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NUCLEAR REGULATORY COMMISSION

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COMMISSION MEETING

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BRIEFING ON OFFICE OF NUCLEAR REGULATORY RESEARCH
PROGRAMS AND PERFORMANCE

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ROCKVILLE, MARYLAND

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THURSDAY
MAY 10, 2001

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The Commission met in the Commission Meeting Room of 1 White Flint at 10:30 a.m., Richard A. Meserve, Chair, presiding.

PRESENT

Richard A. Meserve	Chair
Nils J. Diaz	Commissioner
Greta J. Dicus	Commissioner
Edward McGaffigan, Jr.	Commissioner
Jeffrey S. Merrifield	Commissioner
Andrew Bates	Acting Secretary
Karen D. Cyr, Esq.	General Counsel

ALSO PRESENT:

Dr. Dana Powers	ACRS
Dr. Graham Wallis	ACRS
Dr. Kenneth Rogers	Expert Panel Chair
Harold Ray	Southern California Edison
John Gaertner	EPRI
Dr. Edwin Lyman	Nuclear Control Institute
Shane Johnson	DOE
Dr. Thomas Murley	
Dr. William Travers	EDO
Dr. Carl Paperiello	Deputy EDO
Ashok Thadani	Director, RES
Thomas King	Director, DRAA
Farouk Eltawila	Acting Director, DSARE
Roy Zimmerman	Deputy Director, RES
Michael Mayfield	Director, DET

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(10:27 a.m.)

CHAIRMAN MESERVE: On behalf of the Commission, I would like to welcome you to today's briefing concerning the NRC's research program. As I think everyone in the room knows, over the past decade and longer, there has been a decline in the funds that are allocated to research in current dollars. In constant dollars of course the sages have been even more remarkable.

As a result of these trends, when I first came to the Commission I was concerned about the capability of the NRC to conduct its necessary research, and have discussed with my colleagues, which I think a view they share, of making sure that our research activities are appropriate in scale and appropriately focused.

It has also become apparent to us that there is some confusion in the licensee community about what we do, why we do research and what research we do do. So it is with particular pleasure that I endorse the thought, my colleagues endorse the thought that there would be some studies that would be undertaken by independent panel of experts as has been chaired by Dr. Rogers.

We also have had the benefit of a study that has been conducted and is periodically conducted by the ACRS.

So our first panel this morning, we will hear from the ACRS and from Dr. Rogers and various members of his panel about their very helpful reports.

Let me say it is particularly fortunate for us as it's proven that these reports are quite complementary in the sense that the Rogers' effort -- if I may refer to it as that, I realize that there are individual contributions from each of you -- but that that effort takes the broad strategic view of the overall activity and sets it in the general context of the Commission's activities, whereas the ACRS report is programmatic in its focus and looks at the details of what we are doing. Together, they give us a comprehensive overview of the activities.

We have also had the benefit of a study that was submitted by the National Laboratories, and which we also appreciate. The National Laboratories' report will be discussed by Dr. Thadani with the second panel when the NRC staff will come to speak to us.

Before we proceed, I would like to take this opportunity to offer thanks to all of you for your efforts. I have been astonished at the tireless effort that the ACRS has put in. I have remarked on that in the past, and we appreciate their efforts here. We also very much appreciate the time and effort that has been put in by Dr. Rogers and by all of the members of the panel. We recognize that this intrudes on your schedules. It was done as a voluntary activity without compensation. We very much appreciate your willingness to serve and your dedication to the task. Just an extraordinary effort. I would like to thank you very much for your activities.

I think it is also appropriate on this occasion to recognize and offer my congratulations to Dr. Rogers, who I understand has been elected a Fellow of the American Nuclear Society. I know that is a richly-deserved honor.

With that, why don't we proceed. I think that the schedule would have us proceed with the ACRS first with Dr. Powers and Dr. Wallis.

DR. POWERS: Thank you, Mr. Chairman, Commissioners.

The ACRS has submitted to you its annual report on the NRC research program. As the Chairman indicated, if Commissioner Rogers' group looked at the 30,000 foot level, we looked at the mud.

(Laughter.)

Our objectives in preparing the report this year were two-fold. We hoped to be able to identify some exciting new areas and directions for the research program that would allow the Agency to be better prepared for meeting future challenges. We also set out to examine the ongoing research program.

What I have to say is that we were not terribly successful at identifying any startling new directions for the research program. What we found instead was that the NRC research staff is acutely aware of the kinds of challenges that it will face as new changes take place both within the Agency and within the industry.

I have listed some of these challenges on the slide. I don't know whether I have slides or not. If we go to the next slide, please. I think these are familiar to you. What we found was that the NRC research staff has within the constraints of its limited resources, been trying to address all of these new or future foreseen issues, and make accommodations, and sometimes very imaginative accommodations to their programs, to if not address explicitly the issue, to prepare itself to address those issues.

As a result, the ACRS was really only able to make some suggestions on some new research topics which are listed on the next slide. The first of these is the issue of synergisms. We know that quite a number of activities are taking place within the Agency as it moves toward a more risk-informed regulatory basis. At the same time, quite a number of changes are taking place within the industry, especially as they look to license renewal and the use of fuel at higher burn-ups. The ACRS has raised the question.

As we look at these, and we do tend to look at them as individual actions, are there any synergisms. We have new particular evidence, perhaps plausibility arguments, but new particular evidence that there are synergisms. We simply think it's an area that the research program should be looking at to assure that these can be treated as they are in somewhat of an independent fashion.

As we move in toward the use of more risk-informed regulations and the use of integrated decisionmaking, as we put reliance on expert panels at the licensees' operations, to make decisions concerning the maintenance and quality assurance of systems components and structures within the reactors, we are making decisions in the face of both uncertainty and at the same time, floods of information.

The ACRS wonders if it is not time for the Agency to give some careful thought to more formalized decision making, using some of the progress that has been made in the decision making area.

Finally, we suggested that as interest grows and the possibility of having new innovative reactor designs, the Agency may want to complement its existing options 2 and options 3 for risk-informing regulations to begin what's called the "clean sheet" approach, particularly for advanced reactors. By that we mean a reexamination of what the regulations would look like, given that you had an abundance of risk information which was not available at the time the current regulations were formulated.

Perhaps the more important impact of this year's ACRS study of the research program was the examination of the ongoing research work. Much of this work has been initiated based on requests from the user organizations, the so-called user need letters.

ACRS was able to look upon the work then as there being prima facie evidence there was a line organization need for the work. Questions that it bore in mind as it examined the individual programs are listed on this slide. I have to acknowledge the substantial amount of help we have derived from Commissioner Merrifield's speech in formulating some of these questions.

Is the research needed by the Agency for an independent review of a licensee proposal or other regulatory action or would it be better done by the licensees themselves? Has the research progressed to a point that it is adequate for regulatory decisions? Does the work need to be modified to better meet Agency needs?

We examined the research in 13 areas that I have listed on the next slide. We developed a

relatively lengthy report that addressed each one of these areas. I can't go into the individual findings in any detail. I simply want to call to your attention some highlights of our findings on the research program.

The first point that I wanted to make is we found quite a number of the programs both well organized and well conducted. On this next slide I have listed three that were particularly good: the thermal hydraulics program, in which they are looking at code and consolidation and improving the thermal hydraulics analytic tools we have available, is especially important as we tend to move toward more realistic analyses and away from deliberately conservative analyses of thermal hydraulic phenomena. Dr. O'Twielen and his staff I think have done an outstanding job in what is an enormously technically challenging area.

The fuel research program we found to be very well organized and technically strong. Dr. Myer and his team have done amazing things in this field, taking what would ordinarily be a fairly parochial fuel study designed to confirm some regulatory decisions and turning it into an international cooperative effort that's leveraged both with cooperation with the industry and cooperation with several of the laboratories outside the United States.

We did note that some of the findings of this research program suggested may need additional resources in order to provide the kind of information the Agency will need to make regulatory decisions.

Finally, I note the environmentally assisted cracking. This is a particularly good example of an area where the NRC needs to maintain a core competency. The predominant responsibility for corrosion in nuclear plants of course belongs with the industry, but the NRC needs to maintain a level of competency so that they are able to understand the kinds of proposals the industry needs with respect to corrosion. We felt that this program had struck the proper balance between independent research and maintaining an awareness of what the industry was doing.

We found several examples of what I would call outstanding research organizations. One of the most striking is the work that the research organization is doing in the area of pressurized thermal shock. This is, to my mind, one of the best examples I have ever seen of matrixing in research. Three of NRC's core competencies, thermal hydraulics, probabilistic fracture mechanics and PRA, have been brought together to focus on an area that is going to be of interest both to the industry and to the public.

