BECKJORD: When are you going to be finished with the valves?

MR. SHAO: Well, we are finishing -- 1995.

MR. BECKJORD: '95, yeah.

MR. KINTNER: Let's go back again to corrosion. Larry, it seems to me this is one which could be a simple issue of licensing. Is that being factored into the research? It's hard to permit a license and to accept significant corrosion in a containment.

MR. SHAO: Right now in a licensing renewal they're concentrating on the quality of the passive components, and the major pipes. They're not worried about these active components which can be replaced. Containment, the containment in vessels is very difficult to replace, so it's very important in licensing.

MR. KINTNER: Well, you say you're even with the requirements. Is that really true?

MR. SHAO: The reason we say even, is our work has just started. We are not ahead.

(Laughter.)

MR. BURSTEIN: He listened to the fact that there were no customers out there.

MR. BECKJORD: There are customers now.

MR. BURSTEIN: For what? For license renewal or for new plants or reactors?

MR. BECKJORD: There are 20 containments now that have corrosion problems.

MR. SHAO: The licensees are coming for occasion to have an exemption from the -- some of them are below the code thicknesses. But it is only localized, so we can put an analysis to that with the code. In a few years if the area get bigger and bigger then maybe it can be a major problem.

MR. BUSH: That's a different animal.

MR. KINTNER: Well, that'll come to a head with license renewal though.

MR. SHAO: Oh, yes. Our research is not only looking the cause of corrosion, it's also giving some methods of analysis in case these things come up, what we can use to show that this is going on.

MR. BURSTEIN: Does this type of phenomena, if I may, get involved with maintenance rule applications?

MR. SHAO: Partially, yes.

MR. BURSTEIN: You haven't applied it here yet, but I'm wondering whether this is really the place where it

may be most effective.

MR. HELTEMES: Well, the maintenance rule covers passive components, but it's not effective until January 10th, 1996, and so the maintenance rule is not yet effective. It does cover the condition of SSCs as well as water treatment performance.

MR. BUSH: This is fairly new because the Numark aging documents are for containments in the PWR. They're a little over two years old. They're the ones that NRR is getting SCRs and SRPs on.

MR. BURSTEIN: This phenomena came about two to three years ago.

MR. BUSH: Well, it happened about the time they had already made the reports.

MR. BURSTEIN: The industry report, yeah.

MR. BECKJORD: Okay, we're going to be -- the behind list includes four items. I talked about CANDU already, talked about the digital instrumentation and controls. And the steam generator issue. And particularly the preparation of the rule and reg guides for evaluation of steam generators, for flaws and cracks and cables.

We're just getting the program underway but it's not underway as yet. I might ask John Craig to say just what is the schedule on the cable.

MR. CRAIG: We're developing a cable test, a new

research program in coordination with NRR comprised of two phases. Basically the first phase is for fixed data generation for a database that we can use to see which cables are out there, what tests are done and the types of degradation they've experienced.

We're working with the international community. We had a workshop in the fall that was attended very well by the industry, both domestic and foreign, and the next phase will be to get some cables, new cables and naturally aged cables, some that have seen radiation and some that have seen radiation and temperature, hopefully some that have not seen temperature, and identify condition.

Modern techniques will allow us to determine the qualified life of the cables. As some of you may know, the regulations state that if there is an accident that the cable in that part of the containment would see temperatures, high temperatures, steam, et cetera, and still perform its functions.

So they have to qualify to the local environment, so we're trying to see if we can develop some condition monitoring techniques to allow you to determine that the cable is 40 years old and would still be qualified in 60 years without the need for additional testing.

Some recent results show that cables in plants are aging slower because they're not seeing high temperatures

and that seemed pretty logical, although other cable types, one installation types we just looked at in the cooperative program with the French, it shows that cables that see lower temperatures have more damage because they're seeing low temperature and radiation as opposed to high temperatures and radiation.

And our researchers think that there's some kind of healing effect with the polymers which is not a given at low temperatures. The damage will be less. There's a trade-off there. And we expect to be working through the plants -- we will have some cables in a facility that will be tested, as we've now developed a test matrix for monitoring and testing. And we expect the testing in June or July.

MR. BECKJORD: How long will it take to run?

MR. CRAIG: The whole program will probably take two to four years, depending on the number of cables we test. To create the cables takes quite a lot of time.

MR. UHRIG: Are you using the cables out of plants like Yankee or --

MR. CRAIG: As a matter of fact Yankee -- I was at Yankee a few months ago. And we are working with Yankee to get cables from them. The good news is now that we're working at the plants they have some of these cables that have been on reels for a long time, so we have a good, if

you will, control to look at that and see if degradation is unique to the plant.

MR. BURSTEIN: I'll bet you can't buy any cables today with that same insulation that they bought in 1960.

MR. CRAIG: There are some variations in that so it makes it a little tougher.

MR. BUSH: John, is this basically like a phased program like the phased program run earlier at Sandia? It was a part of Empire, they went through a lot of this and in fact even got it to predicting residual life.

MR. CRAIG: They tried, right, and it didn't work. It was a lot of condition monitoring type things. For those of you who don't know, the Sandia tests showed that cables that have been qualified for 40 years, some of them are good for 60, some of them are good for 40 and some of them are good for 20. They passed the test or didn't pass it after 20, 40 and 60 years.

And that raised a lot of questions, so it's going back in part to look at the test procedure, to make that more clearly defined with less radiation during the testing process. And it's trying to fill some specific correlations. So in effect it's phase three, but it's going to redo phase one and two.

If the cables weren't already tested -- that's why we're putting a lot of emphasis on -- to make sure that

we're not doing tests that have already been conducted on cables. We have access to the database and the U.S. maintains that.

MR. TODREAS: When you placed this contract before, did you go out and check any commercial testing type companies or any industrial -- again, it's not obvious to me why a national lab is the best place for this.

MR. CRAIG: Brookhaven has done the testing for us, I'm sorry if I confused you. Brookhaven has taken the lead in the data review. They were helping to acquire cables from licensees. We did in fact go around and do testing at the wire labs, and we've gone to a number of labs. It's essential to have people do the testing with the licensees. We do it for licensees because many of the same kinds of testing is done ultimately if you're going to determine a cable's qualified or it's not.

MR. TODREAS: Thanks for that clarification.

MR. KINTNER: Did you detect any less urgency on steam generators than there was a year ago when we had that meeting? The reason I ask is that --

MR. BECKJORD: I think the answer is no.

MR. BURSTEIN: I think there's more steam generator problems surfacing now than there was a year ago.

MR. KINTNER: Yeah, the reason is in the meantime utilities changed steam generators in record time to put

them back on line. The things just run beautifully, like a new Cadillac. It seems to me sometimes it would make things more effective to change out steam generators earlier and just get it over with. That's why I asked the question.

MR. SHAO: But there's a different kind of problem with it. The problem you're thinking of is damping, and now it's corrosion and cracking. You fix one problem and it creates another problem.

MR. BUSH: With 690 I don't think they have unequivocally established that they can't have a primary water source --

MR. SHAO: 690 is very good for denting.

MR. BUSH: You've answered my question.

MR. CRAIG: Let me say a word on steam generators, too, because it's significant. There's been a task group with RES and NRR to develop a defect specific steam generator rule. And we're working very closely with industry and the PRI for the specific physical aspects of that, any new measures to take to identify defects as well as qualification of the MTE personnel and equipment.

I want to say weeks ago, but two months ago at Prairie Island there was a fuel test of some sophisticated grooves that were done. They achieved speeds comparable to the fastest probes that industry has today. But there were of some magnitude or better --

MR. BURSTEIN: How do you know? One of the things that troubles me is when you start looking at steam generators in situ, unless you pull some tubes and do some destructive testing you really don't have a method of calibrating your measurements.

There are dozens of steam generators that have now been removed from operating plants, and they make ideal test base for this kind of verification and validation, if you will. So I would hope that you would use those for that purpose, because part of your steam generator work I trust includes the non-destructive examination and the plugging criteria.

May I ask whether the idea of multiple breaks is still being reviewed in your analysis of steam generator integrity?

MR. CRAIG: It's an issue that's still being discussed within the technical staff and I think it's factored into the ultimate analysis. This is an open question at this point. But we haven't moved to multiple tubes.

MR. ISBIN: Have you been able in any way to obtain benefit of the research that is being done by naval reactors on the signature analyses?

MR. CRAIG: I don't know the specific answer to that. We have been talking with the Department of Navy but

I'm just not sure how much information we've gotten. We can check and get back to you. I just don't know.

MR. BECKJORD: I don't think we have specific information from that. It certainly in my experience has been difficult to get in the past.

MR. SHAO: The Navy has less generator power than the reactor because their generator is horizontal. Our generator is vertical.

MR. CRAIG: No, excuse me. Navy generators are vertical tubes.

MR. BECKJORD: You may recall that when we had the meeting last April on steam generator tubes originally one of the contractors involved in the naval program was going to do a paper on that. And that paper was withdrawn and the people did not come.

MR. SHAO: Yes, at the last minute they withdraw the paper.

MR. MORRISON: I wouldn't be too terribly optimistic. I asked one of my colleagues that works in the navy program specifically and they were doing signal processing techniques, putting them in context, and this was some of the technical issues. The other person was convinced they were using state of the art things in the navy.

MR. BECKJORD: The next one is the seismic hazard

analysis, number 13. A big change here. This here has been an agreement between Lawrence Livermore and the APRE analyses of seismic hazards. We have a program underway between NRC, DOE and APRE on that. And as a result of the narrowing of the differences there are some things indicated for a change in the individual plant externally on the guidelines and let's see, it's been a month and a half, two months ago, we had a meeting and we have agreed on a course of action to take which will change and simplify the requirements for certain plants that have -- that without a change would have a considerable amount of effort to perform for their seismic analysis. Larry, you can give a quick summary on that. It hasn't been done, but it's --

MR. SHAO: We are working on it We anticipate the individual plant examination for external events. Seismic is one of the major external events. And originally based on the severity of a seismic hazard we put -- planning different beams, and about 50 sites use so-called focus scoping. But now with this new Livermore group which comes closer to seismic hazard depending on site, we are revisiting the scope of that.

Very likely there will be more in the reviews than the focus scoping. So we are working on this now.

Right now if you'll notice on this viewgraph, the scheduling the guideline is by the end of this year, '94.

MR. KINTNER: So it isn't settled yet?

MR. SHAO: It isn't settled yet, but we're very close to it. We're on schedule.

MR. BURSTEIN: It's nice that whenever we don't meet we draw the schedule.

MR. SHAO: That was the same schedule.

MR. BURSTEIN: Now, you know and I know that the idea that says we're ahead of things on seismic is a gross distortion of the last ten years' history. And I have sat here being very silent and gentlemanly, but if you're going to claim fame, do it on something else.

(Laughter.)

MR. BURSTEIN: I have here a couple of curves and some plots of the data that go back to 1984 and 5, and the differences that we went through, and it took us twenty million dollars and ten years to resolve this issue. I don't consider that timely.

I think that the costs that the NRC's position on seismic imposed on this industry come to the millions and millions of dollars.

MR. KINTNER: The questions we sent were as follows: Is the seismic issue settled, and I thought the answer to the question was yes, and then we find out the answer is no. How long to do it, I thought the answer was 12 years, now I don't know what that is.

Looking back, why did it take so long?

MR. SHAO: Okay, let me tell you how long. Do you know how many years of seismic records the United States has? How many years? Twenty-five years.

We have to use this 25 years record to extrapolate to a thousand years. There is no idea -- that's the main problem. We have only 25 years records.

MR. KINTNER: Let's take these things one at a time. There are records for the earthquakes --

MR. SHAO: The recorded data, 25 years.

MR. KINTNER: Somebody has some idea of those earthquakes. There may not be thorough seismic records but there is evidence there which has -- and second, suppose there is 25 years of this, get the people together and you'll have the stuff in a few weeks.

That gets to the heart of the matter, which is someone somewhere in authority and possibly that is in the NRC, I think in the NRC, has to take the responsibility to settle these matters and stand up and be counted. That's what's going to be done with regard to design and operation of reactor plants.

You can't, it seems to me, let everybody who has an outside attitude on this hold up the entire matter, and this is a fundamental issue I think we ought to address, because the same thing is still true of source terms.

It takes a great deal of courage to stand up and say we've got evidence from 12 years research that this is the source term.

MR. SPEIS: But we have reached agreement on most of the important technical issues. We have a hundred different views and all kinds of mean letters.

MR. BECKJORD: We'll show you the letters if you need the letters.

MR. KINTNER: No, I don't necessarily want to see them, but it does seem to me that if you're talking about the amount of money spent on research, the implication safety today and tomorrow, that's how these matters get resolved.

MR. BECKJORD: Well, the reviewers who were involved in that who are the peers in this area have agreed. And so now it's just a matter of working out how we're going to incorporate the requirements that stem from that into the IPEEE, and you know, if you recall the main problems in that first version of the Livermore curve that came out was the factor of ten. And it really came down to one expert was very firm in his belief.

MR. BURSTEIN: I think it's unfair to go back and try in three minutes to condense a confrontation that illustrates the problems between some of the industry and RES or NRC positions. Because they are serious, they are

significant. And we're not going to perhaps come to agreement on what even happened let alone why it happened and how we can prevent it in the future.

There are lessons here. And we should look at them. The change from mechanistic to probablistic approaches; fundamental issues of this nature were included. But I think the question that the new chairman is asking is an important one.

When we have these differences of an order of magnitude and we have the weights of different experts or different laboratory experimental data or different other things, what is the method of resolution?

Do we have to wait 20 years until somebody withdraws an objection to get agreement?

MR. BECKJORD: This issue was not a 20 year issue.

MR. BURSTEIN: It was ten years.

MR. BECKJORD: No, it wasn't.

MR. BURSTEIN: I will bet you a good lunch that it was ten years. You're talking to one of the guys who was involved for at least that length of time and my hair isn't gray for that reason, or whatever the color is.

MR. MURPHY: The results of the two probablistic studies became available and were published in '88 and '89. It was one year later that we started this initiative in cooperation with DOE and APRE as the initial formal seismic

hazard resolution program.

We attacked that problem. The difference between these two probablistic studies and --

MR. BURSTEIN: You're doing what I said we weren't going to do.

MR. HATCHER: It was known from the very beginning that once these two studies were completed in the mid-80s that all you had to do is remove one point from the acceleration curve and the two sets of curves would superimpose.

MR. BECKJORD: No, that's not --

MR. BURSTEIN: That was our understanding. If you were blind enough not to see it don't argue for me that you have a different justification. I beg not to get into this discussion. But if you want to get into it I'd have to warn you, be careful.

MR. SHAO: I want to mention one point, what NRC did to the industry. We did two things. One is removing all the snubbers. The other one is leave before it breaks, because our research -- the industry can remove all the snubbers. How many snubbers have been removed -- 8,000 snubbers in one plant.

MR. BUSH: But research can't take credit for that.

MR. SHAO: Yes, because increased damping values.

MR. BUSH: Wait a second, wait a second. I chaired the committee on that for ten years that did that business. We have one representation from there, and the only thing that NRC did is they paid for the document.

MR. SHAO: Because Japanese keep the low damping value, and we decide to upgrade damping value. And the other thing is leave before break. You know, some of the -- we did research on that. You don't have to -- how much so-called --

MR. BECKJORD: Mostly in the seismic.

MR. KINTNER: Well, it seems to me that the one question remains, which is the one to resolve proposals. Is this the way issues of this kind will be resolved in the future, because on the other side of this fence it is very, very damaging and discouraging to try to resolve head-on an issue which seems to us however complicated it may be, that it doesn't take this long to settle it. What it takes is courage.

And you can hide behind these skirts forever, and meanwhile right now today the ALWR designers are going to refuse to agree to what's going to be applied to their designs from the seismic point of view.

They are confused, they're doing two sets of calculations and they're bound to the issues that -- and so that isn't right.

MR. SPEIS: I would like to say something. I think it's fair to say at the same time that once people come to some conclusions about some issues it's not easy after that. And it was -- it gets involved when they try to take the leadership to do something more than the average, take it to the OAG, and they take it there and it's a difficult process.

You're trying to get all the committees, this committee, this area has different views, you know. There's an outside and there's an inside, too, and it's painful, really, and I don't know -- but that's a real issue when something like that comes up and you know that if you work hard you will get something better, but the process is -- I have been personally involved in a number of issues the last five years and it's been very painful.

MR. KINTNER: This has been successfully used in the resolution of the Mark 1 liner issues. It's the methodology which his being used at ECH. I would give you the name of that methodology but then I'll be accused of supporting things which I'm not supposed to support.

But here are good examples where methodology can be used and has been successfully demonstrated. And it comes into play indeed when you get this great diversity of expert opinions.

MR. BURSTEIN: One of the things that I guess I -

- how old is this methodology that you referred to? It's only a fairly recent --

MR. SHAO: Three years.

MR. BUSH: The nureg documents has that document. It's a very good document, incidentally.

MR. BURSTEIN: Some of these issues predate some of these confrontations. To date some of this analyses that we use now effectively. And I think there's reason to apply these new techniques where we can.

But I think there is this fundamental question that we obviously are not going to resolve today. But we should keep in our mind that some way we must find a system for handling these disputes before they generate into these long, expensive programs of resolution.

Because the original Nureg CR3756 in the seismic issue came out nine years ago. Nine years before the current 1488 resolved this issue. You want some more references, I'll be glad to go down the list with you about all the interims that we went through.

Clearly --

MR. BECKJORD: I don't want to sound defensive about this. And in a way I'm sorry I'm --

(Laughter.)

MR. BURSTEIN: You could have escaped if you wanted to. But the -- somehow the regulators and the

regulatees have to find a way of resolving differences that doesn't result --

MR. BECKJORD: Well, peer review. I mean that's essentially -- it was essentially peer review that brought this one to closure.

MR. BURSTEIN: Yeah, and then we'll see if we get one stinking peer reviewer that's out in left field, we're going to believe him because it suits us.

MR. SPEIS: But he might be the, you know, the Messiah. How do you know that he's not the possessor of the truth? I mean that's what they're telling us --

MR. BURSTEIN: You see what I mean? You see what I mean exactly.

MR. SPEIS: I'm not saying that, that's what many people are saying.

MR. BECKJORD: Well, this issue I will tell you is more difficult than most. You know, if you're talking thermal hydraulics and severe accidents and digital I&C and this type of thing, finally the decisions are made within the commission on the technical questions. Something like this, you've got the U.S. Geologic Survey, they have people working on the problem and it's just -- I mean we got USGS to the table on this one and they, you know, they know what the results are, they participated in the -- we spent what, about two years with them on the probablistic method, and

they are in agreement.

MR. BURSTEIN: I understand -- you remember, some of you go back to 1979 which was not the best year for nuclear in this country. Among other things as I recall the NRC shut down five nuclear plants designed by a Boston engineering and consulting firm because of the difference in the addition, whether it was algebraic or numeric on some seismic criteria.

It's that kind of very expensive and very arbitrary activities that are outside examples, if you will, of why we need the process to address these issues quickly and authoritatively.

MR. BECKJORD: I think that's right, and I think again that's the answer. And there's an even bigger one than that that came up before which originated with the ACRS. And the ACRS never accepted peer review in this particular matter. And it took years and years and years to resolve. Finally it is resolved, and I think peer review is the answer.

. VOGEL: It's seven miles from the epicenter, and looking around me I'm beginning to think that seismologists are a little less dependable than some other people.

(Laughter.)

MR. BURSTEIN: I think if you had honey storage

requirements that were better than the ones prevailing the --

MR. HATCHER: The problem in dealing with something like this is that you cannot define all the variables, whereas if something that's engineered is denied you can hopefully control your experiments. You can't do that with natural system to which we don't have access.

MR. MORRISON: I know we're having great fun on seismic. I suggest we move on, otherwise we'll be here all night.

MR. BECKJORD: I believe we're at university participation. We have increased participation of universities. We have had for some time seismic work at a number of universities. About a million dollars. Probably will continue at about a level with that for the next few years.

We've continued to look for ways that we can use -- an increased use of university staffs. There are a lot of reasons for this, both because it's a resource that is there and we have another problem with the cost of work at national laboratories, it's going up. They've had a tax assessed to the work that is done there, the Department of Energy has. And generally speaking the national laboratories are -- there are less attractive places to do work now, not only because of cost but because of the kind

of approval procedures that are getting underway now. So we're glad to go outside and do it.

John gave us some idea of what they're trying to do in the cable area in the case of universities. Of course we have to consider the matter of continuity, of getting both the availability of equipment and the continuity of people to work on a job. Because the graduate students are generally a part of contracting university work, which we support. And I think it's a good idea, but you have to have the kind of short-term project that is compatible with having graduate students. University work is more compatible with research like some exploratory activities as opposed to some very specific research, for example the thermal hydraulics area.

The proposals for grants; we've had a grant program which has been fully subscribed to now for about five years, but is limited. We can only spend one percent of our effort in grants.

MR. BURSTEIN: How about the -- maybe you want to address the research originated in your own shop, and whether that has application to university environments.

MR. BECKJORD: Yes, it does. We have -- there are a couple of examples. One which comes to mind is condensation. And that's really work that came about as a result of the consideration of the phenomenon of the 8600

model.

So where we can find compatible activities we include that too.

MR. KINTNER: You're going to 6.3, 4.8 and now 7.5. It sounds as if you are maintaining a slight increase in the overall university portion of the work; is that right? And it would be your intent to raise the level or --

MR. BECKJORD: I don't know how much we could increase it beyond -- if we can find the tasks that are compatible and we can find the people to do it we'll increase it. As I say, the national labs are getting less attractive because of the cost of doing work with them.

We've got the grant program we were talking about but we're also seeing universities come in under the components and procurements. We just had the components and procurement for analysis of seismic data in particular. We had four successful bidders on that program. Two of them happened to be commercial corporations. The other two were universities.

We've also been doing some work with the University of Texas at Austin on concrete performance. Actually it's anchorages in concrete. And those universities are coming in on our competitive procurements.

MR. BURSTEIN: Is there any problem between

equating the university proposals or response to research work and private industry?

MR. MURPHY: No, none at all. We set down the specifics that are evaluation criteria and both the commercial and the university have to meet those criteria to fulfill the requirements.

MR. BURSTEIN: I guess that's because university overheads are so high.

MR. MURPHY: Well, a little tidbit there, the first qualification on these contracts is for quality of the work. That's the first criteria. The second thing that they evaluate is the cost. And there has to be a proper mix, but the first thing is the quality of the work.

MR. TODREAS: I would just say relative to that, it's interesting. But I hope you don't get the idea that if they're competing for that successfully that it would eliminate the grant side, because I'm not sure actually of the things they -- whether it's successful. Whether they're really doing it with students or post-docs or whether in fact such universities can successfully compete that way. They're really stretching their basic commission at times.

So I don't think it's a substitute. The same thing I wanted to ask you, what happened to the issue of the broad agency announcement that was supposed to open up I thought a third category between grants and these

competitive procurements.

MR. MURPHY: The procurements -- we're simply talking about personnel for seismic data analysis.

MR. TODREAS: Does that tilt toward these fully competitive -- is that by definition decompetitive procurement? Do you also do grants --

MR. BECKJORD: The one thing that we -- we can't exclude from the broad agency announcement, we cannot make it for only universities. It doesn't exclude anybody else.

MR. UHRIG: It excludes national labs, doesn't it?

MR. BECKJORD: Well, yeah, national labs.

MR. TODREAS: Well, I think I see the picture. If I could amend what I said before -- I can see universities competing within their mission under what you designate as a broad agency announcement. I thought you were talking about universities actually competing on RFPs, which are aimed at more the commercial side. And that's where I had the -- that they may be stretching.

MR. MURPHY: The universities may be stretching, but we have had strictly RFPs where we specifically describe what we wanted them to do, and they have competed successfully on these things. In addition there's the broad agency announcement category in addition to the separate side for the grants.

MR. GOLAY: I just want to say one thing, that

from the NRC's point of view you probably would do better to try to direct passes to universities which fit their own culture. That under the financial pressures that universities have as other organizations also have I think they will be increasingly tempted to go after anything that moves.

On code development -- I mean not development, maintenance is a good example which came up earlier today, which is one that I would suggest is really inappropriate for a university. Yet I think if you offer it you'll find people going after it.

And so some thought I think should be given to which types of tasks really are the best ones to direct that way. Particularly if one of the ultimate products that you want to get is a flow of good students who might be thinking about NRC as the place to go to work ultimately.

MR. SPEIS: Unfortunately, Mike, we cannot do that.

MR. GOLAY: Well, the grant program is an example of where you have tried to do it.

They're competing with the other universities and --

MR. KINTNER: It seems to me to some degree university participation, how you use universities, goes back to the question which is talked to on the next page

which we saw only one part of before. Which is the maintenance of available expertise when you want it. The right tasks and so forth would be a part of the ability of the NRC to respond to questions when needed. Because I think quite often say a graduate student's participation is a lot of not only capability on their part when you're asking a question but also they're more likely to be available in the future for NRC-type issues.

I think that's a separate and distinct argument for university participation.

MR. SPEIS: Well, even if we're mostly successful then three years later this process has to start all over again, basically, which is just another problem.

MR. BURSTEIN: You know, I have some difficulty -- and perhaps we'll get into this when we discuss some of the answers to the commission questions -- how we can retain or elevate ourselves to a world class primacy with a third-rate budget and no opportunities to develop these evolutionary types of systems that lead to this primacy.

The budget constraints don't let us keep these experts in-house or on payrolls or as consultants. I don't know whether the commission wants us to have all of these firemen out there on somebody else's payroll.

Who's going to pay for keeping these men and women of competence ready in case we need them? I'm reminded that

the basis for the university future and the regulators future is a viable and vital industry. And I urge you to recognize that the electric utility industry in this country isn't that today.

All you have to do is to look at where the equipment is being manufactured that goes into transformers or valves or pipes or vessels. Where do you buy forgings for large rotating machinery today? I don't think there are any capabilities left in the U.S.

So one of the things that we are seeing is that we are becoming less and less of a basic industry that supports all of these activities. And I think we have to begin to address some fundamental questions or face up to the realities.

Why have a world class leadership? All of our technology is being done in Europe or Japan or someplace else. Even Eric has to go to Japan to get a laboratory to do some rose petal designs.

Why have this if we're not going to support, if we don't have anything to support in this country? Going back to my earlier screams of where is the customer. Can we really do this, and should we not address this later today or tomorrow.

MR. MORRISON: Sol, I would leave that question hanging for a moment.

MR. BURSTEIN: I would hope so.

MR. VOGEL: That's the emperor having no clothes.

MR. MORRISON: But being very mindful of the time that's remaining today what I'd like to do is to thank Eric and all the staff for the presentation. What I'd like to do is sort of turn the meeting in the direction of getting prepared for the discussion we want to have tomorrow with the commissioners.

By the end of the afternoon I'd like to see if we can get at least if not the answers to their questions at least the things we have for discussion, and we can come in tomorrow morning after a nights sleep and clarify them and get them ordered in a manner that would make sense.

I think we also want to be satisfied before the end of the afternoon that we've covered all the questions and have them addressed.

MR. KINTNER: May I say -- there's one that wasn't answered yet and being -- you may have mentioned this -- I asked them separately from this list to tell us how we could be more useful.

The way the committee works, the subcommittees work, the attitudes and responses of the committees -- we really appear to be useful, and we've thrown this question open to the staff on a number of occasions. How can we do better. And nobody seems to have the courage to tell us the

best way to do it is to go home.

There must be some suggestions that you have now and so if you could sometime between now and the morning tell us how we can do that, it's another question --

MR. MORRISON: Well, Eric does want ten or fifteen minutes at the end of the afternoon to discuss the packet of briefing material that's entitled Resumption of Options, which relates to the other handouts that were made after lunch of some of the thoughts that are coming out from the commission and individual commissioners.

I think we ought to come back into the activities of the committee now and use the staff as is needed to help fill out any gaps that we have in our knowledge.

I would propose we start with this handout that came from the viewgraphs that I presented at the early part of the day, and the first page says topics for discussion with commissioners. Starting well up at the top down on their questions which I -- it reads from the VSRM that was sent to us, is the research program doing the right things.

I think you've had a good review of the research program in the discussions that Eric led this morning and this afternoon. What are the thoughts of the committee with regard to is the research program doing the right things?

MR. BURSTEIN: Is there another copy of it? Somehow it passed me by, I guess.

MR. MORRISON: All right, does everyone have a copy? That's a good thing to ask.

Somehow you were the only one overlooked. I apologize. Suddenly when we get in a creative mode everybody gets quiet.

MR. MOLZ: Well, it seems like one question that came up a lot is this -- is getting back to the customer question again. Is the industry evolving and changing in such a way that the amount of research and regulation that is going on is unbalanced?

I personally don't have a lot of insight into that, because I don't deal with the broader aspects of the nuclear industry. But we certainly are as a world, we're getting more and more integrated and things are going where they can be most efficiently done. And so there is going to be a lot of change in that area in the next decade, no question about it.

How does that relate to regulation and research, in support of it?

MR. MORRISON: I think you've raised a good issue. Neil, go ahead.

MR. TODREAS: Yeah, I'm not -- well, what I believe if we take this question as a narrow question and tick off technical areas and look at it in that way we may come up with one of two things you wanted to add. But I'd

propose maybe we take it broader. Take the source term, the seismic issue as examples.

The research program is doing the right thing relative to working on them. But apparently the research program as constituted within the agency, given the complexity of these problems, is not effective and therefore maybe not able to do the right thing relative to clcsure.

And if from again what I heard and I guess what I knew about the seismic point, if we want to deal with that issue this may be the place to do it. And the way to do it is maybe not so much point the finger directly at the -- well, to put the finger at the ineffectiveness of closing the issue is bigger than the research program, it's probably a whole structure of how the research program, it's capabilities, however it's empowered fits into the agency.

MR. SPEIS: Mr. Chairman, can I say something -- from what you said I think there are two questions, and maybe I can separate it. One of them has to do with even when we do the resource and get two results somehow they don't find their way into the regulations or they're not codified in time so the industry knows exactly what it is so they can figure out the use. That's one question.

The other one is, when difficult issues come up and there are groups all over the place, you know, how do we go about resolving them or who is fast enough or who has a

good process to do it.

MR. TODREAS: Yeah, well, I was giving you the benefit of the doubt, saying on the second one people who have technically qualified now and are able to see the picture so that they're doing the best they can. But the problem must be back in the first question. Because the job doesn't get done when you step back.

And since this is a commission discussion and they can transcend the limits of the RES, maybe this is the place to bring it up.

MR. SPEIS: Well, you have -- to be effective you have to have some good examples --

MR. TODREAS: Well, I thought I heard two.

MR. BUSH: Well, there's a third aspect of that thing and that is that even when RES and NRR at the upper levels agree to something it can get completely sabotaged at a lower level.

MR. SPEIS: Within the commission?

MR. BUSH: Within the commission.

MR. KINTNER: That almost happened in steam generator tubes.

MR. SPEIS: Well, it would have different views, but I think we would still move forward with the, you know -- it took longer because of that. That's what happens basically.

MR. KINTNER: Well, it seems to me -- have any of you had a chance to glance through what Roger's put together?

MR. TODREAS: I was going to say, the way I'm bringing this up -- I haven't heard what Roger's put together but I glanced at it. He's talking about restructuring RES within the whole agency. I don't know whether he's got in mind to actually solve this problem or solve a different one, but it does impact it.

MR. KINTNER: Well, I very suddenly -- it seems to me again what he's suggesting is there is a role that research should take a lead on which is to develop a broader base of fundamental knowledge from which all else returns. And that as the role of research in specific questions phases out.

The questions of severe accidents and so forth, as those phase down -- I think it's clear from our discussions today they are -- if there's anything to fill that void, which is to keep good people doing good things and generating a body of information which allows you to regulate properly and answer critical questions when they arise, this is an answer. It sounds to me like a very good one. And that is something which we do -- I think we could support to the commissioners. We ought to talk about that a lot longer before we do, but it's something that I think --

I believe would be a good idea, that the research division have broader and broader capability of looking for fundamental knowledge on which you can now take up to the questions.

My answer to the question of the seismic and the source term is two parts. The first and most important part is hard facts, hard technical facts. I mean eventually that's what has got to carry the weight of decision. And so if there was not a sufficient base to make for those decisions and stand up and be counted on them, there should have been. And somebody maybe should have foreseen that.

In the case of the source term I think the base was there and nobody was willing to pull it together and say that's the facts and this is what we're going to do with them.

MR. SPEIS: But we have done that. I'm surprised that you would bring up the source term. I don't want to be talking because I'm retiring in six months too.

(Laughter.)

MR. KINTNER: It's just an example. It's past Navy now, but it's an example which is so obvious that you can point to it.

MR. TODREAS: I brought it up.

MR. MORRISON: Herb has a comment he'd like to make.

MR. ISBIN: I've probably been as harsh a critic as anyone here, but some of the things that I've been hearing right now in answer to this question surprise me.

This committee has been involved over a long period of time with the research that is being done. And suddenly we're coming to the conclusion that they're not doing the right thing.

First of all, the question is wrong. Doing the right thing is so broad that it doesn't have a definition. It is beginning to encompass so many different topics that it isn't a proper question to answer, because each person can have his own interpretation.

As far as I'm concerned research has been involved with the programs of major interest and the committee has been involved in commenting on these programs, and research has been trying to fulfill them.

Now, whether it fulfills it to the extent that we would like it is another question. Do they do things efficiently, this is the kind of thing that Ed was trying to get involved with last year, but somehow this got lost in the shuffle, so I really suggest you try to repeat that last question and get on the right thing and be more explicit as we go along.