We found also some excellent examples of research planning. On this next slide, I list three that are particularly good because they have detailed documentation that are available to you to examine.

The research in fire of course, as we are now getting the results from the IPEEE program, we can see that fire may be coming a more important issue for us to examine on a regulatory basis. We have a particularly strong research program being developed in the area of fire.

Professor Diaz I think will be the first to tell you that the Agency will need a strong understanding of digital I&C; as we move into the area of advanced reactors. We have a particularly good research plan in those areas.

Finally, I would like to point out the work by the organization for analysis and evaluation of operational data. This used to be an independent part of the NRC organization. It's been folded into research. This was an area of concern to the ACRS because we felt it important that an independent in this evaluation of operational data would be important. I am happy to report to you that the analysis and evaluation of operational data is proceeding much as it has in the past. Some very excellent work, and it has fine plans which should well take it out to the year 2005 to carry out.

Finally, I would like to point out the issue of legacy data. There is an effort to preserve legacy data in the criticality area. This is not the only area where the NRC has either sponsored or participated in important research efforts. In the past, these are experimental efforts that are not likely to be reproduced in the near future. It may well be important for the Agency to take steps to preserve these experimental data, particularly in the area of thermal hydraulics and severe accidents, as well as criticality work.

ACRS in its report was able to identify a couple of areas, several areas where some strengthening in the research program was possible. Two I would like to highlight. They are presented on this final slide.

We found the tactics for conducting research within the Agency to be very good. We did feel that the strategies could be strengthened. An example of this has to do with probabilistic risk assessment, the questions of what depth and what breadth we want to have for our probabilistic research, probabilistic risk analysis efforts.

But perhaps more important, is how do we want to disseminate probabilistic risk assessment capabilities. Is it to remain an area of a specialist, either in the research organization or the line organization? Or do we envisage eventually having probabilistic risk assessment capabilities to be a routine tool available to any part of the organization or in the regions?

The other area of strengthening we think is in the area of human factors and human reliability. A persuasive case can be made the human factor is going to be one of the most important parts of reactor safety in the future. We think there is a need for superior coordination between the human factor research and human reliability analysis. More importantly, we think that it is important for the Agency to better define what we want to accomplish in these areas of human factors and human reliability.

Well this has only been a brief discussion of the report we have provided on the research organization. I would certainly be happy to elaborate on any of the points it makes, either at this forum or any other forum.

CHAIRMAN MESERVE: Thank you, Dr. Powers.

We'll return to your report after we have had a briefing from Dr. Rogers. Then we will open it up for all of you for questioning from the Commission.

Dr. Rogers, as I indicated, was the panel chairman. There were a variety of other members that participated. He is joined today by Mr. Harold Ray, who is the Executive Vice President for Southern California Edison, Mr. John Gaertner from EPRI, Dr. Edwin Lyman from the Nuclear Control Institute, Mr. Shane Johnson from the Department of Energy, and Dr. Thomas Murley, who is a former NRC employee, which we view as his highest accomplishment. I am just teasing Tom.

(Laughter.)

Ken, would you like to proceed?

DR. ROGERS: Good morning, Chairman Meserve and Commissioners. It is indeed a pleasure to be here to report to you on the results of our panel on the role and direction of nuclear regulatory research convened last summer by Dr. Travers and Mr. Thadani, and which I was honored to chair.

Together with me at the table are five other members of the panel of experts, and there are other members of the panel in the audience as well.

I will summarize the most common views of the panelists, after which each of the five members of the panel will have an opportunity to speak to you on the most important points in their individual contributions to our report. Their comments are limited to three minutes each, I hope.

Following our individual presentations, we will be pleased to respond to your questions and comments.

As you all know very well, the nuclear industry is currently involved in important and far-reaching changes that are creating new issues and new challenges for the Nuclear Regulatory Commission. In response, the Agency is currently involved in an internal evaluation to determine how it can meet these challenges, and at the same time, pursue its objectives.

An essential part of this effort is a thorough review of the activities of the Office of Nuclear Regulatory Research, RES. I will use the term RES in my presentation to distinguish it from the more generic term, research.

Since it was established by Congress in 1975, RES has contributed significantly to NRC's independent capability for developing and analyzing technical information in support of the licensing and

regulatory process. As a supplement to internal planning, input from stakeholders was sought on the role and future direction of RES.

A 17-member panel of experts chaired by myself and representing industry, academia, government, and public interest groups, was assembled and asked to present their views and comments on the vision, mission, role, and general direction of regulatory research, and to provide insight and guidance for future activities. A list of the members, all of whom serve voluntarily and without compensation, is included in Volume I of our report, and is shown on the first slide.

The work on this report was divided into two phases. The panel was convened for two meetings for each phase. The objective of phase I was to broadly examine the mission and role of RES. Based on the information from the written submissions and discussions during the meetings, several conclusions and recommendations widely shared by many panel members became apparent. These issues were restated in the form of policy recommendations to the Commission.

For the phase II effort, the panel was asked for their individual suggestions and comments as to how these recommendations could be implemented. Since this panel was not established under the Federal Advisory Committee Act, no attempt was made to develop a consensus report. Instead, each member was encouraged to present his or her own individual viewpoints and recommendations.

In his opening address to the panel, Chairman Meserve offered three questions for consideration. Are we spending enough on research? Are we doing the right research? Are we doing research with the right people? Preliminary responses were developed in phase I. However, the panel requested and was given additional information so as to be able to provide more substantive answers.

The individual final responses to the Chairman's questions are included in Volume II of our report. I will summarize them in my presentation.

I should strongly emphasize that the material included in our report represents the unique viewpoints of individual panel members based on their experience and understanding of research as it is conducted by the NRC. Their views are included in their entirety, without modification, in our report.

Volume I is a compilation written by a non-member of the panel employed by the NRC. It summarizes the positions, conclusions, and recommendations which appeared to be most widely shared by the panelists. Our very brief presentations to you today cannot do justice to the thoughtful, constructive, and detailed comments in the individual submissions of the panel members. We hope that those will be considered carefully because there is much value in them. The panel members were all interested and faithful contributors to the final report.

I will now turn to the Chairman's three questions. In a sense, they deal with immediate issues, more operational rather than policy in nature. Not surprisingly, the spread of panel members' views on these issues was somewhat broader than on their policy recommendations.

First, is NRC spending enough on research? There was a great deal of discussion on how to get at an answer to this question. Simply looking at the very large reductions in the RES budget over the years was not a credible way to get at an answer. Institutional comparisons of the percentage of the total NRC budget devoted to research wasn't really much better.

By focusing on the prioritization criteria used by RES in allocating their budget and considering those projects which could not be funded, it was concluded that research in general and anticipatory research specifically are substantially under-funded. The shortfall appears to be in the range of four to 12 million dollars per year.

The 10 to 20 percent of the RES budget allocated to emerging issues did not appear to be adequate. Concern was also expressed that RES's budget has been insufficient to maintain its technical core capabilities. It was suggested that RES increase its technical capability and expand its contract to services and facilities, but of course this would require additional funding.

Is NRC doing the right research? Not enough anticipatory research is being done, and not enough work in the materials and waste areas.

The strong emphasis on research directed to user needs can result in significant gaps in technological currency that cannot presently be filled.

RES should be doing more work on the utilization of PRA results and on developing improved PRA methods and data.

The Advisory Committee on Nuclear Waste should present a list of unfunded projects they feel should have been done.

The special research skills normally found in RES are required to review the waste management programs and to verify the credibility of the work being done under NMSS. The present systemic processes for prioritizing research projects needs greater coordination between NRR and NMSS.

A larger percentage of NRC's research should be funded out of general funds appropriated by Congress.

Is NRC doing research with the right people? The original intent of Congress was that NRC would use DOE's national labs so as to benefit from DOE's budget for research. It has been increasingly difficult for NRC to rely entirely on the national laboratories for its research needs.

NRC should find ways to make it easier to contract with the most qualified organizations, even if they are not national labs, while maintaining of course its necessary independence. University teams are particularly well-suited for anticipatory research, and should be used when possible.

The Commission should continue to find new ways to use DOE labs and resources through additional collaborative arrangements with DOE. In-house RES resources can become insular and isolated in the absence of some kind of systematic cross-training experiences.

RES should be required to reassess the unfunded, but needed research efforts, and to develop a statement of required competencies and funds required to carry them out.

Periodic reviews of NRC's overall research programs by a broad-based group of experts should be conducted every two or three years.

I will turn now to policy recommendations for Commission consideration and how they might be implemented. Time and slide limitations, how much one can get on a slide, make it difficult to provide the kind of elaboration that's in our report, so I have to refer you to the report itself for more complete information.