MR. MORRISON: I was just trying to respond. That's the question the Commission proposed to us --

MR. BECKJORD: I don't think we can change the Commission's question. You may want to answer a different question, but we're not going to do that.

MR. ATOURI: Let me say one more thing, and then I'll be quiet. I'm concerned about what Ed said about the functions should be tested, developed all the data and all the information, and have it available. But I think what is important is to integrate that information with some goal in mind. That's when it becomes difficult. And that process is a joint process between us and the people who are also using and applying that in some of the areas that were difficulties in the last few years. I think we had all the information on the table.

If we can kind of sift through the information and then -- but, when you start applying it, that's when you find out that you're missing a little bit of information, then you have to go and get it. If you don't have something in mind for the ultimate application, then even five years from now when people try to use the information, it will be incomplete.

So I personally have some difficulties with George's views, because at least I gather his views is that he wants to make this a kind of a university environment or have all the smart people in the Commission be up-to-date with everything.

And not to second guess everybody else who makes decisions.

MR. KINTNER: Let me back off and agree with you that I think in both the source term and the seismics, the information is available and should have been used.

But, what seems to me hasn't been answered is this question of maintaining a world-class structure when the major questions of the structure we're set up to answer aren't being answered. Slowly but surely, they're going away.

And the question is, What do you do now? Well, it seems to me there are only two options. One of them is you phase everything down. There's no customers as Sol says. And phase everything down to a low level in the United States and wait for somebody to do something about nuclear power again, if they ever do it. Or, you try to maintain a world-class capability. And, in doing that, it seems to me you have to change the objectives that we talked about.

MR. ATOURI: Well, you have to be very smart to decide in what areas --

MR. KINTNER: Well, the Commission -- that may be something you put back to the Commission. Does the propose -- it started to do so with CANDU -- if in fact Eric's right that a lot of ALWRs are going to go to a specific -- is the Commission going to the maintain a leadership role in terms

of the search associated with those new plants? If that's the case, then it changes the perspective.

MR. SPEIS: Let me give you and an example of an issue that we thought it was closed and was due a long time ago, the fuel behavior. It's based on the change in design basis. And, now, we're finding out from someplace that it was done in France, that there's a totally new picture. It shows highly irradiated; that the thresholds go way down. Okay?

And there were struggling, hard times to get some people together to take a look at this issue. It's -- basically there hadn't been concern about this issue. You know, in the old days we didn't have the fuels, we had no -- we abolished that primary issue about seven or eight years ago. And all of a sudden it's an emerging issue. And it would be an important one, because the industry wants to go to higher and higher --

MR. KINTER: Just to prove the 60,000 days per time.

MR. ATOURI: That's right. And some of those tests were done at about fifty or so. That was very low and very reversible; totally different than what we expected.

We're not sure if this is really the truth what happened, but I'm telling you we're going to have to get the people together. And we don't have them in this case. We

need to have one guy that just happens to be working in some other area. So here's an example of an emerging issue that we told you was closed --

MR. KINTER: Well, let me see if I can simplify anything. Herb has said, and I think what this committee has said in the past is that, as far as we were able to discern, the right things are being done. We've said that.

Now, it seems --

MR. BURSTEIN: I don't think so. I don't think we've ever addressed that question.

And I'd like to challenge Herb a little bit when he's concluded that this committee has been criticizing RES for not doing the right thing. I don't think that's true either. We pointed out some gross missteps perhaps. But, remember that RES -- and forgive me if I defend you, Eric -- RES has to respond to users. And, as we heard, some 85 to 90 percent of its budget, if not more at times, is dictated by what the demands of NRR or other offices within NRC -- and I'm the first to use RES as a target for NRC in general -- but it's different.

And I think this committee -- this committee -- and here I second what Herb has said -- has been satisfied that RES has served its users as best it can. That when NRR comes in and asks a question, it usually gets an answer. Usually a good answer; not always in time to help everybody

involved, but as best it can. And I think this committee has made that finding. So, from a user's demand point of view on RES, I think we can say they've done well by the obligations imposed on them.

Now, I guess, research has not had the luxury except in this 10 or 12 percent of its budget to determine on its own what it should be working on. So I don't think we can criticize it for 10 percent of its effort as being characteristic of 100 percent of what its budget requires.

Maybe the correct question is, if we can respond to it, do we need to ask NRR if they're asking the questions?

MR. KINTER: Well, this says, is the research program doing that right thing?, not necessarily is RES doing the right thing.

MR. BURSTEIN: That's correct. And here we have been confined -- This committee, I assume, has been confined to its review of research and not what the other offices are necessarily up to.

MR. MORRISON: Let me follow up with a comment on that, Sol, because having sat here for six years -- the program when we first came in, I would characterize it very far away from the user-driven end of the spectrum. In fact, it was probably an interest-driven spectrum or whatever you would characterize the other end of that spectrum.

And over this six-year period it shifted to nearly a 100 percent user-driven. And I think if you'll check the records, you'll find that in many of these meetings they keeping asking the question: How is the user need really resolved? But that's the right sort of need that's being tossed to them from NRR. And the answer always has been it's a negotiated process. So I can only walk away from that and say, well, they must being doing the right thing, otherwise they wouldn't require it.

MR. BURSTEIN: The right thing what their user has required. All right.

MR. TODREAS: I think if I can first say hello, and then come back to the light water reactor, or the advanced light water reactor, which we've sat through. I agree that it is primarily user-driven, but I would also add we never heard the people from RES say that the user is wrong. We think you ought to do this. We think it strongly enough that we would like to propose it, discuss it with you, get your opinion, and try to launch it.

Additionally --

MR. BURSTEIN: That in fact is true.

MR. TODREAS: That's true.

Additionally, we sat there and we scratched our heads and said, should anything be added or should anything be subtracted? And we had a few comments which say

specifically the reliability of passive systems, but we always had response in-residence. So that's why when I started off, I said I think the answer to that question is generally yes, and, therefore, I tried to answer it in a different way.

But, if I'm wrong, if you guys have actually been sitting on the staff's boiling desire to do valid things and it really hasn't surfaced over the last two or three years, that would be valuable information.

MR. SPEIS: You mentioned the passive reliability program.

MR. TODREAS: I think we're together on that.

MR. SPEIS: No, but you used a word that I don't use.

MR. TODREAS: The reliability of passive systems?

MR. SPEIS: Yes, basically what did you say after that?

MR. TODREAS: I said that that is something we've talked about, but I thought we were certainly together that that was the right thing to do and it was just a question of finding out -- fine tuning it. So I don't call that as --

MR. SPEIS: That was a tremendous place for me. That program was going nowhere in essence, and we spoke with them, we tried the whole approach.

MR. ISBIN: This wasn't the Sandia work?

MR. SPEIS: That was the -- Yes, I believe it was. But it turned out to be a kind of PRA in that sense, you know, sitting down to think about the process of whether we could -- that's one of the difficulties sometimes we're having, that our schedules and other agencies -- some of our people sometimes move too fast to do the right things, instead of asking --

MR. KINTER: I think this question --

MR. SPEIS: Sorry.

MR. KINTER: Sorry. Go ahead.

MR. SPEIS: We're sitting down to ask all the right the questions, is this the right word? or are these right questions? And sometimes it's difficult even to agree on whether they're the right questions, but I think it is important first to do that before we rush forward to do work. And that's what happened in this area in the past.

MR. KINTER: I think we are to, ourselves, broaden the question to say, is the research program doing the right things? And my answer to that is, yes, as far as what the Commission's role is and what research has been asked to do. They are doing the right things. Some of the things might be finished sooner or finished late, but, nevertheless, the correct answer is yes.

But someone should be thinking about what are the right things for the future because this picture is going to

change, it's going to change rapidly as we go through the next five years or so, and that is something which I don't think has been answered.

One of the things you could do is say you're going to do the basic stuff that Strigers is talking about. Another thing you could is say you're going to work on outside things like RBMKs and the CANDUs. There are a number of things that could be brought into the picture. So the question would then be, beyond, yes, we've done the right things up to this point, and they've been done reasonably well, but what's needed to be done in the future hasn't been established.

MR. MORRISON: Mike, you've been trying to say something.

MR. GOLAY: Well, basically I want to build on some remarks that others have made, especially Ed just now. Being unencumbered by as much information and knowledge that most people here have, I can say things more bravely. I've sort of formed an impression from the morning's discussion that maybe for the work of the research group, they are at a point of change, not only in the personal leadership but in terms of the agenda, because essentially what is evident here is a focus on really two classes of problems.

One is changing the criteria by which a problem is accepted onto the group's agenda, we're guided -- focusing

much more on the regulation as driving us than formerly. And the second is focusing very much on problems of physical performance. Many of the problems we've heard about today are carryovers from the '70s really and others are residues from TMI, questions raised by TMI and being closed out.

And that for the future I think the thing that you would look to then are what new questions has experience put on the agenda, but which isn't -- which are not really being addressed strongly in the research programming. And the second is having moved the focus of the customer to being NRR, how could that be reconsidered? So I'd like to take them in turn.

And that is when you go to a power plant, one of the things that you're very impressed with is the need to coordinate the information flows there. And, if you want to get really good performance, one of the questions is what are the standards that NRC should be imposing on the holders of licenses to insure that all of the operations which they're carrying out will in fact be performed successfully.

Now, you might say that this is a problem that doesn't need solving because they're doing well enough. But, if you go to a plant, what you see is that they have a terribly difficult time in trying to do it. It's like a twelve-ring circus going on at any one time. And there are

improvements in technology and, I believe, also in management methods, which can probably get better results there providing the target is outlined. And that's where I think research can be very valuable in getting a better result for both the utilities and the NRC. And, as part of that, advanced INC comes in.

A second thing, which has always been a problem with the NRC, has been the uncertainty associated with dealing with it for a licensee. When you come in on a new issue, the problems are almost always one of how is the NRC going to react on this if you're the licensee considering it. You know, look at license extension as the example today.

And there's a class of problems having to do with helping the NRC be a more effective regulatory agency, which I didn't hear being addressed today. The focus seems to be much more on how does research give NRC better tools to come up with the answers? But, in terms of the NRC's processes and procedures, I don't see that kind of thing being addressed. Where the key issue is really one of uncertainty, it comes up in risk-based regulation. It's going to come up in the aging. It's going to come up in the procedures for license extension. I think that there are things which this group could do to actually help the regulatory people do a much more effective job at getting

the licensees to devote their resources to improved performance.

In the face of high uncertainty very often the licensee's response is to simply abandon attempts of improvement saying effectively what's the use? or the risk that my investments will lead nowhere or high enough that it's not really a good thing for me to be spending my time and money on.

The second has to do with human performance, not so much -- rather the third -- not so much in the human factors area, which, you know, has been worked pretty well, say, the control room redesign, but more in organizational performance and management. You know, Sullen, when he first came in, one of the first things he did was to look for indicators that he could use to judge whether organizations were being managed well.

And, as far as I'm aware, that's not a topic which is on the research agenda here. Yet, in terms of getting better performance from licensees, it's probably one of the most crucial. As you know when you go to research utilities, you find different cultures operating; and trying to sort out what's good, what's bad and where you'd like to put limits on how they do things is really an unsolved problem.

But then if you go further down from that, the

things you see are things like in, say, management of the staff, the problem of, say, circadian rhythms has been recognized, but it hasn't translated into guidance for utilities in terms of how they're allowed to schedule their staffs. And so you find essentially that each organization has its own practices.

What I'm really trying to do is to say that there is very broad agenda having to do with how you operate a plant, both effectively from it producing electricity, but also in getting good safe performance, which doesn't seem to be part of the agenda in research at all. And that kind of thing I think could be a good way to refocus what the future agenda here might be.

In the second category, I would suggest, is then looking at who are the customers. And I would suggest that in addition to helping NRR, the question of identifying the problems which limit the effectiveness of NRC and thinking of research, which could help solve some of those, could be valuable; and identifying the criteria to govern the operations of plants, again, to get better results, could also be another version of a customer in serving up research problems.

So, anyway, those are some initial perceptions.

MR. MORRISON: Fine. Thank you, Mike.

Let me just call the meeting's attention to a

letter that Eric sent, addressed to Ed Kintner, dated the 28th of April, 1994. I don't know whether the new members have that or not. And that was the response to the, you know, the research office to our three reports on advanced instrumentation and control in advanced reactors, of high-level waste.

And one paragraph on the second page of that letter refers us to the Energy Reorganization Act of 1974, which puts some very clear bounds around what NRC can do in research, at least, that's what I interpreted the paragraph to be telling us that, to keep our nose out of certain things.

But maybe what's involved, to quote here, that "the function of the office of Nuclear Regulatory Research is to provide and independent capability toward developing and analyzing technical information relating to reactor safety and safeguards, and environmental protection in support of the licensing in the regulatory process. RES was established to fulfill a need for confirmatory research. Gunther's report warns that it would be a serious mistake to make a regulatory agency responsible for research that goes beyond confirmatory assessment."

And so there's a fairly narrow bound put around us. And the final sentence in this paragraph "RES cannot lead the industry toward a particular strategic vision or

integrating initiative without acting inconsistently with this legislative intent concerning its mission's scope."

MR. ISBIN: So RES's program is not dedicated to the supporting the licensee?

MR. MORRISON: Apparently --

MR. ISBIN: That was going to be a comment that I was going to make in following up on Mike's discussion.

Mike raised this issue which is really the last bullet on your chart, Mr. Chairman, page 1, that -- What is the regulatory basis for the research program? And I think he has very accurately described some of the issues related to what RES's mission is, and who the customers are, and what the function of this program is.

I have some problems that RES has interpreted some of its language to suit itself when it's convenient and is not willing to share it with others when it is.

(Laughter.)

MR. ISBIN: I think that Mike and I would both like to do away with RES and NRC and NRR barriers, and we'd like to treat the whole thing as one piece so that we could divorce these artificial boundaries that keep us from perhaps taking advantage of as well as criticizing the whole as opposed to one of its parts.

But there is no question that these ideas of what the relationship of the confirmatory or the RES research

program -- let me not characterize it in any way -- in a regulatory environment needs to be defined in order to perhaps go back to that, what is the right thing for them to do?

MR. BOULETTE: For whom? For whom is part of the question I think on that first question. I mean what I was hearing Mike say -- if I misunderstood, I apologize -- but I was hearing a plea for more research to be focused on the licensee needs. Did I hear that?

MR. GOLAY: I wouldn't put it quite that way. I would say that there are areas of licensing behavior where the NRC is largely silent. And I think it's fundamentally because they have not developed the intellectual base to set up guidelines regarding what's acceptable and what would be beneficial. And that, if you look at the problems of the existing set of licensees, they're almost all to do with how you operate a facility, rather than how you design it and how the safety systems are going to perform.

So it's not to support the licensee, but rather to see if you can develop criteria which would give safer performance from the licensee by addressing questions which are currently right now simply left unaddressed.

MR. MORRISON: Let me show my ignorance by raising a question. I thought that was the whole role of INPO, that the industry is not even establish outside --

MR. SPEIS: INPO, doesn't really have anything to do with regulations.

MR. MORRISON: No, I was referring specifically to the licensee performance, whether it's a role -- you know, that's why it's created.

MR. BOULETTE: The reason for regulation is not superior performance. The reason for regulation is safety. And what Mike is referring to, I think, again, and I know I'm reacting to this, let me -- if the reason for RES's research was to support the licensee, I would shut the program, because you wouldn't have a ten-year seismic program either if it was in support of the licensee. So that's not the reason for RES's research program. I don't believe --

MR. ISBIN: In the end it has to be that it supports the safety of the plants which is the fundamental purpose of the whole regulation. And sometimes the safety of the plant has to go beyond just what the so-called needs as defined by NRR or any other group within the NRC is.

And I think this is what Ed was getting at in the report, the INC subcommittee report, is that there's something so fundamental here that the integration of the human factors part with the instrumentation and control issues that we can't separate them; that if it is necessary to change some rules or change interpretations, then maybe

this is necessary here.

MR. KINTER: Another thing that overlays -- you'd overlay that thought in my mind when Eric says, well, the contractors ought to do it. But in the present industry's environment -- Nobody's doing very much fundamental research at all. This question of fuel that you raised, that, yeah, they're not doing very much fuel research, very little. They're selling it like mad, but they're not looking for research. And so fuel fails and pulls apart, actually pulls apart and then rolls around in the reactor vessel. Is Westinghouse interested? No.

So that's another thing that overlays the NRC's research mission, which is the industry in this area is dead. You've heard what was said about EPRI. EPRI was taking leadership for many years. Now, it doesn't have the money to do a lot of things it was doing before. And the contractors aren't doing it; there's no money in it for them. So I think the NRC's role has got to be thought about slightly differently. Because if they're not going to do it, nobody is. Maybe that's the answer.