The first recommendation is that the Commissioners endorse the following policy positions: first, the NRC must maintain as a used and useful arm of its organization, a reliable, respected Office of Nuclear Regulatory Research, RES, and must support this office with the necessary people and resources so it is an unassailable source of technical information and support for regulatory actions.

The language we have chosen, used and useful, reliable, respected, and unassailable resource of technical information, really summarize the views of most of the panelists. These words are there to convey the sense of fundamental importance of RES to the work of the Commission that underpin the legislative creation of the office by Congress, and that persist today.

To carry out its responsibilities, the funding for research in general at NRC, and for RES in particular, will have to be increased. The core capabilities and resources available to RES, people, analytical tools, and access to facilities, must be carefully monitored and maintain at the highest possible level of excellence.

The Commission should charge RES with monitoring the Agency's state of readiness to meet future challenges as a result of new technologies, reactor design advances, safety issues, and independent industry initiatives, and reporting its findings to the Commission on a periodic basis.

Research, RES, must support the activities of other program offices, which in turn should be required to coordinate their activities with RES, at least to the extent of planning new work, establishing objectives of technical studies, and assessing the validity of data and analyses.

At the same time, RES should be allowed to initiate anticipatory technical studies without approval by program offices, but with their cognizance and input wherever possible.

RES must be able to do and be seen as able to do independent verification of data which NRC

will rely on for regulatory action.

RES must institute and maintain a comprehensive and effective communications program to make available their plans and activities.

The Commission -- these are our recommendations -- the Commission should require RES to develop a new provision for strategic oversight of its anticipatory research that has various inputs, including the program offices, for identification and prioritization of projects, but choices of anticipatory projects must lie with the Director of Research.

The Commission should encourage RES to extend its activities beyond narrow technical studies and task RES to identify new systems-wide issues that could have significant safety implications. Examples are the positive or negative synergistic results of current and/or new regulations or new industry initiatives, and the impact of regulatory attention on the licensees' safety culture.

Communication of what it does, why it does it, and what the results have been of RES research programs must have a higher priority and command greater resources.

RES must continue to grow its cooperative efforts with other organizations, including but not necessarily limited to EPRI, DOE, industry, academia, public interest groups, and international organizations.

RES must seek out and wherever possible, utilize facilities, equipment, and resources available from these entities and maximize the use of technical data and results already developed. RES, in cooperation with and supported by the Commission, must establish procedures to accomplish this while fully retaining the decisionmaking independence of RES.

We think the Commission should ask RES to identify impediments to the expansion of cooperative research with the international community, and with suitable domestic organizations, and to propose to the Commission strategies for encouraging cooperative research without compromising NRC's regulatory decisionmaking independence.

The base of contractors used by RES should be expanded to include more non-governmental organizations, and innovative ways should be developed to avoid the present significant delays in the contracting process.

A clear and understandable definition of what research includes and does not include at the NRC and its value to the safety of the Nation's nuclear program, must be established by the Commission and accepted internally by the program offices and staff personnel, and effectively conveyed to all stakeholders.

Continuing efforts must be made through research the process to eliminate unnecessary regulatory burdens on stakeholders, while at the same time, focusing on areas that will benefit them through safer and more efficient operations.

Charges to licensees for research costs should be on the basis of identifiable value to the efficient and effective regulation of those licensees.

We recommend that the Commission establish a clear, concise definition of research as it's conducted at NRC, with clear distinctions among anticipatory and confirmatory research, and technical assistance.

Interpretation of the word "realistic" in the context of research should be clarified.

Adjustments to the fee structure should be considered by the Commission so that licensee fees go to regulatory activities related to those licensees, but not to support NRC work solely related to new technologies unconnected to current licensees' operations.

This concludes my presentation. However, the other panel members are here to speak on features of their own submissions. After that, we will be pleased to answer questions. We can now hear from Mr. Harold Ray.

MR. RAY: Thank you very much, Ken.

Chairman Meserve and Commissioners, I would like to begin by saying that Panel Chairman Rogers has done an absolutely outstanding job in the work that he has done for us and for you. I couldn't continue without making that statement. It is a diverse group, well represents all the various stakeholders, I believe, involved. Was not an easy chore. Ken did it extremely well.

Because it is a broadly balanced group, I am going to take my two-and-a-half minutes remaining to be rather parochial and speak from just the viewpoint of a power reactor licensee. I am sure you won't attribute to me such a narrow point of view, but it will be the one that I reflect to you here.

That is, that it is not feasible for the licensee fee-based funding, a point that Dr. Rogers just ended on, which must be directed to the regulatory needs of those licensees to also support either the competencies required for continued U.S. leadership in nuclear safety generally or to provide the regulatory foundation necessary to support the application of new nuclear technology.

I believe it is the case that the significant decline in NRC research funding, which was described to the panel and has been referred to here, and which I generally deplore, that that decline is a direct consequence of the reliance on user fees imposed on current licensees. It is likely to continue unless research is either made more directly relevant to the current licensees or better yet, an alternative source of funding is provided. There is a step that's of course been taken in that direction already.

But the notion that there is such a thing as a domestic nuclear industry which could itself support all areas of needed NRC research through fees is simply no longer true, if indeed it ever was true.

Now with regard to the research which can clearly be supported by licensee fees, much has been accomplished. To improve the efficiency and effectiveness of power reactor regulation recently, by the acceptance of the principle that regulatory requirements should be informed by risk significance. I don't know why I have a hard time saying that.

However, much more needs to be done in this regard, especially since it is impossible to base decisions concerning high consequence, low probability events on subjective experience. I would like to underscore that as I'm sure all the Commissioners do appreciate the importance of that point. So much of what we do is based on our own experience, and only through the disciplined processes of research can we transcend that experience and get to the real facts that are essential.

The field is wide open and ripe to harvest relative to the quantification of risk significance, and as important is the need to evaluate the role of uncertainty in the use of risk-informed regulation.

Finally, I believe finding the proper balance between deterministic and risk-informed methods is an appropriate area where research could also make an important contribution.

I am among those who advocate an increase in the resources available to research itself to pursue emerging issues at the direction of this Commission. I received the impression during our work that research office is too much in the mode of merely contracting for and overseeing work requested by so-called users, and that it was not sufficiently accountable for performing and for defending the value of the results from work which it itself has initiated. Thank you.

DR. ROGERS: Mr. Shane Johnson.

MR. JOHNSON: Mr. Chairman, Commissioners, my name is Shane Johnson. I am the Associate Director for Technology and International Cooperation for the Department of Energy's Office of Nuclear Energy Science and Technology. I am here today in place of Bill Magwood, the Director of the Office of Nuclear Energy, who served as a member of the expert panel. Mr. Magwood was unable to be here today, as he is testifying before Congress on our Fiscal Year 2002 budget request. So I hope you will excuse his absence and understand his need to be elsewhere at this time.

My remarks today represent the views of the Office of Nuclear Energy. It is a legitimate responsibility of Government to develop and maintain in-house technical expertise to guide the development and implementation of the regulations governing the commercial application of nuclear energy technologies. Likewise, it is incumbent on the Government to maintain technical cognizance of advances in those nuclear technologies which are under consideration for possible future commercialization.

To this end, Government-sponsored nuclear energy research to address outstanding technical issues that may possibly affect the safe application of nuclear technology is good public policy, providing benefits to the public at large as well as to industry.

With all the recent talk on possible new plant orders in the United States in the not too distant future, we believe this is an appropriate time for NRC to reexamine its concept of independence and its policy toward cooperative research. It is our belief that a fundamental change is needed in the way NRC views independence and verification.

Much has changed in the U.S. nuclear industry over the past three decades. The technology is now better understood by the designers, the operators, and the regulators. As such, the need to conduct separate, independent research has become less important than to ensure the appropriateness of the research being conducted.

Independent or confirmatory research does not make the best use of the Agency's finite human and financial resources. The Agency needs to pursue all opportunities to leverage its scarce research funds by teaming with industry, other Government agencies, and the international research community in cooperative research activities.

It is our view that an informed determination needs to be made regarding the extent to which NRC can responsibly rely on research done by others to meet its needs without compromising its independence as a regulator. Once such a determination is made, the Agency can be much more effective in identifying and managing the human and financial resources necessary to meet its regulatory responsibilities.

It is vital that the U.S. nuclear energy research community work together more closely to ensure that clean, safe, and economical nuclear power maintains its place in our Nation's electric generation infrastructure. Working with industry and other Government agencies would allow NRC to leverage those scarce funding resources to address issues of common concern. We encourage NRC to review its policies on confirmatory and collaborative research.

DR. ROGERS: Mr. Gaertner.

MR. GAERTNER: My name is John Gaertner, Electric Power Research Institute. My presentation will highlight items from the written comments of Ted Marston, Chief Nuclear Officer of EPRI, and also a member of this expert panel. I think you will hear corroboration of many of the same ideas that you have heard already.