MR. BURSTEIN: Now, wait a minute. We just talked about the industry, the nuclear utility industry, having created some of its own facilities. You mentioned INPO.

MR. KINTER: Sure.

MR. HATCHER: You can't ignore EPRI.

MR. KINTNER: I can't ignore it. I can say all those things are losing their momentum.

MR. BURSTEIN: But is RES competitive with EPRI, and should it be?

MR. KINTER: That's an observation, not a representation.

MR. BURSTEIN: I'm sorry.

MR. KINTER: That's the circumstances of life.

MR. BURSTEIN: But indeed, we are --

MR. BUSH: We're just concerned it might be a recommendation.

MR. BURSTEIN: Yeah, right.

MR. GOLAY: Now, let me try to crystalize this with an example. You know we had Sullen when he first came in, he said he wanted to have some performance measures for how to manage a nuclear utility.

MR. BURSTEIN: Now, this is typical of people who come to NRC or to the nuclear business and know from their own backgrounds in other fields that they're going to christianize it. The Sloane School has been trying to do this for ten years and hasn't gotten very far -- Next case.

MR. GOLAY: Okay, now let me continue. Now, if the problem were easy, we would have these criteria. And there's a certain temptation to say, look, things are going well enough, just, you know, keep the camel's nose out of

this particular tent. This is going to create more mischief than anything.

And I'm rather looking at it from the point of view of asking what kinds of help can be provided rather than mischief, that classic problem. This is a subtle question; it's the kind of thing we just easily misinterpreted.

MR. TODREAS: Maybe that's why we have new blood and regeneration like a colleague who just spoke here -- . But I think you should realize that in the NRC program maybe three or four years ago when Tom Sheridan was part of this and Sol was part of the review, we set through maybe two or three years of Brookhaven attempts of programs at this and parallel programs that had been initiated at the Sloane Schools.

And then these were gradually dropped from the research program, because they were not fruitful. And that's why I say it's not that they haven't been looked at and tried; and maybe they're desirable to look at again, but I mean, that will be up to --

MR. BURSTEIN: But, indeed, Mike has put his finger on the one area of difference, whether it's a cultural difference, whether it's a philosophical or an economic, but all of these plants that are out there, all of these nuclear plants that got very slower hardware, very

similar systems, very similar designs, they all have similar margins between their design and operating circumstances, why do they operate with such a wide variety of results? I think that's a legitimate question. It has to do with safety as well as economic performance.

MR. TODREAS: Do you want to research again? It seems to me --

MR. BURSTEIN: I think I know what the answer is, but clearly the question is, is that part of why we have a research program in NRC? If the answer is yes, then I think we have to respond to Mike's questions in more detail. If the answer is no, then we go onto the next subject.

MR. SPEIS: One of these days we'll have to have Mike tell you everything we're doing with the human factors and in assessing them.

MR. GOLAY: Well, that's why I was glad that I had that preamble about not knowing a lot of things.

MR. SPEIS: The research sent us nowhere. In some other areas, industry told us, you know, get out of our business, you know, you guys don't know how to tell us how to develop methods for marginal runs.

It's an area that we're treating very carefully. Okay? But we'll have some efforts and eventually we'll let you know about it.

MR. BUSH: There are narrow questions as well as

like the extent of what we're talking. What is the permissible area we're talking? Things like that have been raised and have been looked at.

MR. VOGEL: The circadian rhythm is another issue. It's one of the recommendation of the committee, opportunity like TMI. And that was the only one of nineteen made by this particular committee that was not implemented. And the reason was that the operator said, why doesn't it kill them if they went through this six months in a nightshift and six months in graveyard shift -- six weeks even?

MR. MORRISON: Well, just to reenforce what Neil said, I'd happened to go back over the last week or so, looking at some of our prior reports, and I pulled out the 1988 one that was done on human factors research. And these were the NRR priorities as our report indicated: Shift scheduling and overtime, computer "quality" classification, confirmatory research using simulators, the vent report, improvement to annunciator systems, expert system verification and validation methodology, impact of high technology on control room operations, team performance, operator performance under stress and emergency conditions, operator performance under extreme conditions, training effectiveness. That was all addressed back in 1988 and has disappeared. And, if I looked at the 1993 list of human factors was being talked about the committee, none of those

are on the list.

MR. SPEIS: Well, some of them have found a way to -- there's also work -- regulatory guides --

MR. VOGEL: This is conversation is sort of institutional one. I dare say that EPA could have the same discussion. The problem is that there's so many seats involved in making decisions. Now, when I was at Exxon Nuclear, there was never any disputes. Ray Dickman told us what to think, and that was it.

(Laughter.)

MR. VOGEL: He may have been wrong, but that was it.

MR. TODREAS: Well, you know, some of the subjects we've been talking about -- you mentioned circadian rhythm. Somebody else mentioned allowable overtime. One of the things that gets lost when you try to make a regulation on something like that is the tremendous variation between people. It's not something that everybody has the same degree of affinity for or is bothered by and that's why the people running the plants that know their employees can presumably can make decisions to put the best people in the best kinds of jobs to consider that.

And then if you make a regulation and you force everyone into the same pattern, it's always debatable if you really help anything. My wife always works either the

evening shift or the midnight shift, one or the other, because she loves it. And it just sits right with her. Me, I wouldn't want to do that for anything.

MR. KINTER: She must not like you.

MR. TODREAS: Yeah, she likes me. She tells me she does anyway.

MR. ISBIN: It's all on the record now.

(Laughter.)

MR. KINTER: Well, let me try again, and we'll get off this question. Is their program doing the right things? Yes. But the Commission should consider with regard to whether it's going to be doing the right thing in the future in view of the following: A, B, C, D. A -- we can put a list of those together.

One of them is to what degree is it going to be involved in an external reactor matters; B, to what degree does it really intend that the NRC maintain its world leadership in these following fields; C, to what degree should it be looking in advanced areas other than simply the questions that are addressed to the NRR; to what degree should research be doing that; and, I think D is to what degree should the organizational strength and health of the NRC research operations play into what NRC research operations does.

This question of keeping critical masses and the

question of bringing in some bright young people, like Jack, to replace, and so forth. He was a product of this kind of a program, you know, an intern program established to get bright people and give them special education and bring them in to put them work, and as you can see what's happened for himself.

All these things could be put to the commissioners because they ought to be thinking about this in terms of the future of the research. At the moment we have nothing really important to say.

MR. BURSTEIN: I want to know why we're inviting you as the incoming chairman. You're very diplomatic. You answer a question with a whole series of questions.

MR. HATCHER: I want there to be a future. In trying to justify something like this, it has to be justified based on a question of national security, and can it be? I mean, we're looking at something here that is a question of leadership, a question of long-term support, and it might actually come down to that kind of thing.

MR. KINTER: The policy decisions of that kind is something the Commissioners have to answer, and you're right it puts the question back to them.

MR. BURSTEIN: But even that policy decision -- again, somewhere in the files that I've been looking through, I found a speech that Sullen gave very early on

after he became the chairman. And I'll paraphrase it. I'm not quoting it exactly. But he said that in his view NRC's role is not to be an advocate to nuclear power or the nuclear power industry.

So it seems to me when you start talking about things very broad, you get into the answering-question position, which is not his choice at least as chairman early on.

MR. VOGEL: But I don't think anything that we said in this INC report about the integration of human factors, instrumentation and control in any way violates that principle.

MR. BURSTEIN: I don't think it does either. And I don't think that that was the issue that was being raised there. Although it may be a question of how far should NRC goes in this INC role, that moves it from the ability to give guidance which it does very well. Again, NRC certainly ought have the responsibility of asking you for a rock, but being able to tell you I want to have it in a certain size and shape and form and color, if I'm going to --

MR. VOGEL: I think initially they didn't have that ability to say I want this this size, shape and color. It was bring me a rock, and I'll look at it. Now, they have reached a point of where they can specify the color and the size, et cetera, but for several years in here this was not

the case. It's still not whether it is square or round.

MR. KINTER: Well, again, I'm trying to answer this first -- an answer it seems to me that we have three alternatives. One of you can say yes. You know there's an old proverb of let your answer be yes or no, all else is evil. Or we can say "yes, but," which is what I tried to describe here. And maybe those aren't the right four things, but yes, but you should be thinking of the following. And, before we can no, the following additional things ought to be done. This is the only few alternatives we have.

MR. BUSH: And I think we've already answered with the second answer to a large extent. I think we have been saying yes; but I agree with Ed that the real question is, will research be doing the right thing in the future? What do we do to prepare ourselves for the upcoming problems?

MR. KINTER: Spence, you are --

MR. BUSH: Yeah, I have, you know, we can look back over our shoulder to know what's been going on and say some things. But the thing that worries me if I were to make a personal prediction of, you know, where we will be in the next ten or fifteen years, I really expect to see reactors shut down. I have a very low probability value for client life extensions. I'm saying here, I've been following that for ten years or so.

And I assess the probability of somebody buying a new reactor as extremely remote, or maybe after fifteen years that will change. I don't know. But those are all negative factors. And so one has to say if you want to look at the future and say you need to keep a world-class organization, you're going to have to say it almost in spite of certain trends that you might predict. Now, I'm not saying that you shouldn't do it, but it makes it a difficult question to answer.

I don't know how you answer it to be honest with you.

MR. MORRISON: The problem goes further, Spence, it's assuming that you would want to maintain a world-class organization, what kinds of research would you have them do now to maintain that? I'm recognizing that I must accept your future projection.

MR. BUSH: Yeah.

MR. MORRISON: What would they work on?

MR. BUSH: Well, I think a lot of what I would suspect if you make some assumptions like that is that you would have to retain a level of competence, which doesn't say that you move into many new fields, but what you do is you try to preserve the old ones, which I think this is in a general trend. That's one possibility.

The possibility of the budget getting bigger, you

know, doing that thing, I don't see.

The competence thing that takes two parts. You have to have competence within the NRC and then you have to have the competence that you can lean on outside the NRC. And there has to be some kind of a minimum funding level, which I don't really know what it is, in order to preserve it.

That doesn't really say, Dave, that you're going to an awful lot of new stuff. It's more of maybe looking at them a little more carefully on some of these things, et cetera, and, if possibly, deciding that some things you just -- there's no real reason to continue in that respect. That's a very difficult question to answer.

MR. BOULETTE: Doesn't that fly a bit in the face of -- doesn't that kind of speak to encouraging the ongoing nuclear industry in some sense?

MR. BUSH: Do you mean doing the work in spite of what I consider the trend?

MR. BOULETTE: In other words, in spite of these dire conditions.

MR. BUSH: I say that's what -- it's a difficult question to answer, because obviously if one really believe that, then you have to say one of two things, maybe it should continue to downsize, you know, even at a more increasing rate. The other side of that coin is that, well,

there's an inherent advantage in having a world-class organization to do that, regardless of what's going on within the United States. That's very difficult point to, I think, defend, but it may handle it.

MR. BOULETTE: We keep circling around the fundamental question, what is the objective of the research program of the NRC? What's it really all about?

MR. BUSH: That's why I raised that particular question.

MR. BOULETTE: Okay.

MR. MORRISON: Well, to add on to what Spence said, if we go with that kind of assumption, then another question that comes up is, can this organization become a research for hire?

MR. BUSH: To a degree it has; part clinically, if you look at it.

MR. MORRISON: No, hire by the other parts of the world that are going to be more working on nuclear power.

MR. BUSH: Well, we haven't called it that, but fundamentally we've done it do a degree. When you receive money and attract a lot bigger pots of money to do certain things that we wouldn't have done otherwise. The one that Andy was talking about on the pre-stress/post-stress of concretes is a good example. That one would have never have gotten off the ground if it were, in my opinion, if it

depended on NRC money. In fact, I don't think there even was that much interest in the thing. It took the Japanese money to really get that one going. And I think there are a quite a few examples like that.

MR. SPEIS: Most of our big programs that we have been started in the last year regarding the research, and our contribution is maybe 20 percent.

MR. BUSH: That's what I mean for the seed money. I think you took the seed money and you talked about the expertise, which may be -- is a mercenary attitude.

MR. KINTER: If you look the snake in the eye -- I don't want to say that this is my recommendation to all the NRC's observations and judgments, but selling themselves and giving these guidance notes to the planning groups of new plants and licenses, they should plan on 50 to 60 license renewals, and they had to take care of Yucca Mountain and things of that kind. If you had to look that in the eye and when you hear what has been said today about the status of research, reactions and otherwise, and the way it is going to phase-down, then, you know, the whole organization, the NRC from top to bottom, it's got to come down to half-size.

MR. BURSTEIN: That's right. That would be the trend if you project it.

MR. KINTER: Now, is that consistent with maintaining safety or the continuing operating reactors?

MR. BURSTEIN: But there are an awful lot of leaves of the cabbage that you could peel off, because there is a lot of excess conservatism in many of the assumptions that are made in with regard to safety, but that's also a sacred cow, and it's very different.

MR. ISBIN: Mr. Chairman, I would suggest that the committee try to work this the next four to five years. If we don't try to go much beyond that, you may have the collective wisdom to know what's going to happen in the far future, but some of the statements are very pessimistic. I don't think they should be reflected in this committee's report because it doesn't really constitute a well-thought-out and well-discussed position. But we certainly can on the basis of the research that we've seen and what needs do be done, talk more positively of the next four or five years.

And I would suggest that, Ed, that you keep those A, B, C and D and refine them and have something to that effect.

MR. KINTER: I may be doing that.

MR. MORRISON: You're not going to let people know that.

MR. KINTER: Well, maybe there are others. Is that -- I'm sorry, it looks like I'm taking over.

MR. MORRISON: No, go right ahead.

MR. KINTER: Is that the consensus of the group that there are three options. We'd take B mainly -- what's being done is this program is correct, but it should be thought given to the following; is that what we want to say?

And then are there any other D, E, F and G's that anybody wants to put forward or taking A, B and C out or whatever?

MR. ISBIN: And at this stage I think what it has to say on the task force response could be helpful.

MR. SPEIS: This is on developing a maintenance level.

MR. ISBIN: Right. The program is all part of it, yeah.

MR. SPEIS: I have paper which is on its way to the Commission. It hasn't gone yet, but I would like to make it available to you. It's how we have felt about this program in the area of thermal hydraulics. And I would like to pass it toward you, Mike.

MR. GOLAY: Well, we may want you to talk about it here in just a minute. Let me close the item -- Bob Uhrig has a question on.

But I'll take the responsibility when we start tomorrow morning, I'll have that list of ABC's, whatever they are. Some XYZ's, if we get down to that point. Then maybe we can shoot at it, and we can say that we really

addressed the question, number one.

And I think what you're talking about is it probably fits kind of collectively into two and three: are there enough resources to do what is being done? And, secondly, are the skills of the staff on the contractor-base keeping up with the changes in the Commission's needs.

MR. BOULETTE: Dave, I think if we answer these other questions, we'll probably get some of other, D, E, F's and G's.

MR. MORRISON: Well, I won't turn off my hearing aid. Sol?

MR. BURSTEIN: In response to the second question, I'm not sure whether that's what the Commission really intended, because it should be clear that there's always enough resources to do what you're doing.

(Laughter.)

MR. BURSTEIN: If there weren't enough, you wouldn't do it, you wouldn't get it done. If there were too many, you'd be inefficient, and nobody s suggesting that of anybody at the NRC.

(Laughter.)

MR. BURSTEIN: So I think the answer there is rather clear, but there is never enough resources to do what should be done. And I think that's by whatever definition you want to employ the word "should."

We have talked about, and I don't know where the proper place is, if it is at all at this point, but we just said something about the NRR size and budget perhaps should be more subject to trimming compared to the RES budget. Yet, it seems that research in every organization, whether it's industrial or NRC, seems to be the one victim or the earliest victim of any budget constraints. And maybe we ought to make a plea that there is no way we can get to be a world-class organization or maintain it, or do what Eric said he wants to be -- I think it's on page 8 of his reply that you referred to before, where he says "The intent is to produce a thermal hydraulic capability that is truly world-class and, once again, advances the state-of-the-art." Now, if that's one of the missions, and I'm not debating whether it is or it isn't, but, if that's one of the missions of RES, it certainly doesn't have any resources to do that.

MR. TODREAS: You know, I'm starting to wonder if some of these directions that we've gotten from the Commission are not ill-conceived to a certain extent.

(Laughter.)

MR. ISBIN: This idea of somehow downsizing and maintaining quality while at the same time doing some of these grandiose things may not be just be consistent.

If you have to downsize, it seems like you have to define what's essential and focus in on doing that and doing

it well. And, from a safety viewpoint, if we're going to have at least a near-term contractual -- let's say of the nuclear industry and several of the privates of groups are making the decision that it's not really that profitable to be involved in the normal aspects of things -- then you do have the situation where everyone is going to want to walk away, like we said.

And so it seems like managing the safety of that kind of an environment is what should be focused on. And it's not an easy environment to manage safety in.