As you know, NRC research and EPRI have a successful memorandum of understanding for cooperative research that has been in effect since 1997 and has been recently renewed. There has been research in six technical areas, and we hold regular meetings to discuss potential new areas for cooperation. This experience provides a unique perspective for our comments, which follow.

First, I emphasize the need to assure that RES has necessary funding and core competencies to respond to emerging challenges of this industry. These challenges include: a new regulatory framework for new plants; safety implications of new reactor types; enhanced I&C; and information technology; a risk-informed regulatory environment; more use of realistic analysis; and burden reduction for licensees.

Second, I note the need to clarify the requirements for RES independence. Independence must not unduly restrict opportunities for increased collaboration. Independence must not unduly affect contractor selection. For example, we have observed that the national laboratories may not have contemporary knowledge of operational plant issues, and may not have the same incentive to bring closure to issues that others may.

Independence of RES to select and perform anticipatory research should not prevent oversight by NRR, which we believe can enhance the RES role to anticipate and to, as they say, poke and probe.

Third, I stress the need to improve RES communications with stakeholders outside of NRC. One such opportunity would be a thorough periodic review of RES programs by an outside advisory group, which was recommended by Dr. Rogers. And also summaries of research projects, including the purpose, results, and a perspective for their applicability would be useful.

Finally, I recognize the benefits of an RES funding scheme that represents a balance between user fees and funding from other sources.

Progress on these items, we believe, would result in more industry support for RES research and a more effective regulatory process. Thank you.

DR. LYMAN: My name is Edwin Lyman. Since 1995, I've been Scientific Director of the Nuclear Control Institute. And I'd like to thank the Commission and Dr. Rogers for the privilege of serving on the expert panel and the opportunity today to present NCI's views on the future of NRC safety research.

NCI is a public interest organization, and our role is usually the fly in the ointment, and I hope I don't disappoint you in that regard today.

NCI President Paul Leventhal, as a U.S. Senate Aide, helped to draft the Energy Reorganization Act of 1974, which separated the regulatory and promotional functions of the Atomic Energy Commission. Paul asked me to stress that the drafters of the original Senate-passed bill wanted to ensure that the NRC maintain a safety research capability that was independent of ERDA, DOE's predecessor agency, and which had a broad research mandate.

The legislation that emerged from conference established an Office of Nuclear Regulatory Research, RES, but one that was restricted to confirmatory assessment of the adequacy of NRC regulations. However, a confirmatory assessment was rejected three years later by Congress, which amended the ERA to provide for research authority on the development of newer improved safety systems. The addition of this anticipatory research gave RES a mandate closer to the original intent of the Senate version of the ERA.

This historical perspective is noteworthy today because of the independence that is so fundamental, in our view, to the RES mission. Independence not only from DOE and licensees but also from other NRC program offices has been put at risk by the severe cuts in the RES budget over the last decade and what we see as an excessive focus on linking research goals to specific programmatic objectives. These developments have also adversely affected the ability of RES to carry out the important anticipatory research function, which Congress specifically assigned to it in 1977.

At a time when many stakeholders and the public perceive that industry influence over NRC regulatory activities is increasing, when formal public participation is being restricted, and when there is growing pressure from Capitol Hill for NRC to expedite license renewals and licensing of new nuclear plants, the preservation of a robust and independent RES is more critical than ever.

NCI believes that most of the research projects pursued by RES are sensible and technically justified and favors funding for many of the worthy projects that RES would like to pursue but remain unfunded. Thus, we do support efforts to restore the budget of RES to a level at which it can effectively perform its statutory function. But, on the other hand, there also should be a renewed effort by NRC management to ensure that research sponsored by RES is conducted in an objective manner and that the results of the research are freely distributed to the public without spin.

I'd like to briefly mention a few examples that illustrate to us the importance of maintaining independent NRC research and testing capability where necessary. One example involves the NRC licensing of advanced cladding types, like M-5 and Zerlo, which are now in use in U.S. reactors. Recently, information came to the attention of RES suggesting that similar alloys would become embrittled in a loss of coolant accident much more rapidly than Zercalloy.

And this is now an issue, I think, of great uncertainty. There's some data provided by the vendors of these alloys, which indicate it may not be a problem, but additional safety issues are being revealed. And to this end, RES has asked the vendors for samples of both unirradiated cladding material and irradiated fuel rods for their fuel testing program at Argon, which Dr. Powers has praised.

Unfortunately, at the last public meeting in February 2001, the vendors were not enthusiastic about honoring this request. In our view, this kind of testing is essential for restoring public confidence in the use of advanced alloys like these, and should also become a routine part of fuel qualification for new fuel types.

A related issue involves NRC's research program to support licensing of MOX fuel in Duke Powers, Catawba, and McGuire Reactors. Again, RES is interested in obtaining samples of irradiated MOX lead test assemblies from the McGuire lead test assembly radiation that's planned. But to date, I believe the DOE is not being very cooperative in this request, which we think is a mistake, because the only lead test assembly qualification that's being planned is at Oak Ridge under DOE auspices, and we think there's a conflict of interest because of DOE's having investment in the MOX Program. So we hope that the Commission will support the RES request to DOE and also to NRR to obtain samples of MOX fuel for its own testing program.

On the question of licensing advanced reactors, NCI doesn't support large budget increases for NRC anticipatory research on especially innovative reactor types. I think there are difficult policy issues associated with greatly increased public funding for licensing and the question of where the borderline is between activities necessary for licensing and those associated with development and therefore promotion.

Finally, one cannot understate the importance of RES public confidence in its independence and objectivity. Unfortunately, there still is a long way to go to gain this confidence. It appears there's a tendency on the part of some RES staff to recast research findings that do not support prior NRC decisions in a more favorable light.

The example I'm familiar with is the issue of ice condenser containment vulnerability during severe accidents. NCI is particularly concerned with this problem because of the plan to use MOX fuel in the Catawba and McGuire Plants, which are ice condensers, since, according to our estimates, the laden cancer severe accident risk to the public will increase by 25 percent once MOX fuel is loaded in these reactors.

A thorough and fair assessment of containment performance must be an essential prerequisite for NRC approval of MOX using these plants. However, the discouraging experiences of Dr. Kenneth Bergeron, a researcher who recently retired from Sandia National Laboratories, provides evidence of ongoing interference by NRC management and RES-sponsored projects in which he has participated, including a study of ice condenser containment safety.

Dr. Bergeron was a co-author of the study that analyzed responsive ice condenser containments to severe accident pressure loads. He has spoken of the chilling effect that budget cuts for severe accident research have had on the objectivity of contracted research. Dr. Bergeron gave me permission to quote him directly, and I quote, "In the case of the ice condenser report, I personally resisted pressure to whitewash the issues for four years. I think the IC report underestimates the safety issues substantially. Time and time again, the project staff were asked to look into issues in greater detail if there seemed a possibility that they would reveal a rosier picture. And time and time again, other issues that might yield evidence of additional problems were glossed over.

Clearly, any perception that managerial bias influences the outcome of NRC-sponsored research is very damaging to RES as well as the Commission and renewed and vigilant efforts must be made to ensure that RES is insulated from political and budgetary pressure. Otherwise, it will lose its regard by the public as a credible source of safety information.

In summary, we see a big part of the problem is the requirement that RES activities conform to the NRC performance goal of reducing unnecessary regulatory burden. A fundamental goal of safety research is to reduce uncertainties and provide a more precise determination of safety margin, but the results of such efforts may uncover margins that are unacceptably small as well as unnecessarily large. To regain public confidence in NRC's objectivity, RES must demonstrate that it's willing to deliver bad news as well as good and the other NRC offices must be willing to respond promptly and appropriately to RES findings.

Thank you for your attention.

DR. ROGERS: Dr. Murley?

DR. MURLEY: Thank you, Ken. Mr. Chairman, Commissioners, it's good to be back at the table after many years. I should mention that by way of reintroducing myself, I was a Senior Manager in research, in the Office of Research, back in the late '70s, as well as the Regional Administrator and Director of NRR. So some of these issues seem like deja vu to me, because we debated them back in the '70s, as you can imagine.

But the landscape with regard to research and its justification are totally different today. And so I commend the Agency for undertaking this review and of the role research. I endorse Ken Rogers' summary and recommendations. I think they captured very well the conclusions that most of us reached.

I found no fundamental problems in the way research conceived, planned, authorized, carried out, and used today in NRC. The existence of the Research Effectiveness Review Board I think is quite a good initiative. My sense is that it's being done today better than I remember it being done in the Agency. So I'm going to focus my few remarks on some policy recommendations for the Commission itself, because I think what we can best do for the Agency is to focus on these higher level issues.