I guess in some sense that sounds pessimistic, but it doesn't have to be. I mean there are challenges in that. I mean regulatory responsibilities are always going to be changing as things change. And there are certainly a lot of management capability that something like that demands. And maybe that's what needs to get focused towards.

MR. TODREAS: If follow up on that and try to do the job, there are certain areas that are critical here for safety. And by "critical," since nuclear power is so challenge versus other technologies, you have to be at the world-class level or almost.

So, if were to list those or you would do it with -- I mean you could list -- I guess we've got thermal hydraulics. We've got INC. There are a few others. Pretty soon you run up to the budget limit. And then you find out

what you've left. And then you point at those, and you say given these "X" -- let's call them four or five numbers to get the level that it requires -- you don't have anymore resources left to do the next three or four. We could respond that way and list the items with some budgetary estimates and help.

MR. MORRISON: I think that's a good idea, Neil, that if you look at page 3 on that document that has the viewgraphs on it, these are the list of critical disciplines that Eric presented, actually page 2 and page 3, that Eric presented, I believe, at our last committee meeting. And we saw additional instrumentation of controls and emerging critical disciplines and technology for advanced reactors wasn't terribly well-defined. Then thermal hydraulics was in.

I guess the question is where would you draw the line on that page 3?

MR. VOGEL: Does that have a ranking?

MR. MORRISON: Well, mentally, I certainly I think it's a ranking.

I don't see that NRC needs to maintain an economic analysis capability and that's anywhere close to thermal-hydraulics; it's at the top of the list.

MR. KINTNER: With radiation and protection and health effects and environmental sciences sure as hell are

important, and Eric spoke about them.

MR. MORRISON: Why do they have to maintain that? The DOE has tremendous amount of capability in both of those areas and so does the Environmental Protection Agency and the Department of Health and Human Services. Why not one more agency in this camp?

MR. HATCHER: NRC is supporting a large level of redundancy in the, say, the biology, tectonics, seismology and this sort of thing, and in water resources also, at the Southwest Research Institute. So why not environmental sciences to be able to evaluate the results of the DOE studies?

MR. UHRIG: If nothing else but to protect itself from EPA arbitrary positions that may not be appropriate for NRC.

MR. TODREAS: Yeah, but the scale is probably different. But I think when you hit materials performance, maybe geological sciences, from there -- after materials, let me say -- from there and below, you have to be able to integrate and evaluate other work, but you don't necessarily have to create it, and that may be a way to make the difference on the money.

MR. SPEIS: If that's the case for health effects, for example, you would have maybe a 150 or 200K program. We have an expert, Yanes, who keeps up with what's going on,

and it's a matter of knowledge and integration.

MR. TODREAS: The question is can we motivate an expert over the long term to keep up with that, or two, or three, at those low-levels?

MR. SPEIS: No, in light of the rescurces we have, we have decided it's in this area we have five experts or one, or to put them in thermal hydraulics, and that's the choice that we have to make basically.

MR. TODREAS: Well, let me go back to my question. You told me that practicality, but you've got an expert of mind in a certain area. You mentioned a name and an area.

MR. SPEIS: An example.

MR. TODREAS: As an example, I mean, but at the levels you're talking about with funding availability, can you keep experts like that over the long term?

MR. SPEIS: Well, we've decided that, you know, that's an important area. We get many inquiries from states, from Congress. Health effects is an important area for something called the Nuclear Regulatory Commission, so we have to keep -- to have some expert in this area.

MR. TODREAS: And they keep going. But at the level that you're applying it to, do you have a enough expertise or are you skimming it?

MR. SPEIS: We're probably at the bounds again, somewhere in between.

MR. TODREAS: So, you're not very comfortable with it, but you think you can get by?

MR. BURSTEIN: To support what Neal is saying, when you get below the materials area, there are other agencies, both Federal and non, who have expertise, who have resources, who have really lead the state-of-the-art and the science, the engineering, far more than NRC could or should.

That the International Commissions on Radiation Protection, the committees, all these other activities have much more qualification and competence when it comes to health effects than NRC can put together. I'm not suggesting that they shouldn't have someone who appreciates that. But my point is that when it comes to areas like thermal hydraulics, when it comes to areas like ALWRs, there is nobody else who's doing any of this work except the vendors. This is a unique NRC technology. And as such, that's where the concentration of resources has to come. So I support Neal's position on this position very strongly.

MR. KINTNER: Well, that drops out geological sciences, which is one of the biggest things for Yucca Mountain. Perhaps human factors, which we've been meeting on for months.

MR. BURSTEIN: I'm not suggesting that they don't know about it or take it into account, but they don't have to have the same expertise as you USGS does for Yucca

Mountain or that DOE does or DOE's contractor, neither do they have to have the same human factor's capability, that some of the other people involved in these disciplines require.

MR. BOULETTE: We're talking the same issue we've raised several times: To what use is the NRC making of the other organizations that have these skills, these technologies?

And I think what Sol is saying some representation in those areas has to be present, but not totally --

MR. VOGEL: Well, by implication, you're trying to establish an overall objective to the Commission as the whole, and then working from top down. And I'm not sure --

MR. BURSTEIN: And don't forget that there are two items on the previous page that I think seem to head that list too.

MR. VOGEL: I'm not sure but that we aren't in a sense overreaching what the Commission should be doing.

MR. HATCHER: Perhaps I can give you an example just to indicate how we use critical disciplines for expertise. Just take environmental sciences, we have two rules going through right now. One is the license renewal rule that has a GEIS, a generic environmental impact statement, that must be four inches thick, developed by our agency, responsible -- the responsible office is the Office

of Research.

The other rule is the decommissioning rule, residual contamination, also called radiological criteria rule, and it has a GEIS that's very complex. It has a lot of mathematical modeling. The supporting documents for some of these rules get very esoteric, if you will, in environmental sciences, and we have to develop those rules. We have to defend those rules in these documents. And we have to also direct the contractor, and they are contractor-evolved. Properly we have to have be able to make the technical judgments of whether we're getting quality work for the money we're spending or whether they meet the needs of the agency.

It's in some of those activities where we have the expertise in-house to make those types of judgments and give the technical direction necessary.

MR. SPEIS: But we're not doing any research in this area.

MR. TODREAS: Well, that just says the dollar figure that you need for the last five items may float out, but that still doesn't -- It doesn't, say, upset the hypothesis that these two groups of activities with a differential between them.

The first group is narrowing the materials; and the second group is geological sciences down to

environmental analysis.

MR. SPEIS: I think --

MR. TODREAS: I was going to say I am not so frozen as to where exactly the line is, but I have this feeling they're at two categories.

MR. SPEIS: We can give you the money -- economical analysis, environmental sciences, no research. We just have some people who it is there responsibility as to who, as Jack just said, where the agency protects to help; in fact, we probably have about a few hundred thousand resources. It's mostly to keep up with all the other agencies, to address questions, and some of those questions are related to rule making that Jack described.

Human factors with a few million dollars Geological sciences would have maybe three million or so, but then you go up into, you know, eight, ten, fifteen or so. It's kind of a big category.

MR. BURSTEIN: And I think that's the way it should be.

MR. KINTNER: Well, that just says what they're doing is right, again.

MR. ISBIN: Well, that's correct. And the whole thing is called technical discipline, so they need these disciplines and we should support them on that.

MR. HATCHER: I guess I remain very confused about

the way things are organized here. Tuesday I sat through a series of presentations at the HC&W meeting in which the people from the Southwest Research Institute, which apparently visited last fall as part of this committee -- made several excellent presentations on what they're doing there -- and had some long-term goals that got into pretty -- with what I would consider rather academic, esoteric type of service. They may never get to, but that was their long-term goals.

And it was supported by the people who are supporting their work. I guess that I would like to see, if possible, just for my information, perhaps the other new members would like that as well, an organizational chart, maybe before we go to the meeting tomorrow afternoon, just showing where these -- what the groups are within the Commission that are supporting various aspects of research -- not a detailed one, just to show them that -- Do you have the waste-management group over there?

MR. SHOTKIN: We have a waste-management branch supporting the --

MR. HATCHER: They're supporting people at Southwest Research Institute.

MR. SHOTKIN: There's two office that support Southwest, NMSS, Nuclear Material Safety and Safeguards; that's the program office. They hold the contract of

Southwest Research Institute, and then the research program has a certain research element within that contract, and that technically comes out of our office as well as the budget.

MR. HATCHER: Okay, how much communication is there back and forth from who's doing what and how much redundancy there is and this sort of thing?

MR. SHOTKIN: There's constant communication. And also we have a program plans that we've developed and coordinated and have concurrence of the program office in order to make sure that we're working on the right things and our direction is clear.

MR. SPEIS: I think for the new members, George can probably get them the program but we're in the process of revising them right now.

MR. ISBIN: And then once this committee that stressed the tectonics, stressed the vulcanism, and this became part of the research program that you're carrying out?

MR. KINTER: I was glad to see that the Southwest Institute has a major program in Santarem.

(Laughter.)

MR. SPEIS: Well, you people supported that program, anyway. It was great.

MR. MORRISON: Tell me this before we close on

this whole subject of the resources and skills, why don't you pass out your information and give us a few minutes of how you define what a maintenance level is and how you're approaching it.

MR. SPEIS: Well, what is -- you'll have -- you will get them before the Commission, and it hasn't reached then so just keep it to yourselves.

It is hard to maintain a thermal hydraulic expertise toward -- up to all standards. This whole program was very big in the old days. We had semi-scales, and the DCCS question was around us for a long time, now those programs of course have been terminated. And, in fact, for a while before the ALWR program came to us, there wasn't lots of activity in this area, so we're in the process of cutting down. And then the classic designs came in, we were kind of rushed to do some more upgrading.

So right now basically the program it has a real focus, because we were involved with -- I'm really talking about the next four or five years right now, even though what I'll say shortly is going to to the next ten or twelve years.

So right now the program has a focus and focus is the AP600, the boiling water reactor. And we're, of course, looking at the CANDU reactor. But, after this program gets out of the way, when we complete the other work and the

original work that is associated with it, we're done as far as the program is concerned.

And you see here on page 2 over here, it seems that you have in front of you, that we think there are a number of elements that are important to developing a long-range plant for maintaining capability in this area. You need a challenging technical environment, of course, the maintenance, already a covey of experts. You have to have some resources. You have to decide what level. But the only thing which is here that this implies also needs some continuing involvement with some real things on an experimental program.

So then I go and give some ideas about what are the issues involved as far as getting the challenging technical environment, how to maintain the expert's assurance of resources and the continuing involvement. Maybe you can read it at your leisure at tonight, and you can get some ideas. But, basically, the other thing that has to be done is you have to focus the program on -- what's the other one? Ramona. Ramona is the transient.

But the key thing will be that some real effort has to be underway, some experiments, something else.

MR. KINTNER: Let me question, here's -- I guess my question is to Neil, not just to you, given you're going to do the upgrading and the required modifications required

for the passive plants, and given that you've got a hundred reactors running here and there, more world-wide, based on the codes that already exist, why do you need more codes? Why do they need to be improved? What's going to happen that requires more codes?

MR. SPEIS: These codes are in existence. It's real obvious for PWRs and reactors.

MR. KINTNER: It's there. Do you mean I'm going to go in the library, pull it out, and put it in my computer, and push a button, and I'm --

MR. SPEIS: No, it's not that simple. Maybe Todreas can address that question. If it was that simple, I guess --

MR. TODREAS: Well, that there are modifications for both AP600 and SBWR.

MR. KINTNER: Yes, I know,

MR. TODREAS: Which will be done when the experimental work is further completed.

MR. KINTNER: Right, I have no problem with that.

MR. TODREAS: I just looked at number 4 on page 4, it really maintains it without codes; it's working on the problems.

If I could, I'd like one sentence though on this, you define thermal-hydraulics excluding thermal-hydraulic phenomena in containment. And I think that comes about

because your organizational structure and history, and I think that's a big mistake. Because first, you -- you're in the face of reality, because thermal-hydraulics is wherever it is if containments are being issued, and second, if you do succeed in maintaining the cadre, but you split off the thermal-hydraulic capability needed for containment, that doesn't get the attention with them being in trouble later. So I would --

MR. SPEIS: Especially for the small designs accompanying it.

MR. TODREAS: This doesn't reflect that at all.

MR. SPEIS: It does not; you're right.

Let me give you another example -- this is on maintaining capability and somehow it should be coupled with this.

Let me give you another example on your favorite subject, the source term. There's a tremendous about a war for the last year, starting off with TMI, our work involved in release as a possible temperature, all kinds of environmental parameters. What happens to the source term in the primary systems? What happens to the source term in containment? We have addressed separately the drive containments, the DWRs with the suppressions pools, the experiments in place that I think you'd have a decent job, a good job to make more. And with -- and also we have

developed this long-term, in spite of what you have said earlier --

(Laughter.)

MR. BURSTEIN: We just haven't let the rest of the world know you have, yet.

(Laughter.)

MR. SPEIS: They know that, because we sent the original reports --

MR. ISBIN: It's sent out for public time.

MR. SPEIS: But now the question is what we do about the -- do we drop that subject from the budget category, so when you see on our budget category, short-term, it's really very little. Okay? The only thing we are doing is keeping up with what's going in the foreign countries. You know, the French are spending $20 million to do quite a bit of work. The Japanese are getting involved. They're using our tools.

So I would say that right now in our stuff, we have about half, and I'll locate it or dedicate it to this effort and maybe, one year at two different laboratories, half at Oak Ridge, which are keeping up with the experiments.

But it is in an important area. I mean there is radiological assessment source terms. They are part of the reactors. And so we have to keep some of the -- Now, if it

would kind of disappear, we'll have to make a decision of what to do in this area.

But that's what -- that's our thinking process right now. We are keeping a low-level, some laboratory involvement, and the focal point is the experimental work that is done for us.

MR. ISBIN: Is CAMP also involved --

MR. SPEIS: We are --

MR. ISBIN: No, go ahead, finish.

MR. SPEIS: Well, I was saying that this paper that deals with the thermal-hydraulic issues -- and, of course, it will contain the containment when we revise it. We will be preparing similar things for all the other important areas. You know, how to develop long-range programs, to maintain some confirmability, in light of not having big programs like we used to have in the old days.

MR. ISBIN: Do I infer from what you have written here on thermal-hydraulics, through the others, that in terms of maintaining a critical capability you have to the in-house as well as the external activity?

MR. SPEIS: Yes, yes.

MR. SPEIS: That's right, exactly right.

MR. VOGEL: And you've maintained the expertise to modify severe accident codes to get results back, because I'm sure there will be some mild differences.

MR. SPEIS: We'll have to see when it comes.

Let me give you another example of the source term. A few months ago we got somebody at MIT did a thesis on source term at Chernobyl. And it was published throughout the country. And so we've got all kinds of letters for our commission to make an instant assessment. Sc we have to have somebody here in-house and some of the laboratories to kind of look into this area and say something about it; otherwise, I don't know what we would have done. That's an example, you know.

That's an example of why we have to have these, you know, but we have to be careful, you know.

MR. MORRISON: Well, coming back to the third question about the skills that exist of the contractor-base. Are they keeping up? Is there a concern that the skills, the contractors are not keeping up with the changes of NRC's needs for research? Are we losing the labs? Are we losing people from other contractors?

MR. HATCHER: Well, almost all the labs have accelerated retirement programs under way right now because of the reduction in manpower, and the reduction of funds available. So there's an awful lot of expertise going out the door, whether they're critical of any of these programs, of course, is hard to tell without getting into a great deal of detail, but there is that reduction of force going on,

and it's going to happen in the Commission too.

The situation at the laboratories is changing very fast with respect to capability. And that's I think a matter of serious concern.

There's a recent report out on this very subject which I have back in my office. In fact, I think in the one of the pass-outs you get a brief article from that report, which deals with the changing commission of the laboratories given at the end of the Cold War. And while our programs are somewhat insulated from the bigger programs at the laboratories, they're going -- they're certainly going to be affected by it because there's a lot going on in terms of funding and, as you've already said, people leaving.

MR. UHRIG: The thing that is happening that even those who are staying are being shifted into other areas for the simple reason that there isn't money to support them. The INC division is really hurting at Oak Ridge. And there will probably be thirty people this last year through activities around. They're already being shifted around. I don't know if the number thirty is plus or minus ten, but it's a number out of about, I recall, 200.

MR. KINTNER: But what is being said here, it seems to me, and common sense would indicate, that in the present environment the skills are both in the staff and in the contractors and laboratories trending downward.

I mean, here you've got these three senior people from the division of research who say they're going to be gone in six months. That's a serious loss.

Whatever it is, the trend in that regard is the experienced technical manager shift is down. And what Bob is saying, which tends to agree with my sense of -- that's happening in the laboratories rapidly too. And then that says inevitability that, say, the skills have been high or high enough, that unless somebody does something about it, they're going to be lower.

And that's not necessary to pool them up with people, but the caliber of the people somebody ought to be thinking about in terms of maintaining this capability nationally. Is that a reasonable kind of statement?

MR. MORRISON: Is there any critical time that is needed for NRC to maintain any of these things? Why not let the market forces dictate. When you need it, you go out and buy it. It may not be in a national lab; it may be someplace else.

There's a hell of a large technical community in the United States, whether it's in universities or industries or national labs or whatever.

MR. SPEIS: I guess the only --

MR. TODREAS: There's one big problem and that's turn-around time. If you take an area where there's a

unique expertise and you lose that expertise to get somebody up to speed, that may be a much longer, you know, time frame than what you want. Unless your willing -- I'm assuming you don't want to put any money out in the meantime.

MR. MORRISON: That's the extreme, zero money out.

MR. VOGEL: Even if you've got an expert and moving to another field in one or two years, you can forget about it.

MR. MORRISON: But if he can change fields in two years, somebody can come up to speed in --

MR. BUSH: There's a question, if you want an answer within a week or two, it's difficult to get with the other approach. If you're willing wait, then I think it's very possible.

MR. TODREAS: Yes, the LeSalle DWI transient incident would be good example. There's a control expert. There's several hydraulic experts, but when you put together this coupled problem, you've got have some people who have had some experience, some taste of this to move -- I mean, if you put new people on there you probably don't get anything for a year I would say or you get all the false starts that we've been through historically.

MR. BUSH: Yes, that's a very good example because the expertise in that area really left the industry a long time ago, and, I mean, left the reactor manufacturers a long

time ago.

MR. KINTNER: One other observation, and it's an observation again, not any kind of a judgment, but it always seemed to me that in all the things we're doing with regard to design engineering and operations and research and the NRC's goal and so forth that to recognize that we're dealing with something, a huge leverage. I mean, to have TMI, two accidents, look what happens. You have one Chernobyl and look what happens. If you have one more industry problem with major consequence in the United States, it will have huge, huge leverage, let aside any human factor.

And I think what you could almost say you're justified in spending $100 million a year forever if that really contributes to the safe operation of these plants. That's just one percent of the electricity -- they're generating less than one percent of electricity to generate.

I'm not suggesting that that's what should keep us -- we should keep spending at that level. I'm only suggesting that we're dealing with nuclear safety here, and we are, I think, in terms of the NRC's research, dealing with a central aspect of nuclear safety.

And, as we said, maybe we're dealing with the central aspect not only in the United States, but world-wide leadership, which they didn't have in the Soviet Union, and now we're trying to mop up, which I think justifies expenditures for

other than obvious immediate purposes.

MR. VOGEL: To me, early on in your discussion -- go ahead and reiterate that fact. I'm sure they know it.

MR. KINTNER: I don't know whether those are agreeing on some of the important underlying principle. You don't do this -- I don't see that you do this on the basis of typical business operations. If you're doing that, you're cutting the rest of the budget to hell.

MR. VOGEL: I don't think anybody could disagree, except Sol's asleep.

MR. BURSTEIN: He is not.

(Laughter.)

MR. GOLAY: Well, let me suggest there's perhaps three ways you can layout it to the Commission, rather than simply say there's one solution that we favor. And, that is, you can continue doing research, recognizing, you know, it's the endless frontier -- There's always going to be something to work in -- but partly as a way of maintaining this critical mass of expertise, but also to give you answers if you want. That's a version of what's going on now, I would say.

The second is you keep the light on in the monastery and the question's really how many monks do you need in order to do that?

MR. VOGEL: And, you know, there's a host of

management problems associated with that, but you could probably figure out a way to do it.

And then the third that you go to just-in-time expertise, sort of along the lines of what you find in Germany, where there's a very heavy reliance upon consultants from anywhere in the world, but mostly from Germany, to assist the regulators in making their decisions. And the U.S. could play a role as part of an international community to try to keep alive the conglomerate of skills that you internationally.

If we lay it out to them in that fashion and ask them to consider the implications of those different alternatives, and also give a recommendation, it perhaps gives them a better basis for deciding what they want to back and how strongly. Where if I run the Commission, it would help me, I think, to decide that doing the current way, the current approach is what you want to do, because they have to also decide I think how hard they want to fight for whatever version to go with or to how to blend them as well.

MR. ISBIN: Another point I'd like to make while Eric and these others are here, and this goes back to those of you have been here six years and know better, I think we can say in terms of setting the basis for talking about future activities that the research program of the

regulatory commission is far better organized, far better managed than it was when you first came to grips with it.

At least that's my sense from looking outside for four years and then inside for two. And I think that these guys have a lot to do with that. And it would be not only a nice thing to do, but it seems to me if we're going to say that the research program is doing the right things, even to do other things, we can make some personal accommodations. Does anybody who thinks that's true? Maybe it isn't true.

MR. TODREAS: That's absolutely true.

MR. MORRISON: I guess there's just really one or two more questions we need to address. One is the -- is the problem staying ahead of problems or is it trying to catch up with problems?

MR. TODREAS: It depends upon the area. The two slides there, one basically says, here's the areas that we're keeping up. And I think I agree with Eric's assessment here, when it says that in these two areas we've got problems. Three areas, we've got problems. And then we get the fair assessment of the situation.

MR. BOYCE: We agree with that.

MR. BURSTEIN: The RES, to be ahead of the game. I don't like the idea that they should be solving problems before they occur.

My colleague or superior on my right says he

disagrees.

MR. BOULETTE: Well, a good example is if you're worrying about thermal annealing reactor vessels, you don't wait until you have to thermally anneal a reactor vessel.

MR. BURSTEIN: We've already reached that point. We know that the vessels are going to hell in a handbasket. Now you have to do something about. I'm not arguing that ahead of the game.

MR. BUSH: Well, how do you define "ahead of the game"?

MR. BURSTEIN: Having too many people, I guess, I mean looking for things to do. And it seems to me that as a regulating agency, as somebody that has to -- it has to respond to applications or to needs that are created externally to it.

If there's no -- this was my argument before. If there are no customers out there, there is no need for the service.

And so I guess I'm -- I don't feel at all embarrassed that RES is not ahead of the problems. I don't think it should be.

I think it should always be responding to a need, whether it's a user need or an industry need or something else and not creating something that has yet to happen.

MR. BUSH: You were hung up on the semantic

definition, Sol.

MR. BURSTEIN: Perhaps.

MR. MOLZ: Well, no, I think that's a very valid point because if all regulatory agencies began leading in the research area. it would be something that it was designed to do.

If you look at our national problems with high-level waste disposal, you could say that nationally, if you consider all the organizations, we really haven't been able to stay ahead of all the problems for lots of reasons, many of them political.

But I think the NRC is certainly their ability to judge the application that DOE had anticipated to make sometime in the future with the research that's going on.

So in that area, I think they're about right.

MR. KINTNER: The regulatory -- are hampered by this kind of limitation. For example, the FAA, as I understand it, has taken -- aircraft avoidance, instrumentation of that kind.

FAA did the research and so forth, and put the damn things in their planes and they can't fly.

(Laughter.)

MR. MOLZ: I mean, I remember reading -- well over the years, I remember reading a lot about needing those kinds of things and the technologies there. It's just a

matter of doing it.

And the other thing I keep reading a lot about is flammatory control.

MR. KINTNER: Flammatory?

MR. MOLZ: Planes catching on fire, seats burning. I read a lot about that that's coming from the private sector or interest groups, so in a sense, I think maybe if you looked at it, you'd see that the FAA had a lot of pressure put on it to do something rather than just standing out and saying this is what we should do.

MR. SPEIS: We cannot forget that this agency came out of the AC and quite of that resource I know, was damaging to us.

For example, in the area of materials, the HSS program was developed by -- started by AC, and those people developed it because all the information was available 10 years ago to put the PTS rule, and some of the plants started implementing improvements with lots of embrittlement 10 years ago, and that's why they will be able to keep their vessels running for a long time.

So here is an area that, you know, if we had waited for the problem to appear and then develop the information and technology, we'd probably have to shut down.

I guess, Spence, you are one of the guys who are responsible for --

MR. BUSH: I guess, when we start talking about the problems to appear, when we started to find that the SHARPIE values were not holding up where the transition temperations than what we had predicted, that was signal, that was the event. That was not anticipatory.

MR. SPEIS: There was more information in developing the HSS program --

MR. BUSH: But we had to know why and what its implications were. And I think that follows a logical pattern.

But if we went out and said let's get 57 different varieties of specimens and test them to see if something's happening, that to me is looking for mischief, and I'm opposed to that.

MR. SPEIS: Did the signal you just referred to receive the HSS program formation?

MR. BUSH: As f.r as I know, it did.

(Several members disagree.)

MR. BUSH: Well, I'll let others -- but that was my understanding.

MR. BURSTEIN: You said it did not precede?

MR. BUSH: I think the reason that basically was that, quite frankly, Bill Manley signed that letter, he didn't want to. It was written by Dave Oakman.

And Dave, as one is able to very well turn over

all the stones and he was looking at the consequences, which is a very valid thing in this case because that's one accident you can't recover.

And he said that there would be a need, you know, to really know where you are in the vessel.

Now, the seals, et cetera, are one of them, but the real basic issue was if it failed, was there anything you could do; what kind of a program would tell you that it wouldn't fail?

That letter was written and it came out in December, 1965. And they did respond because the program went into place in 1966.

MR. TODREAS: You know, the reason I asked is Sol's appealing. On the other hand, if it leaves us without the tools to respond and there's historical evidence in this case or some other cases that we'd be in trouble, then the case gets less appealing.

MR. ISBIN: I think you need to characterize what you mean by "ahead." You say that "ahead" is that resolution is in sight.

MR. BURSTEIN: Yes.

MR. ISBIN: I think you'll find that the committee backs you up completely.

MR. TODREAS: Yeah, but the question -- the statement -- that's fine, but the statement is more

complicated. It could be read, is the program staying ahead of the problems?

And that could mean is the program, quote, "the research that's being done in the program anticipating the right problem areas. And that's the tough question.

MR. SPEIS: The Commission has asked us quite often about that, you know, how you anticipate --

MR. TODREAS: Probably what you do is you get the right -- you go back to the other thing, and you have the right disciplinary areas covered and you don't give the people carte blanche, but you put them through a few hoops and you give them a little freedom to get started or work to stay interested in probably what's the right areas.

MR. SPEIS: The only problem is in some areas it's expensive. In some areas, you can do it if there's a reasonable amount of resources, but in some other area like in the materials area, experimental facilities, it's expensive but --

MR. TODREAS: Sol, I'm waiting for you to come back here and critique this and shoot it down somehow.

MR. BURSTEIN: I know. I know, and I think maybe I seem to be out there by myself again, you know, one of those prophets that we referred to before.

(Laughter.)

MR. BURSTEIN: But this is an area that we've

discussed before, namely how do you know that you've anticipated all the problems.

And I don't think there is a technique to do that. And in the absence of an ability to do that, I think the RES is properly responsive to emerging events as they occur.

Now, you may not always have the right people. For example, I don't think we had a bunch of experts in digital systems until we had digital systems.

(Laughter.)

MR. KINTNER: I didn't know we had any now.

(Laughter.)

MR. BURSTEIN: Nor should we have.

MR. BUSH: Dave, there's one thing that I can't find in here.

MR. MORRISON: I think the trend from analog to digital was clearly foreseeable and predictable for 10 years in the coming. All you had to do was look across the border at the Canadians.

And the reliability and those aspects were very obvious and the kind of thing, the utilities would want, the elimination of drift, the proper calibration, all of these things.

MR. BURSTEIN: Forgive me, but I'm assuming if something happens anywhere in the world, people with their eyes and ears open like the RES would know about it and that

a border line up North between Canada and the U.S. is no bar to information and awareness.

But what happened before 10 years ago when the Canadians didn't even have an INC that was digitally inspired.

MR. MORRISON: They started in 1960. They had to because they had an unstable reactor they couldn't control otherwise.

(Laughter.)

MR. BURSTEIN: You see, I keep coming back to it. There is no virtue like necessity.

MR. MORRISON: Spence, you're asking a question?

MR. BUSH: Yeah. There's one area that we don't touch on that I think is going to be a growing area, and I'm presuming, if research provides its usual function, it's going to do it.

I'm not -- I don't anticipate an extremely large expenditure, but it'll take some FTEs and so forth. That's in this business of moving into a risk base regulation.

There's a lot of work that goes into that. I've been on that committee that's been working on it now since 1988, and that level of effort amounts to -- has amounted to a few man-years, and this is on passive systems.

You're thinking, I think, on the more active systems, but I think inevitably you're going to be forced

into the other two.

And somehow or another it seems to be an area that is going to grow in significance, and it warrants some type of a comment.

This is a kind of a new area, not new in one sense, but one that we haven't touched on much that I think will see increasing importance.

MR. BURSTEIN: Didn't we mention this earlier?

MR. BUSH: I think we may have, but I'm thinking of it in the context that there's nothing in these packages that I'm aware of, you know, that's kind of setting us up for that.

And we're talking about things that we might be doing or that might be done in the future. And it seems to me this is something that research normally would take the lead on in developing positions and so forth and coming out with --

MR. KINTNER: Well, they said they did. I mean, that was earlier said, they were doing research in that area.

The question is, and I agree with you, this risk base change, if in fact it's carried through, would be a major --

MR. BUSH: Oh, yes.

MR. KINTNER: And the question then is --

MR. BUSH: That's right. You're rewriting --

MR. KINTNER: -- is in fact the research that's being done sufficient to justify? And I don't know how to answer that question.

MR. BUSH: Well, it moves her completely over into the problemistic thing, you know, the deterministic. You'll have to look at both the probabilities of failure and the consequences, so that means you're doing an evaluation item by item or item or component by component or subsystem by subsystem in order to see this, so it's a very, very large effort.

MR. KINTNER: Is that another one that you're behind in, Eric?

MR. BECKJORD: In the risk?

MR. KINTNER: Yeah, risk bases.

MR. BECKJORD: We're not behind in the PRA aspect of it. We're ahead in that. I think what everybody is behind in is the evolution of the risk-based regulation.

And I think the problem there is training people, whether it's in the power plant or whether it's in the NRC because now you have -- in the power plants, you have large engineering organizations. A few of the plant owners have very highly-qualified PRA groups. Many do not.

Within the NRC, you have a large project organization to look out over the 110-odd plants. And there

are a lot of people there whose whole -- the basis for their thinking is centered more on tech specs and deterministic evaluations.

Now, to go to risk-based regulation, you have to find some way to magnify the capability which is now in less than probably two dozen people in the NRC in terms of PRA expertise, and you have to find a way of qualifying and effusing the project organizations for those people.

And you have to do the same thing out in the industry. And it's a very big people problem. I mean, it's the -- the training and qualification of people and it's the change of culture from one which is somewhat wary, and, in fact, very wary. And the regulators, almost to a man, are very wary about PRA-based judgments.

So I think that's where the problem is.

I just wanted to make one other comment following and building on what you've said, Spence, about your observation about the PRA.

I think that the PRA is the answer to the question that you had posed before that, which is, have you done a good job of anticipating what the problems are?

And I think the methodology of the PRA is the method by which you explore the possibilities and the likelihoods.

And you can identify -- it's through the use of

PRA that you can identify what may be problematic. And it's also through the use of PRA that you can decide whether it really is important risk-wise.

MR. SPEIS: Except sometimes it's a chicken and egg --

MR. BECKJORD: Oh, of course, yeah.

MR. BUSH: What you're changing here truly is the changing environment. On the other hand, I don't think you have to develop 2,000 experts capable of developing PRA.

I think you have to have people that understand the use of it.

MR. BECKJORD: And I agree with that.

MR. BUSH: Maybe the 20 or 12 or 24, whatever you have in-house with those in industry are enough to handle the detailed development of PRAs.

In fact, you've already done it, all but one -- I believe you said all but one plant, part of the IPE has PRAs.

So that's not going to be a big industry, if you will, doing additional PRAs, but the use of them --

MR. BECKJORD: That's right.

MR. BUSH: That's right.

MR. KINTNER: When you rewrite the 10 CFR's in risk-based terminology, that ain't a small job, I'll clue you.

MR. BECKJORD: I'm not arguing that at all.

MR. KINTNER: It's a biggie.

MR. BURSTEIN: But it seems to me what you said is that while you apply PRA to the licensees, you don't apply it to yourselves.

And if taking a page out of what Mike said earlier, if you're going to look at the procedures and processes under which the agency operates and RES in particular, is it not appropriate to look at this philosophy in your work as well?

MR. BECKJORD: Yes, I agree with that. I was trying to say that. I think you put it better.

MR. GOLAY: Well, in fact, the NRC has done that over the years used PRA to prioritize issues. I know that with Northeast Utilities, for example, that utility has used PRA as an negotiating tool with NRC.

And so I think those are good illustrations, but let me go further on your list of things, because I think simply building up a cadre of people who are competent to perform this analyses is a necessary but not sufficient condition for this change to occur.