The first recommendation I would make independently is I think there is a need for the commissioners to support research, to publicly support research and its role. Today, it's, as I mentioned, quite a bit different than it was in the '70s or '80s or even in the '90s, the need for it. The needs are different, but the fundamental need for an effective Office of Research is just as important today.

Allied with that, I think the Commission needs to continue to seek relaxation of the requirement to have research funding covered by fees. And I commend you for working with Congress to get that relaxation that you have done. I think that's very important. Because my sense is that the industry leaders in general will not see the benefit -- it's a diffuse benefit -- of research to their activities. And as a result, it will be hard for them to justify to their shareholders spending money for research that may or may not benefit them directly.

And the final recommendation that I would make is that the research staff should have the flexibility to plan and carry out exploratory research on a fairly substantial level. I would say probably 20 percent of their budget is a rule of thumb. And as Ken Rogers said, this should largely be left to the expertise of the research staff themselves, talking in consultation with the directors of the other offices, of course.

Since we started our activities last summer, the nuclear landscape in this country has changed substantially. It's clear that there is real interest in new plants and probably new designs. And NRC will be, if it's not already, the chokepoint for certifying and building any new design reactors. So it's very important, I think, that there be some exploratory work that starts to flush out the issues and define the problems with these new designs.

I think I'll stop there. That concludes my remarks.

CHAIRMAN MESERVE: I'd like to thank you all for very helpful presentations. I'm sure we all have questions. I think it's Jeffrey Merrifield's turn to go first.

COMMISSIONER MERRIFIELD: Thank you. Thank you very much, Mr. Chairman. I'd like to add my thanks to yours to all of the very impressive work done, both by the Committee as well as ACRS.

First starting with the Committee, I do think Commissioner Rogers and the other members have provided us with a good 50,000-foot level view of some of the things we need to be doing.

DR. ROGERS: Going up was 30.

(Laughter.)

COMMISSIONER MERRIFIELD: Well, we try to fly high around here. But a high level view of what we need to be thinking about and where we need to be going.

In relation to Dana Powers and the members of ACRS, I do want to give a significant compliment for a significant amount of work that you did as well. You mentioned a little bit about getting down in the mud. The fact of the matter is that that is indeed where the Commission has to be when it comes to budget time. And for my part, the work that you did will be very useful in that respect, I think, as we go forward in our planning for the fiscal year coming up.

I want to explore a little bit. The effort that was undertaken, Commissioner Rogers, by your panel looked at a lot of what were seen as unfunded areas or unfunded needs and core competencies. I was reminded a little bit of a discussion that I frequently have with my wife. We call it our "what if" game. And the "what if" game involves our house and the things we would like to do to our house if we had additional monies -- new windows, new air conditioning systems and what not. At the end of the game, we always recognize that Congress has control over my salary, and in the end they haven't raised that very much recently.

As I look through the recommendations, I was noted by the comments made by Andrew Wheeler, who's a staff member for the Senate Committee on Environmental Works, the authorizing committee for our Agency. And I quote, "On the question of funding for research, it is unfortunate but levels for funding are not likely to increase in the future," unquote. So we're confronted with the hard fiscal realities here.

So I ask a little different question. The Chairman had three questions that he presented to you, and I think the Committee did its best to try to answer those. And I have to two that I'd like to focus on today and would like to get the answers of the members, including the folks from ACRS.

First one is, is research effectively managing its resources, both human resources and capital resources? We give them $40 million. Are they managing that effectively? Secondly, is research effectively overseeing the services provided by our outside contracts, being either the labs or others?

One final preface I want to make, I've said repeatedly, going to Tom Murley's point, that I am a strong supporter of research. I also said that I'm willing to go ask Congress for more money if we can identify areas in particular that we need to fund. But the fact of the matter is we need to operate within the budget limitations and be able to justify what we're doing. Some of that involves adding things; some of that is, Dana Powers has pointed out, involves sunsetting some things. I would like to focus on how we are doing relative to the money we have now and managing that and managing our contractors? And I'd like to have you comment, please.

DR. ROGERS: Well, that's the kind of detailed problem or question that we were wrestling with a bit, but we found that, one, we really didn't have enough information to be able to make a definitive judgment of that, nor did we have the time to do it, because it's really an auditing function in many ways. But I do think that what we tried to do, and certainly what I tried to do, was to look at processes. One can look at a process, whether it's there or not and whether it's being followed or not.

And I think my own view, and that's how I came to the conclusion that research was underfunded, was that it seemed to me that RES had established a very systematic method for prioritization of its research projects, and that that method involved a number of different considerations and certainly a very important consideration was the advancement of the objectives that the Commission itself had set for the entire Commission. And that it really worked very hard to see that its selection of research topics fit into this prioritization scheme. And it seemed to me that it was a reasonable scheme. The only problem is that it did seem to automatically exclude or relegate to a lower priority any kind of anticipatory research. It just automatically always came down at the bottom. And that seemed to be a problem.

But in terms of actually managing on a day-by-day basis the use of contracts or not, I don't think we had enough exposure to those processes to be able to make a judgment. We did not detect anything that we saw troublesome except for the general comments that you've heard from some of the panelists here today that the use of the very best resources should be primary even if they're not at national labs, while the original intent was to try to get most of the research through the national laboratories. But I would say that I don't think we had enough information to be able to answer your questions in the kind of detail that, really, they deserve.

COMMISSIONER MERRIFIELD: That's a fair point. Do you think -- you know, obviously, we put a lot of focus on the other program offices -- NMSS and NRR -- in terms of their trying to find efficiencies in the way that they do business to be more effective and useful with the money we have available. Is there any reason why the Commission should not be using the same focus on research?

DR. ROGERS: Well, I think the same general criteria, but perhaps how they're applied might have to be different for research. There is a different culture in the research organization from the culture in a line organization, and it should be different; it should be different. Research has to be able to take a longer-term view on some questions than would really be appropriate for a line organization that has to come up with a decision tomorrow. There's a licensee waiting for a decision. That's got to be dealt with.

Now, that isn't to say that there should not be active supervision of research progress, but if RES is going to look into questions from time to time that really have not been very well defined yet, and it is looking into them that's going to provide the definition, the criteria for judging progress there is going to be different from the criteria for judging progress and making regulatory decisions with respect to a line organization.

COMMISSIONER MERRIFIELD: That's true, but shouldn't there nonetheless still be a feedback mechanism for a periodic review of research results to make sure that there's a reason for continuing --

DR. ROGERS: Oh, absolutely. And I think our panel has called for that. I think one of my statements was that every two or three years there ought to be a thorough going review. And if you look at some of the individual contributions, particularly John Ahearne's contribution, he was very explicit in asking for a thorough review of all research projects right now.

My own feeling is that while that is appropriate, I wouldn't want -- one of the reasons we didn't adopt it as a general view of the entire is there has been a very hard review within research of its projects. Maybe more is needed. I wouldn't say that we could say that not more is needed, but on the other hand there has been a pretty hard look at every single research project -- prioritizing it, justifying it, seeing how it fits into the Commission's priorities game.

COMMISSIONER MERRIFIELD: Okay. That gets me to Dr. Powers. You did in fact do some of that vetting in terms of looking at areas that we might consider for sunsetting. Can you describe a little bit the process you used to identify these projects and comment on the vigor of that process?

DR. POWERS:: The individual research areas were broken up among the various members and their level of expertise to examine in comparison to the three questions that I showed you. Is the research properly done by -- necessary for NRC's independent examination of issues or an area that you can get the information from the licensees or the industry's work and simply review it? Has the research progressed far enough that you can make regulatory decisions? Does research need to be modified to better meet the needs?

Examining those three questions individual members make proposals on which areas they thought needed to be in hands for, as you called, sunset. And those were examined by the other members and either protested or accepted. And I will comment that we did find areas where the NRC research had gone to great lengths to leverage and expand its resource base by cooperation with other agencies, areas where it's very well organized.

And in that regard, I think the Research Effectiveness Review Board has the potential of providing a good incremental oversight, episodic oversight of research programs to answer the same three questions. Whether it's going on now or not is something that the ACRS should not look at the effectiveness of that Review Board, but it certainly could afford that function.

I think that there is a problem with the user need process segmenting up the research into fine of categories and not allowing research management to weld together issues into a more integrated approach that may not fit an individual user exactly but would affect a lot users.

So we go on to say that quantitative research management techniques is a hard job to do, and the ACRS did not try to identify metrics for examination individual programs with respect to productivity and resource usefulness. That is a management function that we definitely did not try to explore.

COMMISSIONER MERRIFIELD: One final question, then I'll stop. Mr. Ray, obviously, you're in

charge of an organization that has to manage a lot of resources and try to utilize them effectively. Our Office of NRR and NMSS have both gone through a process of having Arthur Anderson come in and reevaluate their processes for the work that they do. Both have established work management centers to appropriately utilize the resources available to those. Those are not efforts that we have undertaken yet in research, although there may be some consideration of doing so. What is your assessment, although it wasn't necessarily -- or it wasn't the focus of the panel? Is there some benefit, do you think, to doing that in the research area as well?

MR. RAY: Surely there is, Commissioner Merrifield. In any organization, my experience would say that that kind of an assessment can always be helpful to both the management of the organization and to its stakeholders, including this Commission here.

But one of the things that will quickly emerge from that, in my judgment, is the issue in which RES is, in such a large measure, responding to needed defined by others. And so, therefore, the kind of an assessment that you suggested would perhaps look at how well they respond to those needs. It might also, however, look at the more 50,000-foot questions of should they be spending as much time as they are responding to defined tasks given to them by others or should they be defining tasks in greater proportion on their own?

I think that, ultimately, would come back to the Commission here for some judgment. I don't think a management expert could tell you what the right answer is here. But in so far as process is concerned and managing an organization and using its resources well, any of us can benefit from that sort of thing, and I do believe research could as well.

COMMISSIONER MERRIFIELD: Thank you, Mr. Chairman. I just want to make one comment just so that people don't take it the wrong way. I do in fact support research, and I think when wee identify issues and we need to seek additional funding from Congress we should. I think the message we've been getting from Congress, however, are that we need to make sure that we are asking only for what we need and that we can defend what we in fact ask for. And I think one of the things, for my part, I've been trying to probe today is can we adequately demonstrate that we are managing the resources available to us now before we go seeking an additional $4 million to $12 million, as perhaps suggested by the expert panel?

CHAIRMAN MESERVE: Thank you. Dr. Powers, one of the areas that you emphasize both in your report and in your slides is the possibility of synergisms between power uprights, extended burn-up of fuels and license renewal, and each might have the effect of consuming safety margins, and there could be some interactions between them, and suggest research in both PRAs and I think in phenomenological models; at least in your report you discuss that. We're in the middle of process and dealing with license renewals and power uprights and extended fuel burn-up, and I think that we'd all benefit from your insights as to how big a program you would envision to deal with this and with what urgency.

DR. POWERS:: I think that you're speaking of a program that is a matrix program, because you have expertise established in each of the areas already. It would be patterned much after what you're doing in the PTS. I'm not sure that I see a monumental effort here. I think the information is largely available, and it's a matter of collecting it together, identifying plausible mechanisms of synergism, and seeing if there are ways to test those plausible mechanisms of synergism.

The urgency I think is not high, because though you're in the process of license renewal, those renewals don't take effect for several years. And I think the minimum is seven, and certainly it could be as long as 20 years before the license renewal. Similarly, high burn-up fuel, well, obviously, it takes a while for fuel to get to high burn-up, and you do have limits on the burn-up you can get to. So it could be well established at a modest level using the expertise you have, and it might go on for some period of time. I certainly don't think a three-year effort would be out of line. I think five years would be excessive.

CHAIRMAN MESERVE: Okay. Good. Thank you.

DR. WALLIS: I think our concern is more with the power uprights than the license renewal. As you continue to increase power, eventually you come up against some limits, and I think we have a little nervousness about what those limits might be.

CHAIRMAN MESERVE: Do you share Dr. Powers' view on the urgency of addressing that issue?

DR. WALLIS: Well, I think license renewal has turned out to be much less a struggle than we thought it might be. But I think someone should be looking at problems we get into when all these things come together with power uprights of an order of magnitude we haven't handled before.

CHAIRMAN MESERVE: Dr. Rogers and fellow panelists on that effort, there's a wide range of questions I'm sure all of us could ask, and we're going to have a problem focusing. One of the things that you emphasize is that you believe that there is an imbalance today between confirmatory and anticipatory research and that suggested that the ten percent or so that is there today is inadequate. And I think that Mr. Murley, in his comments, suggested maybe 20 percent would be right.

I'd be interested in whether the panel had reached a common view as to what the appropriate balance is and whether you have any insights for us on how you go about figuring out what you should do. It's very easy, I think, in the case of the confirmatory research where you have user needs that are coming forward that you can sort out what is pressing on you when you have, basically, because there's a demand for the information. It's a much harder problem to look over the horizon and to see the issues that are going to be coming that you have not -- that your users aren't demanding of you.

I think we, in the pressurized thermal shock area, we did have the foresight to be able to get the research underway in a timely fashion before the user need emerged. It turned out to be essential that we had that information. And I guess I'm asking whether there is any views you have as to how one establishes an appropriately accurate crystal ball that enables you to sort out what is coming that your users aren't demanding of you?

DR. ROGERS: Well, let me just try to answer that in a couple of different ways. I think that we did suggest that the anticipatory research really should be -- the topics for anticipatory research really should be developed by a broad-based panel of experts, not just in-house but widely -- a wide spectrum of expertise. They should be experts, technical experts, as much as possible in that, but that that is a different process than probably has been followed exactly today. That this probably needs a review in its own right of what is the process, the best process for prioritizing anticipatory research done by NRC. And there's certainly, I think, no fixed percentage that one can come up with apriori.

I believe that once you start that prioritization process and really thrash it out and see what seems to be the absolute top needs, then you try to get your price tag and see how close you can come to affording it. But I don't think that -- I think one can throw out a number like ten or 20 percent, but it's just I think that really is just an indication that some priority has to be -- some absolute priority has to be set for doing some anticipatory research. Nobody knows exactly what that percentage should be.

I think one of the problems is that with the present prioritization system, which is largely driven by user needs but not entirely so, it still turns out that when research has to impose on a selection of the topics the objectives of the overall Commission, then that tends -- it just always tends to drive these things down to the bottom. I mean that's just, operationally, that's the way it's happened.

But I would say this: That we really, I think, are arguing for the broadest kind of input on some of these decisions from the best technical experts in the world. And to try to go at it from that point of view, that I don't think that any of us are really equipped to give you a list or a percentage, and I don't know that a collection of experts could do it either until they sat down and started to really thrash it out. There may be some blood on the floor before the final result comes out.

But I do think that -- my emphasis in this entire process has been the technical quality that goes into all judgments that NRC is involved with. That's got to be, in my view, the highest priority to make sure that always you're calling on the very best technical knowledge with inside and outside of NRC. And that it is not limited by some arbitrary requirement of going in a particular direction. So I think it's hard to give a detailed answer to your question, but I would suggest a new process for that.

The other thing is that all of us who have had responsibility for bottom lines or

organizations have found that, particularly in certain areas, when you prioritize your list of things to do, there is always things at the bottom of that list that are always there. They never go away. They never, ever go away. The top changes, but the bottom starts to stay the same. And some of those things really have to be done. They just have to be done. But they never get up to the top. And how do you deal with that?

Well, various organizations have different ways of dealing with it, but one way that I always used was that we're just going to do a certain number of these every year, even though they're not -- they have to have some priority to get on the list at all, but they don't get high enough to actually make the cut, and then there they are year after year, and they're still there because they're important. And so there's a -- some kind of a judgment, it seems to me, has to be made at a high level that says there is going to be a certain amount of anticipatory research done. You're going to have to figure out how you set that level. It may not be fixed; it may go up and down from year to year, but it's got to come out of a process that uses the best available technical judgment in the world.

DR. MURLEY: Mr. Chairman, in addition to the fuels and advanced cladding and digital INC issues that have been mentioned, I think there's one area that's very clear that research could start doing some anticipatory work now. And that is what are the safety issues with these advanced designs that are being talked about? Apparently industry is serious in this, and I don't think the NRC staff really knows very much at all about how these, for example, the pebble bed reactor, what are the reactivity coefficients? What are the thermal hydraulic aspects of these reactors?

And I can just give an anecdote in my own experience. We began to hear from the AECL in Canada in the late '80 and early '90s that they may be wanting to certify the CANDU Reactor. I could not justify -- on such a speculation, I could not justify the staff resources in NRR, but I did ask the Director of Research at the time to start undertaking a small program to understand what a CANDU is and how it behaves, which he did, and that saved us a lot of time, actually, in getting ahead of understanding the issues, asking the right questions.

So I think that is an area that very clearly can be done by the research staff now.

CHAIRMAN MESERVE: Let me just say that that is an activity that is now underway, but it's come to us really as a result of a user need that they're now talking about against reactors, and we are obviously scrambling to respond to that in an effective way.

Let me raise another issue that -- and then as my -- lots of things we could discuss. One of the points I think you made is the need for improved communication. I think that part of the story here is the need for communication outside the NRC about what we do, why we do it, how we go about it. And I wonder if you have any concrete suggestions as far as how exactly we should go about doing that? What should we do differently from what we're doing today?