And it's really in the follow-on work is where I see the scope for the research function here. And the practical problem in using PRA as a decision tool, especially for regulatory purposes where you have litigation

as a downstream possibility, is providing decision rules for the staff.

The big problem with PRAs is uncertainty. And depending on which part of the system you're applying it to, the uncertainty is very -- is manageably smaller or it's so large you can't really reach a decision.

And there are a lot of practical questions that have to be worked through before the NRC is going to have a system that they can actually use in a bureaucratic sense.

Where -- to give an illustration, I would say that for many questions having to do with say core damage frequency, you could analyze system performance in a probablistic sense if the uncertainties for many parts of that problem are small enough that people can agree on the answers and then they can argue about what to make of the answers.

But if you get to, say, offsite dose and ask what's the expected frequency of a dose of some magnitude, I think most people agree that the truth is we don't -- our models and data today are right and they're not good enough.

And so one of the questions which I think we'll be faced with is, for example, where do you use deterministic decision rules and where can you use probablistic decision rules.

Do you use probablistic analyses as the foundation

for deterministic surrogates?

These are all things which are appropriate, I think, for the research group here to work through and provide guidance for the rest of the staff and provide standardized procedures for everybody involved in licensing using PRA to follow so that they'll know what the hoops are, they'll have models and data where there's agreement on the acceptability of those models and data.

Now, that's not for NRR to do, as I see it.

MR. HELTEMES: You're exactly right. If I may respond to that. Mike, I agree totally with your assessment. And you've done quite a bit of work along those lines.

And where we are as a staff is that we believe risk-based regulations are the way to go but not to put probablistic statements in the regulations.

What we attempt to do at this stage of the ballgame is to focus our own resources and the resources of the licensees on the things and the issues and the problems proportional to their safety importance.

And that's what we're going by risk-based. Our new regulations we want to have calibrated in terms of risk. We want to make sure they're well-founded in terms of the regulatory justification for proceeding in terms of the risk.

And that's what I was trying to mention earlier. Our own rules to ourselves in terms of backfitting, in terms of the adoption of new regulations are quite specific in terms of what type of justification -- what reduction or risk is necessary in order to proceed.

We have matrixes, interpretative decision criteria for backfit analogy.

And just what Eric said earlier, there's a lot of people that believe in PRA, but we want to go slow. And it's more a comparative risk assessment then it is belief in the bottom-line number.

And so much of the risk-based regulations is based upon a -- of risks in trying to reduce risks in certain areas.

MR. KINTNER: Having said all that, is the research that translates PRA results into actuality in regulation, is that being done; has that been done?

MR. HELTEMES: We do it every day in terms of generic issues. For example, the generic issues that Gil Murphy talked about are all risk-based.

When we go out with a regulatory action, that has a PRA publicity analysis associated with it. As an example, most of our regulations now are risk-based. It's what I know as GSI 23.

The proposed rule on the pump seals is risk-

based. There's a probablistic analysis saying what we believe the risk is from loss of integrity of pump seals and what this rule is intended to do, lower that risk by X.

So that analysis is in the regulatory analysis. And when we hold it up to the scrutiny by our own agency, the ACRS and the public.

MR. KINTNER: So the answer is yes.

MR. HELTEMES: We're trying to move ahead. We're committed to this, but we go slow in certain areas, and we don't put probablistic statements in our regulations.

MR. BUSH: It's in the back of the --

MR. HELTEMES: Absolutely.

MR. MORRISON: Let's move to the last item on that topic for discussion, the research program. "What is the regulatory basis for the research program?"

MR. SPEIS: The second to the last one is --

MR. MORRISON: I want to go back to that one in a minute. I didn't want to embarrass you --

I need Eric's attention.

Eric, I'm going to need your attention on this because the last item that I put on the list, "What's the regulatory basis for the research program?" came out of a document that I, from what I can tell, you only sent to Ed and me, which is the minutes of this draft notes from a meeting with the chairman on comprehensive strategic

planning, which raises this issue of, "What's the regulatory basis for the research program?"

And I wonder if you could enlighten me as to what the chairman is concerned about, since that's obvious that some concern has been raised, and it does fit with our research program theme.

MR. BECKJORD: I may not know any more than is in the --

You know, I can't tell you what's on his mind on that point. I can tell you what has been happening for some months now.

The question arose with a document which you've seen which is Commissioner Rogers' piece which the committee has and you can look at it tonight in which he early in the fall and then several times during the fall with somewhat those divisions he suggested defining a new basis and a new responsibility for the research office.

And I'll summarize it very quickly at the risk of oversimplifying it. And there were several other things in his paper, one of which was reassigning responsibility for rulemaking, rule and regulation preparation and development to the regulatory offices, which is the way that it was before 1987.

But I'd like to leave that aside because it's a somewhat different question. I know it's related, but I

think it's basically a different question.

He was looking at not only the basis for the research but the responsibilities of the research office. What he is proposing is that the research office concentrate solely on the development of a knowledge base for regulations.

And in the course of the discussion on this, the Commission said they were interested in the IPM, and they would like Commissioner Rogers to help develop it further, which he has done. And there's a later document which have to read.

At the same time, beginning early this year, what's actually been happening in the research program is greater and greater emphasis on user needs.

And the executive director back in February called for a detailed review of piece by piece of every research project, which we carried out in April and in early May. We've completed it now.

And essentially, one could gather -- I certainly gathered from the thrust of this that the management wanted a justification in terms of a developed and recognized and accepted user need for every piece of research that was underway in the office.

And I think that what comes out of that when the review is done, we can say that that is probably true of

somewhere between 85 -- maybe 85 percent, maybe 90 percent of the research program as what I would call a sound basis. It's got a user need endorsement in terms of the letter.

I have the feeling that the management in executive director's office is looking for a higher percent, in effect, a complete user basis.

I think that's what the chairman is talking about, but I don't know that for a fact.

I could go on. I think this is an important question, because I think it relates to what the group's been discussing earlier today.

And I'll be glad to give you my own view on the subject, which is -- well, first of all, I don't think there's a difference of view on the following point.

I think everyone agrees that the research needs to be carried out by people who understand what the problems are. I think there's complete agreement.

So I think the issue is the following: I think the issue is who decides on the research that shall be done? Is it solely the research office, which will be 100 percent, or is it solely the user offices, 100 percent, or is it somewhere in between? I think that's what the issue comes down here.

And I'll give you very briefly what my views on the subject are. I think there's a very important value in

serving the user need, which the user has the say of, This is my problem and this is what I want you to work on.

We have tried to do that in the last seven years or so -- the National Academy report came out. I mean, I think everyone who has been involved or who has had involvement in research and development knows that the most effective organizations in research and development are driven on the basis of user need.

Research laboratories would -- sell their to services to people who have problems. This is true of the -- a very well-known fact.

In this document that I referred to, there's an interesting article that you have a copy of. It's a short article. It's just copied from this national benefits for national labs -- by Walter Robb, who is a retired vice-president, senior vice president, and he talks about the resolution of the -- support for and the basis for research -- General Electric.

And what he says is that this system, which has been under the GE lab, this Knowles Laboratory since 1963 --

And what he says is that the system which existed up through the 1980's by which the corporation assessed all operating divisions for the research budget and they paid their money in, then they went and -- research laboratories

responded.

And that worked pretty well according to Dr. Robb until the mid-eighties when an appropriation -- the company was re-looking at its problem.

And the chairman of General Electric felt that they could and should be getting more of their research efforts.

To make a long story short, what they did was they formed a study team. That's the first thing they did. And the study team made recommendations.

And the essence of the recommendation was change the system, drop the 100 percent assessment, make the assessment 25 percent, and the laboratory can decide itself what it does with that part of the assessment.

The 75 percent, the laboratory doesn't get an assessment that the divisions, the operating arms are not assessed, but the laboratory, having gotten a budget, a target budget which the corporation has, the laboratory then has to go sell their services to the operating division. And he said that works great.

They've had some few years of experience with it, and it has improved the productivity and the application of what's coming out of the laboratory.

I think that's a very important article. And it just confirms what I think is pretty common knowledge in the

research and development business, that the working user needs are very important.

And I think the lesson in this case is the following one. There are several points. If the research office is working on the problems as determined by the regulatory offices and if they do a good job, if they do a competent job and a useful job, they're going to have support for the work. They'll have a constituency. I think that's point one.

And these are all important. Point two, the research office people who are working on the user's problems as a result of this work are going to understand what those problems are.

And that understanding is much better when it's derived from work on the problems than it is from a kind of a general survey.

I mean, you can go talk to somebody about what their problems are, and you can come away with the impression of what you think they were trying to tell you, but there is no substitute for working on the problem itself. That's what really generates the understanding.

And I think that understanding is very important because that comes to the third thing. If you then have a discretionary budget and you have good people working on it and they understand the problems, the chances are they're

going to come up with results from the discretionary part of the budget which are going to be useful and important.

And to me, I think that's the issue.

MR. KINTNER: You can refer to your three sheets if you wish to.

MR. BECKJORD: I'm trying to say it.

MR. KINTNER: You did say it very well, but there's one thing you didn't finish with is the final line on the final sheet.

MR. BECKJORD: Oh, the numbers?

MR. KINTNER: Yeah.

MR. BECKJORD: I mean, my opinion is -- I mean, I happen to agree with the Robb formula. I think 25 percent is a good number.

MR. KINTNER: You're 10 to 15 now?

MR. BURSTEIN: But that's arbitrary. There's really no basis.

MR. BECKJORD: Yeah, that's an opinion.

MR. SPEIS: Is there not a tendency with that 25 percent to spend that one way or another trying to get the other 75 percent.

MR. GOLAY: Sure.

MR. BURSTEIN: What's wrong with that?

MR. MORRISON: As far as ABB is concerned -- And it's rather interesting, down at the other end of the

spectrum is the order of three to five percent.

MR. KINTNER: But there's much bigger basis to be spent.

MR. BUSH: It depends on whose ox is getting gored.

MR. BECKJORD: Well, let's see. I can add one other very brief story. There was a man at the research lab at GE by the name of Kingdon some years ago.

And he told me once the story of the formation of the laboratory when, I think, Languler and Languler became director. I don't know if he was director when this happened.

Anyway, the story went something like this, and it related to the development of some of the high vacuum and inconstant technology that they were working on.

And somebody asked him, Well, you know, how did you get the money to do this. And his answer was something like this. He said, Oh, I go out and argue for the money to solve the problem that we've already solved, and then I use it to find the next problem that we ought to work on.

Now, unfortunately you can't do that any more, but it's not a bad formula if you think about it.

MR. MOLZ: Universities do that. And it's a very healthy way. It's surprising. It keeps everybody happy.

MR. UHRIG: You get results that way.

MR. MOLZ: And you can be specific. You can be on time.

MR. YUKAWA: Just a clarification, a definition for an understanding. You said there's a certain percentage, 85 or 90 or thereabouts is user defined, but this is still within the user, and this context means within the NRC.

MR. BECKJORD: Regulatory offices.

MR. YUKAWA: Through the regulatory offices.

MR. BECKJORD: Nuclear reactor regulation or the nuclear materials safety and safeguards office.

MR. YUKAWA: Is it also the business required that they -- the administration of the program, they need to write you a letter defining the program and what needs to be done or this here's the problem or how?

MR. BECKJORD: We have a whole -- I mean, the letters that we have would fill a thick manual, and it defines a need.

And some are very general and some are very specific. And the other -- there's maybe one other point to make.

If you look back over a long history of the office, I think that yeah, there is an important point to make.

By and large, user needs are short-term. I mean

they want an answer to the problem and they want it already, or they want it today or they want it tomorrow.

And also, the user needs tend to be somewhat scattered. And if you're going to develop a research program, you have to give it some structure and you have to try to develop a relationship between these 30 or 40 or 50-odd things or at least prove them and then develop the structure for them.

The users don't do that. Really, the research, the people who are doing the research have to do that. And that's very important to do.

And also, it is difficult to get user support for a product which may not appear for a couple of years or three years or four years or even five years.

And that's where the 25 percent for us to work with -- we need enough money to work on so that you can go out and put something together which may be risky but also which has a payoff if you're willing to support more than a couple of months in order to get something.

That's why I think you need that. That's why I think the 25 percent is a good number.

And the office has really been pretty successful on that score, because we've got a half a dozen or a dozen major items which, in fact, originated -- the idea for the program originated in the research office and the user

office.

And I think much of the severe accident program is, in fact, the initiative -- the initiative came from research.

And the ideas for these tests and facilities for the advanced life-long reactors, those were research initiatives which now there is in fact a user need. We classify it as a user need because there is a user need, and it gave us a letter that in fact the program started in research.

MR. KINTNER: But isn't that an essential part of your mission here?

MR. BECKJORD: Yes.

MR. KINTNER: And yet if you were dealing strictly with a needs letter, a formal request or something of this sort, you can't do that except for that 15 or five percent.

MR. BECKJORD: Well, the fact is that the requirements over the last few years and between the requirements and what's happening to the budget, the margin is less than it was.

MR. KINTNER: I guess the thought occurred to me research has needs too, so to speak. You could define a need and the Commission could say this is impossible -- 25 percent of it is the number. You initiate those.

The 25 percent is also needed for common

facilities, so they're common with many problems. MR. SPEIS: Let me say this another way. Eric said that right now 85 percent of our resources is based on user's need, right? Well, I would say if there were no user's need, probably 70 percent would be exactly the same resource. That's my view.

MR. BECKJORD: You mean if it were a solely our - -

MR. SPEIS: That's what I mean.

MR. VOGEL: The thing that I would worry about in this kind of environment, if you went to that kind of system, and you took the 75 percent of the money and put it out with the other divisions and said you're expected to support with your user research division to support your needs here, they might see that as a relief of some of their other problems and you'd never see it again.

MR. BECKJORD: Well, that's right. The situation is not analogous to the General Electric Company in that sense.

And just from a budget point of view, I think it would be difficult to give the money to another office and then the money would be transferred.

But I think what you can do is you can help to establish the policy. I mean, the policy is in effect established today. We went through this review, and the

executive director had the people from the offices around the table and said, you know, do you agree with what's going on?

And they had to give an answer. And if they didn't give an answer, why, you drew a black line through it.

MR. SPEIS: Also there's more formalism came into being. In the last four years, our programs were hit by the OMB so that we are their use. And then it was a question of use or whatever, and then it was outside the Commission itself.

MR. VOGEL: Do they get beyond general breakdown? Do they get into specific programs?

MR. BECKJORD: That depends on -- that has depended on the person who was -- the budget reviewers until about 1989 looked at things in quite a lot of detail in programs.

Since that time, it has - the review is more with the controller who had very little direct interaction in the last year or two.

MR. MORRISON: Is there a sense that the committee, if this question comes up tomorrow, and I would not propose that you address that question head on since it wasn't really one that's in the staff requirements memo.

But if it comes up, is it the sense of the

committee that we would support this 75/25 user need exploratory split or is it something else that the committee would like to do?

MR. KINTNER: Quantity of what, not wanting to talk to it?

MR. BOULETTE: It would be A perfectly le[illegible]ce topic.

MR. MORRISON: I really expect it will come up.

MR. KINTNER: How?

MR. MORRISON: I put it here because it fit with the research program. It didn't fit with the maintaining of codes or some of the other things that seem to have asked.

But it wasn't a part of the memo and the previous discussion.

MR. BURSTEIN: I think we said that was an arbitrary division before. There really isn't any basis. And if we could find some stronger reason, then it's nice to have.

The fear I have, sir, is that as long as we have 25 percent that's not earmarked for anything, you know where it's going to get chopped. That's the first thing that will go.

And it seems to me that that's the area where you need more continuity than any place else compared to the shorter term sol[illegible]ns that you need at once.

And I have said earlier today, I think, that I thought this is an area where university research could probably make its greatest contribution, and that requires some stability. It requires some longer term.

I don't know you manage to hang on to dollars that are not earmarked for answer in today's file.

MR. KINTNER: Why can't we say this in a gentler fashion. I sense that --

MR. BURSTEIN: I'm trying.

(Laughter.)

MR. KINTNER: It does seem to me that there have been more and more programs, and more and more have been constrained over time to answer new user needs, period.

And there hasn't been enough time on their part nor resources in which they might themselves think, What, in a broader sense, could we do that would be more useful?

And, guys, we're facing an immediate problem, and the trenches think we should be doing.

I think that there ought to be -- the pendulum has swung too far in that direction, and it ought to swing back a little bit.

I don't think we have to say 25 percent or 20 percent or anything else, but simply say the user need requirements has become almost entirely dominating the program and any good research organization ought to be able

to have some freedom in the research it does greater than this one now has. That's the way I'd put it.

MR. MORRISON: Well, I think that's correct. I think it will also relate to one of the other topics we'll have to discuss tomorrow about how you maintain some core of confidence that you want to maintain in certain technical disciplines.