DR. ROGERS: Well, I'll try a little bit of that, but let me preface my remarks by saying the first thing that happened in our first panel meeting was that most of the panelists revealed a very rudimentary or elementary or non-knowledge of what research NRC does and why it does it. Now that changed during the course of our meetings, because as more information came in. But many of the panelists said, "You know, I really don't know what research NRC does or why they do it. I assume it's good. I know about one thing, but I don't know the whole program. I don't know where it's come from, where it goes to, how you pick projects, what are the priorities, what is the process that leads to the selection of a research topic, how do you find out whatever came out of it and how it was used?"

And so, you know, that very first recommendation that we made with respect to what the Commission ought to endorse, used and useful is a very significant statement. That's there for a very good reason. Research at NRC should be used and useful. Well, you've got to have a process for finding out whether it's used and finding out whether it's useful. And if is -- and then you have to tell your stakeholders about it.

Now, all research will not be useful, all research will not be used, but most of it should be. And I think that a very systematic way of conveying the process that NRC uses in a readable, understandable way to basically an interested layman, layperson, should be constructed, that's, let's say, suitable for understanding by at least a science writer for a newspaper. And I think that that's something that research itself cannot do, simply cannot do.

Researchers are very poor, as are most technical people, at really selling their product. And this has to -- it requires some real help from your public information, public relations arm who do a very good job. But to sit down and find, one, how to put it in a meaningful way and to determine what your target audience is -- you're not going to be educating the man or woman on the street. You have a target audience that ought to know about these things.

So I do think that some kind of an annual report that is more general but indicates how research has actually been used. How did we come to the decision to do it? And it's very interesting how some of these projects actually got started. I mean just -- Dr. Murley's talked about the CANDU thing. Bob Budnite's talked about the PTS -- how research on PTS originated, in some ways against the views that it wasn't needed at the time. But it started.

And then you follow how it evolved and how it was used. And there will be instances where it just didn't go anywhere; that's research. I mean let's be realistic about it. There will be things that -- and you try to avoid those. But there will be success stories, and I think that the users have to be involved with this this. They have to contribute to how the work has actually been used and what the impact of that is. I mean that's a separate statement. It's used, but then what is the actual impact after it was used?

So there's a full story from genesis to exodus that should be told here in a way not for every single project necessarily but in a way that's understandable, that gives a picture of a process in an organization that understands the value of what it's funding.

CHAIRMAN MESERVE: That's helpful. Commissioner Dicus?

COMMISSIONER DICUS: Thank you, Mr. Chairman. Just a couple of questions, really, looking at the time. One of the issues that the NRC is facing has been brought up to us by Congress, by the Senate, is staffing and how are we going to maintain staffing, what are we going to do with staffing, and so forth? One of the things that I didn't hear you get into very much, either the expert panel or the ACRS, is are we properly staffed in research to do the jobs that you're recommending that we do, because you've made several recommendations? Are we properly staffed? Do we need to relook at staffing? I'd like some feedback on that from both the ACRS as well as from the panel.

MR. CYR: Let ACRS go first on this one.

DR. POWERS:: I think that my general view is that the Commission is blessed with an extraordinary staff. But as you move to rely more and more on your research organizations to have the technical competence rather than having the competence in the contractors, you are having a problem. And I think we've seen it over the last year in spades, that as you ask technically competent people to serve more bureaucratic functions at the expense of technical work, you lose them. And I think that happened -- is happening in the Agency. When your managers bring in technically strong people, you lose them because they find lots of bureaucratic work that they have to do, and the find, quite frankly, that their most important product is view graphs to justify their programs.

So I think that whereas I would give your staff high marks, existing staff, I think you're acutely aware, like all organizations, are going through an aging of your staff. That's a national problem. In my own laboratory, we are actually slightly worse than the national average. We spend a lot of time worrying about that.

But you are bringing in some young and energetic people, and I would caution you, as we speak, to more and more justifications and publications and things like that. If you overburden these people doing that kind of work, you cannot retain those high-powered, technically competent individuals. You'll have the same problem with your contractors, be they in the national laboratories, universities or industrial firms, that if they are more and more bogged down into the justification, communicating with the

public and the like, they'll find your work is not attractive to do.

COMMISSIONER DICUS: Okay.

DR. ROGERS: Well, I think that we are seeing the effect of a decaying infrastructure for all nuclear technology in the United States. We know that the source of technical expertise sources are drying up. So that some way has to be found to replenish the expertise within NRC. My guess is that there's a number of different things -- there's no single way to do that, but there are a number of different ways that can all help.

It's always been my experience that the way to get good people is to have good people. If you don't have good people, you won't get good people. And the young, bright, energetic folks want to see that they have an opportunity to work with somebody they can learn from. And NRC has a number of very fine people of that type. I don't think they have probably been given enough opportunity -- and I'm going on soft ground now, because I haven't really probed it that much -- what I guess is that they haven't been given enough opportunity to act as, I'll say, mentors in a certain sense to bring along young people in a systematic way where you identify where you are going to need expertise, you have a really first rate person, maybe only one, but then you make sure that that person has an opportunity to be as a mentor, a teacher for younger people who can begin to absorb that knowledge and take over.

And the danger is the one that Dr. Powers talked about, that these people get loaded down, both the top-notch person and the younger person are loaded down. There just doesn't seem to be a time or opportunity for it. And I would say that it is -- in my view, it is possible to work with a nucleus of a few very outstanding people and start to grow that out on the basis of younger people.

You did have a core competencies study done. I referred to that in my part of that report. And I think that it was on the right track, but it stopped at the wrong point. It stopped at a point where it looked as if the only next step was to hire a lot of people, and that simply wasn't feasible, simply wasn't feasible. On the other hand, the general approach that was taken -- I read over those SECY papers, and I was really quite favorably impressed with the detailed look and attempt to come to grips with what are we talking about in the way of core competencies? They defined two types of core competencies and how to meet those. I think that that approach should be revisited and forced into a really minimal set that's not 20 people or 20 categories, and then see where you can go from that.

I have written on this subject. I have spoken to some of you, maybe all of you, on some of my ideas on how to do that, and they're not necessarily the only way to go. But I do think that, in my view, the most important responsibility that the Commission has is to make sure that its staff is the very best it can possibly be. That's where it all starts. All these other things can be dealt with in some way -- where your priorities are, what you -- but if you don't have the right good people, then you will waste time, you will waste money, and you will not get really good results.

So that when all is said and done that is the key. And NRC is a technical organization; it's a knowledge-based organization. And one must never forget that. It is a regulatory body, but it operates on knowledge, and if it doesn't have good knowledge, its results will be mediocre.

COMMISSIONER DICUS: Are we proceeding to do that? Do you see any concerns?

DR. ROGERS: Well, I don't think there's a program in place -- you mean to become mediocre or --

(Laughter.)

COMMISSIONER DICUS: No, to not become mediocre.

DR. ROGERS: Or not become mediocre. I think there's -- you see, I think there's a lot of talk about it, hand wringing -- "We're losing our good people. How do we get them," and so on and so forth. I think that this just needs a -- I think it needs a champion in the form of a single person to be given responsibility or a single organization to do that. And that's why one of the recommendations that we made was that RES be given the responsibility of looking at the capability of the entire organization from a technical, purely technical point of view. Now, you may not want to accept that, but at least it's a way to go.

But, you see, when everybody has a responsibility, nobody has a responsibility. When everybody is responsible for technical quality, nobody is responsible totally for it. It can be good or bad, and there can be cracks. My own personal view is that somebody needs to be named as a champion for that.

COMMISSIONER DICUS: Okay. Thank you. I have more questions, but I think in light of the time, I'm going to pass. Thank you, Mr. Chairman.

CHAIRMAN MESERVE: Appreciate that. Commissioner Diaz.

COMMISSIONER DIAZ: Thank you, Mr. Chairman. I want to add my appreciation to all the members of the panel at ACRS for their efforts. I think this is a very, very good effort, and we thank you for it.

Let me go to, first, to the 80,000-foot level.

PARTICIPANT: Pretty soon you're going to be in space.

COMMISSIONER DIAZ: Well, you've got to remember that I was in space before I came here.

You know, we've been talking of the Office of Nuclear Regulatory Research, which we call it RES because if not it spells out NRR. Start from there. And let me say a few of the phrases that I've been hearing: core technical competency, user needs, differentiation between different uses and research, independent technical opinions, cross fertilization, learning from each other, knowledge-based organization, being independent even inside the NRC, have good value adjustment, competition between anticipatory and confirmatory research. It all gets put in this, you know, RES.