Now, is it an accounting issue, you say that comes out of the exploratory sense, or is that an accounting issue that comes out of the requirements sense, but nonetheless, you have to do it.

Sometimes its easier to take it out of the exploratory one.

MR. BURSTEIN: Can you even discuss this without discussing the total budget in relation to what the users have already asked for?

Because if you're going to reduce, let's say, from the exploratory or increase it from, let's say, 10 or 12 percent to 25 percent, that means you've got to increase the total budget by about 10 or 12 percent.

MR. MORRISON: That's correct. I think that's the only way to approach it is to find out what the base of the requirements are and then add X percent.

MR. HATCHER: I think with respect to state percentages to the management, the suggestion Ed made is

much better.

And I think if you don't do that, that becomes a very easy thing for someone to try micro-manage when you look at the budget. This may not happen in history, but it will surely happen in OMB or Congress or wherever. If that thing appears in there, that will certainly be an opportunity to lop something off.

MR. VOGEL: Twenty-two and a half.

(Laughter.)

MR. COLAY: Exactly. One way to help frame this would be to state the constituency in addition to NRR, the NRC overall in terms of how it functions and areas where safety of the licensees would be improved.

The use of digital INC is one example where, in effect, technology has moved ahead of regulation, so there are new opportunities actually for improving safety, and it doesn't fit either of those other two categories.

MR. BECKJORD: Well, from the Commission point of view, the ideal situation would be that the Commission could say that we have meetings for all its worth.

Most of it comes out of the regulatory offices, and some of them for work with a longer lead time comes out of the research office.

MR. BURSTEIN: Eric, may I ask you to interpret Commissioner Rogers' four points in the memorandum from

Cholk dated November 19?

Under C he said we ought to have technical capacity to develop regulatory practices. I'm, of course, paraphrasing it, but that's the way I read that language.

Does that go to what we were discussing before in terms of NRC's processes and procedures?

MR. BECKJORD: Is that point C?

MR. BURSTEIN: Yes, sir.

MR. BECKJORD: Well --

MR. BURSTEIN: You may not have had any opportunity to discuss that.

MR. BECKJORD: Well, I've discussed his proposal with him, not specifically on that point.

MR. BURSTEIN: I was just curious if you knew what he had in mind when he chose those words.

MR. BECKJORD: Well, I think -- I mean, he gave a couple of examples. And I think it was his feeling, for example, that the capacity, the introspective capacity to guide development of NRC's technical programs and regulatory practices.

I think an example of what he means there would be this risk-based regulation that the parameters of risk-based regulation would be something that would be done in the office that --

I think that's -- I think I've got that right.

MR. MORRISON: Well, does anyone feel the need for further discussion on that? That's one of the regulatory bases. Certainly, we can reopen it tomorrow after everybody's had a chance to digest some of the papers that Eric handed out.

Sumio, I want to come back to the makeup of the committee. Did you want to kick it off with a specific question?

MR. YUKAWA: No. Just a comment that we're asked to judge ourselves. Is that the import of this thing?

MR. BURSTEIN: But now that we've got four new members, we've got it made.

(Laughter.)

MR. KINTNER: Really, you need a chairman. That's one of the needs the committee has is a chairman.

MR. VOGEL: No, I think that we don't have anybody from the human factor on the committee, right?

MR. MORRISON: That's right.

MR. VOGEL: Is that an oversight or intentional or what's your opinion on that?

MR. MORRISON: Well, when Dave Woods left the committee, we had our eye out for somebody in the control and instrumentation because he was kind of straddling both areas with his own expertise on the human factor side.

And we did develop a list of names, but we weren't

really satisfied with it last fall at the time that we did it, and so we filled the instrumentation and control need on this ground.

MR. VOGEL: I guess they're kind of hard people to find.

MR. MORRISON: Yeah, so we do not have somebody who is, you know -- whose expertise is primarily human factors.

MR. BARATTA: How do you characterize on the --

MR. MORRISON: Well, thermal hydraulics, primarily thermal hydraulics.

And he has done -- he's had an interest in the accidents. And one of the things that he did was to develop -- he's the person at Penn State who collected all of the records at TMI and they now keep and maintain those records for anybody to use.

So they've got it all on computer. I mean, if you want to find out anything about the TMI accident, get in touch with Tony and they can give you a number and you can dial in and get access to this whole thing.

MR. KINTNER: I have one comment about human factors. It seems to be that Sol and Tom together bring some wisdom about human factors into this committee.

And anybody who's tried to make these reactor plants operate right, keep the places managed and

disciplined and the control rooms doing what they ought to do, that's not human factors in that in a formal, academic sense, but I think there's some insights there.

MR. VOGEL: Well, Mike's comments earlier on, what I got out of them was that they didn't relate totally to human factors.

MR. KINTNER: I'm sorry. What's the implication you're saying?

MR. VOGEL: I said when he was really talking about human factors in his comments earlier, I think.

MR. KINTNER: That's probably a good question to knock around tomorrow.

MR. MORRISON: Well, yeah, there is some question, I think, in the human factors area, that there's no one who follows that on a full-time basis in all fields, and that's where at least Dave Woods would --

He knew as much as what was going on in the defense area as anybody, the medical field. And so David had a nice combination of backgrounds he brought to us.

But as Eric said, in looking at even the list of people that Dave recommended to us, we couldn't find anyone that would really fit that same need.

One thing that I was just counting up to be sure because there has been some criticisms of the committee in the past that we have the right balance between people from

industry and people from academia.

And I think part of the comment is five honest-to-God people from industry, although if I take Bob and Chuck Mayo, maybe they have some industry background they bring to it although they sit in academia now, so maybe the score is 5 to 7 or 6 to whatever.

But I think we've got enough balance that I don't think anyone from the outside can criticize us as not being able to represent two very broad views in the whole field here.

MR. TODREAS: You don't really have people from the a research laboratory environment, laboratory research environment unless I'm wrong. Well, I'm not sure about GE.

MR. YUKAWA: I was not in the research laboratory there.

MR. TODREAS: But I guess it's yourself. But I was thinking of National Labs or large industry research laboratories. We kind of get the industry and then we've got academic who work usually smaller projects.

MR. VOGEL: I sort of come from that background.

MR. TODREAS: Well, so does Bush.

MR. BUSH: Yeah, except I won't be around, so that's a --

MR. BOULETTE: I spent 14 years at Hanford.

MR. BURSTEIN: We won't hold that against you.

(Laughter.)

MR. TODREAS: I guess between you --

MR. ISBIN: When you mention national laboratories, is there any restrictions on having people from national laboratory representative.

MR. BECKJORD: No, the only restriction that there is is this conflict of interest. And I can tell you there are two kinds of conflicts of interest in the legislation.

The one that is most important in this committee is the individual conflict of interest, and the resolution of individual conflict of interest is, to my view, is simple and straightforward, and it goes directly to the question of if you have -- for a consultant who is working for an organization on a specific issues, cannot advise the Commission on that specific issues.

But that does not prevent that person from giving advice on the field as long as it not specifically tied to that issue.

And you all get letters from the General Counsel that say that in this case, you should not advise the Commission.

And that is individual conflict of interest.

MR. VOGEL: Do those have to do with specific people?

MR. BECKJORD: Yes, it's very specific. Yeah,

it's very specific, and it really follows the revenue. I mean, if you're deriving income from somebody on a certain issue, that's the thing that you shouldn't advise the Commission on.

Organizational conflict of interest is a newer concept, and probably the thing to is one of these sessions, we'll get one of the lawyers in and see if you can understand it from him or her.

MR. BURSTEIN: I thought you were going to tell us.

MR. BECKJORD: Well, no I don't think I'll attempt to do that.

(Laughter.)

MR. BECKJORD: I understand it very well.

What I can tell you is that what it used to be was this. This I did understand. You take a national laboratory and you take a person working at that national laboratory, and as long as his boss was not managing another person who was working on it --

Let's slay you've got two people. One is working on an issue for a commercial company. And the other person works for the same boss and he's sitting on this committee.

In the old days, that would have set up an organizational conflict of interest, and that would not be permitted.

In other words, we couldn't have a person from the laboratory at the working level who is working for the same boss that another man did who was a colleague who was working for him. That's where the problem is.

The interpretation now is very different. What it says is that that conflict goes all the way to the manager and the director of the laboratory.

And so we have had cases where a national laboratory had to stop working for us on an issue, and we've had places where a national laboratory decided to stop working for DOE on an issue because our lawyers said there was a conflict.

MR. BURSTEIN: Do you see why we should shoot all the lawyers?

(Laughter.)

MR. BURSTEIN: Anybody who knows anything about the business is not allowed to serve on an advisory or a pertinent committee or do anything construction in this.

MR. BECKJORD: Yeah, that's the down side, but as a practical matter, in the life of this committee, there has been no organizational conflict of interest.

And the number of times that individual conflict of interest has come up and really been an issue, you know, there have been a couple of cases where I think a couple of your members have withdraw from a particular consideration

because of an individual conflict of interest, but it hasn't been a problem.

MR. KINTNER: Of all the areas of research going on, somebody here is a presumed expert and needs to be pointed to as capable of criticizing those programs.

That would be my answer to this question. And if it weren't so, then you'd have asked for input, put some other people.

I've turned this question back to Eric in another way, which is something that I asked him to be ready talk to, and I don't know whether he did or not, which I think this committee would like to be, whether it can ever be or not, likely more useful, more effective, more capable of making certain programs better in whatever way that is, better workmanship, better in terms of the work being done.

We've made some changes since I've been on it two years. One came to be the subcommittees.

And another subject is our relationship with you and with the staff.

Another subject is our relationship with the Commission and ourselves, and we have a chance to make this kind of proposal to them. What, if anything, should be doing differently, tougher, less tough, much more specific in our criticism, less specific.

Can you speak clearly now?

MR. BECKJORD: Yeah, I can speak clearly on that.

Well, there are two aspects. One aspect has to do with the charter, and I don't recommend any change to the charter. I think it's a good charter, so I think the kinds of things that you have the power and authority to do are fine.

I think, with respect to the operation of the committee and the preparation of the reports, the only suggestion that I have would be that I think we could probably improve the presentations and we could improve the opportunity to review them if we had some more planning and consultation between the chairmen or the subcommittee chairmen as the case may be with the people whose program is being reviewed in order to focus more specifically the issues that you think you'd like to hear about.

And this could be done by more preparation for a meeting. We could start out, talk to me about it, and, you know, see that the right people get in touch with you, and then the meetings can be planned better.

The presentations now, I think, tend to be -- we try to cover everything, try to anticipate everything that the committee might be interested in.

And I think the committee's been in operation long enough now so that you have a pretty good idea of what the program is. Of course, your new members will need a little

catch-up time, but that will take place.

And we can do a better job of presenting the material to you. And I think that provides an opportunity to improve the overall process. That's the suggestion I have

MR. KINTNER: But as far as you're concerned, our reports are as strong as they ought to be. You picked up on specific issues that need to be made and made in a hard enough way that they've had an effect.

I mean, do you have some sense of that?

MR. BECKJORD: I wouldn't change the reports. You maybe -- I guess what you don't know is you don't have the opportunity to see the effect of the reports.

They are read with a great deal of interest, and the Commission is interested in the answers that are given to those reports because they ask about them, they want to see them, they ask about some of the answers.

You don't have the opportunity to see this, and maybe you ought to. Some of your reports have made things pretty interesting around here.

(Laughter.)

MR. KINTNER: Well, I'm just going to make one observation.

MR. BECKJORD: You can judge that by the nature of the response in your letters.

MR. KINTNER: And that is I'm surprised at your answer, which seems to me, this is not a criticism, if I were in your position I would either want this group to all get the hell off my back and let me do my job or I would like you to take positions on sacred cows that I have.

MR. BECKJORD: No, I think -- you know, I think the committee should call it the way it sees it. I'm going to stay out of it. I'm not going to tell you what stay out of.

MR. MOLZ: I was going to say that as far as planning for meetings, I think you can over-plan. From out point of view, I think the committee likes to have a lot of informal conversations about things.

And it's been my experience if you tell someone exactly what you want to hear, then that's exactly what you hear, so I'm not sure you get the most information transfer when everybody knows just what everybody's going to ask.

I think certainly you can't go into a meeting and, you know, talk about the horse races or something like that, but I think you can overdo the specificity.

MR. TODREAS: The question I wanted to raise is whether the committees as constituted in the areas where there should be a shuffle?

MR. VOGEL: You mean the subcommittees.

MR. TODREAS: Yeah, the subcommittees, the topics.

That's kind of one way to influence the way the committee works is have a realignment so that you get at new things that need it with more focus.

MR. BECKJORD: Well, of course, we've alternated now a couple of times from full committee to subcommittee operation.

And I think you may want to initiate another round of the subcommittee approach, and certainly the digital INC would be an important thing to do. It's going to be more focused now, and the timing would be coincident about with this workshop which will be coming up.

MR. UHRIG: Well, it's going to raise the issue whether this subcommittee could play some role or even whether it should have any contact with this.

MR. BECKJORD: I think that it should be, you know, to take a look at the workshop and see what's coming out of it. I mean the committee's job is really course correction. That's what it comes down to. And so we could tell you if -- by the way, there is -- one of your -- it has come to me that one statement I made this morning is in error regarding the proposal that I was telling you about.

I had concluded that the proposal wasn't ready. That in fact is not true. The proposal exists and it has in fact gone out to the board members, in fact some weeks ago.

So hopefully we're much further along the line

than I thought we were as of yesterday afternoon.

MR. KINTNER: Why couldn't as Bob said they get a telephone conversation and get it resolved tomorrow?

MR. HATCHER: They can do it by fax if they would. It depends on how the board chooses to operate. It's their prerogative to do it any way they want to. They can do it by fax, overnight mail, electronic mail, or the way that it appears to be going right now.

MR. MORRISON: Well, there's a question here of which board. It's the whole way up to the National Academy board.

MR. BURSTEIN: The commissions in between have to sign off as well.

MR. MORRISON: Yeah, but I think it's to go to the supremo board, whatever it's called.

MR. BECKJORD: Well, in any event what I was thinking was that we can hopefully get this process underway that is at point about three months into it, where we go back to the director of this study and settle finally on the scope of the human factors part so we can tell the committee about that and we'll have a chance to make some judgment about that.

And then the next thing is the workshop. And I would think that that would be a very important point, because after the workshop there's about six months during

which the National Academy does it's report. And we could certainly feed back our own impressions and they would have the committee's thoughts on the subject.

So I think there are two major opportunities and one minor opportunity for the committee to get into that.

MR. MORRISON: According to my watch it's about time to wind down for the afternoon. I certainly commend everyone for sticking with it all afternoon.

I would propose we start out tomorrow morning, and I will verify that list of items that we first talked about to answer the initial question in the research program area. And then I think we need a discussion on supporting points that we've had this afternoon and make sure that at least if my role remains by the end of the morning to sort of get an overview and start off the discussions with the commission tomorrow. Everyone can then chime in as appropriate to respond to specifics on it.

The agenda for the meeting with the commission -- and I don't know how fixed that is -- it was laid out but there would be sort of 35 minutes on the general issues that I would lead off on and there would be a chance for Neil to take about ten minutes worth of comments and Spence to make five or ten minutes worth of comments. And Ed would wrap up with the new committee and the new directions.

I don't know that that's cast in concrete.

MR. BURSTEIN: I've got a question on that. It seems 35 minutes for you to present this and for us to kick around all these topics is short. And the extra ten minutes that I have and five minutes for Spence, I'm not sure how I should take this. Is that completely separate from this discussion? Is it ceremonial, is it substantive?

MR. MORRISON: I think that's worthwhile discussing tomorrow morning. As far as I'm concerned I am not going to make a 35 minute presentation. If it lasts more than about ten it's probably twice as long as what it needs to be to get things off and rolling, because I think the more important thing is the dialogue between the commissions, and that's what will happen.

And the only reason for even trying to shape a discussion is so we kind of all know where we're coming from as a committee and whether we speak then as individual committee members can be pretty much set by this discussion this afternoon and discussion tomorrow morning.

MR. BURSTEIN: So I take that to say we may have time within the 30 minutes or 45 minutes to really get through all this mass of discussion.

MR. MORRISON: Well, let's hope so.

MR. KINTNER: One thing I'd like to point out, this is supposed to last an hour and a half. Last year it lasted two and a half, I think. George has an office I

believe not too far distant where we can get together and reorganize, lick our wounds, make some assignments to committee, subcommittees and so forth and decide I guess decide on some dates for the full committee for the year and then disband.

MR. MORRISON: Well, if there's nothing more to be added let's adjourn.

(Whereupon, at 6:00 p.m., the meeting was recessed, to reconvene at 8:00 a.m. Friday, May 20, 1994.)

REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission
in the matter of:

NAME OF PROCEEDING: NSRRC

DOCKET NUMBER:

PLACE OF PROCEEDING: Bethesda, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

B. Charles Hopkins

Official Reporter
Ann Riley & Associates, Ltd.