And I really believe -- and I'm going to ask Dr. Powers and Dr. Rogers to make a quick comment on this -- there's so much in a title. When somebody in Congress or in industry looks at research, what they see is somebody like I used to be, running in a lab and doing things. And in reality, this research organization is quite complex, and it has multiple, multiple functions.

Amongst one of them, one of the most important ones, is the issue of nuclear safety assessment, not per se a research function, because it's a knowledge-based function. You have to look at what is being done, and you have to make a determination, do we need to do something else. It might be that the result of the safety assessment might be a research program, but it's not necessarily so from the very beginning. In other words, something arises in the licensees or the Commission, and all of a sudden somebody else comes and says, "Let's do a research program on it." No.

First thing that happens is there is an evaluation process. There is an assessment process. There is something that takes place that takes precedent which is knowledge-based and requires core competency. It requires that people know what they're doing. And that function, okay, could end up in research, but it could be terminated right there. But people don't seem to realize that these functions are interrelated with the first function. The very first function of a researcher, by the way, is to make an assessment, do I do research or not?

And so a quick comment: Should this Agency be better served is the Office of Research will be called the Office of Nuclear Safety Assessment and Research? Dr. Powers? Dr. Rogers?

DR. ROGERS: Dr. Powers can deal with it first. I can deal with it, but I'd rather hear what he has to say first.

(Laughter.)

DR. POWERS:: Be well served. In the matter of optics and how it seemed to the outside world, I have no competence to judge that. What I will tell you is that in our report we certainly said that the Office of Research, in addition to the user need effort, needs to have its own ability to go out and assess the operations taking place in the line organizations, and from that deduce research that it ought to undertake. In other words, this assessment function, yes, they need to do it. As you know very well, that is indeed the first step to doing any research.

And what is missing right now in this user need process is a complementary process where the Office of Research goes and looks at the Line organization and says, "In the longer-term, longer than the

line organization could," just because when you're up to your waste in alligators, it's hard to remember you're trying to drain the swamp. It's hard for any line organization to see what it needs, and long-term can provide that outside assessment, and from that identify longer-term research that he should take those.

COMMISSIONER DIAZ: If there are some.

DR. POWERS:: If there is. And I think it's particularly in the digital electronic area you and I have discussed this, where it may be easier for somebody from the outside like a research organization still familiar with the regulatory requirements to look and do this kind of assessment.

So in answer to the question, I can't judge on the optics and the name, but the functions, yes, it should be part of the research organization. I think that it speaks to the same sort of thing that Commissioner Rogers and his panel spoke to, that they should be able to identify their own anticipatory research and look ahead.

COMMISSIONER DIAZ: Let me -- before you answer, let me just add that the issue is to have proper separation but cross fertilization of functions, which is an issue that I think is vitally important. Separation because on budget when they're made, we need to know what people are doing. Cross fertilization because I agree with you that the competency of our staff will actually -- it's a positive feedback loop that will make things better. I'm sorry, go ahead now.

DR. ROGERS: Yes. Well, just this: That one of the reasons for our recommendation that the Commission define what research is and what it is not at NRC is really what you're saying, you're really getting at.

COMMISSIONER DIAZ: Yes, sir.

DR. ROGERS: And, you know, during the course of wrestling with questions about what research is at NRC and what it is over the years, now I've often said to myself, you know, it might be a good idea to just not call it research, because research carries with it so much baggage in people's minds of somebody in a white coat and a slide rule in the pocket staring at the stars. It's the wrong image of what that office is supposed to do at NRC. Its work has to relate to regulatory issues -- regulatory issues, the technical aspect of regulatory issues, which is not anything under the sun but regulatory issues.

Assessment, yes, should certainly be part of that, in my view, not only because it's the first step towards doing more in the way of something that looks a little bit like conventional research, but that ought to be what RES does, in my view. But the assessment is a very fundamental part of what they should do. And, of course, the folding of AEOD into that, while some of us had some worries about what that might lead to, it certainly seemed to me to be the right step, because that's where your work should begin with an assessment. And if that's someplace else -- see, I'm a little concerned about your separation of functions, because I think they are so closely related and should be so closely related in terms of an RES function that the assessment should be just part of their culture.

COMMISSIONER DIAZ: Oh, it is, but I was trying to make sure that they are given credit for that independent safety assessment, which sometimes is not. It seems like it disappears. And, you know, in budgetary space that counts, and so I was trying to make sure that we provide the proper credit.

DR. ROGERS: You see, the question that Commissioner Dicus asked about, communication, is part of this problem, that we're not communicating to the outside world and, quite frankly, not entirely successfully within the organization itself of what this is all about. Because it really comes down to some very hard fundamental thinking about functions and relationships.

COMMISSIONER DIAZ: Thank you, sir. Let me just make a quick comment. The Chairman brought the issue of synergism. I get concerned with the use of the English word having been very poor of the English language. The word "synergisms" create a connotation that one drives the other. I think that sometimes in the research program that might be true. But the word "interdependence" from the safety point would be a better word than synergism. I'm not trying to correct your English, because, you know, I don't know enough English to do that, but that's okay.

In slide 6 and 7 of the ACRS, there's an interesting issue. You point out lot of significant areas in slide number 6. And on slide number 7, you pick out some that are well organized and well conducted programs. I was trying to generalize what the difference between well organized and well conducted programs and the others are, although I know you've selected these things. And let me tell you what I see as what they are, and then maybe you can correct me.

Well organized and well conducted, to me, in this Agency is that there is a strong connectivity between the research program, the associated safety issues, and the regulatory fabric. There is a real connection in there in between all of these things, okay, whether the regulations are existing or they're to be proposed. And they are supported by the technical basis that is, of course, indispensable to do that.

So if we have this connectivity, which I agree that it's in these programs, shouldn't that always be the common denominator in between all of these research programs, strong connectivity between the program in itself, the associated safety issues that really identify what they are, and what is the regulations that actually represent or will represent this?

DR. POWERS:: And to that I would add regulatory efficiency and effectiveness. And in our own thinking on the subject of well organized, if they had taken proper advantage of the ability to cooperate with industry or international organizations as well. Conduct means the technical act of carrying out the research itself, which is somewhat independent of those organizational factors, that's right.

COMMISSIONER DIAZ: Thank you. I have also more questions, but I'm going to stop right here. I think the issue of independent research versus comparative research, some say that needs to be analyzed, and the reason is that information technology has actually changed the way that we can do these things, and it provides a basis for our oversight to ensure that things are being done right. It is no longer like somebody did something in the corner we didn't know how it was done. So the openness that this Agency requires is fundamental to be able to conduct comparative research. Thank you, Mr. Chairman.

CHAIRMAN MESERVE: Commissioner McGaffigan?

COMMISSIONER McGAFFIGAN: I'll join everyone else in thanking the two panels and then get right to questions. Maybe I'll start at 80,000 feet or whatever.

You know, I spent a lot of my career working on defense issues where this Agency's budget is a rounding error, and where if we worked at this level and the Congress at the $40 million, $50 million level, we were accused of micromanagement for daring to look at that fine a detail. So that's one perspective. Our budget is a rounding error at the moment in terms of NIH's annual budget increase; not their total budget, which is $23 billion but their increase, which is about $3 billion, we're a rounding error.

So I do resonate with something Dr. Powers said and fear, that if we have people down in the research office whose main product is to justify their programs, we are micromanaging, and we have to worry about that. I think that the ACRS does a good job. I think it's done a particularly good job this year, but I think it does a good job every year in its research report. And we used to send them to the Congress. Congress appropriately isn't asking for them any longer. But I think the process of going through that and having the interaction with the staff on that is about as intense a process at this level of detail as we should expect. I mean that's my personal view. And when we add additional folks, I'm glad you guys stayed at 30,000 feet or whatever number of feet we're claiming you are, because I don't think we have to replicate what ACRS does, and I think we should be proud of what ACRS does and what the staff does.

In terms of getting money for this program, I think that our budget this year has an increase for research, the budget's that pending before the Congress. And we recognize, Mr. Murley, that we need more, because we do have to do some of the things that you suggested with regard to advanced reactors. And we're just going to have to see how Congress reacts.

But the reason we had to make all those cuts, including when Ken Rogers was here, is that the immediate has to be done well or else you do not have any chance of getting increases. We had to do

license transfers well and license renewal well and the revised oversight process well in order to get some credibility with our congressional overseers from which we could build a base and which perhaps we can go back and start trying to make the research program more whole. And I support that, and I support getting as much of it off the fee base as possible.

There's a provision in Senator Domenici's bill that would give us some money off the fee base for at least the research related to advanced reactors. Otherwise, Mr. Ray, we're going to be -- if it's research on first-of-a-kind education, as it was for Westinghouse or Combustion Engineering or whatever, it's going to be in your annual fee if it isn't specifically related to one of the applications. And I think that that's a policy we've always had and we'll continue, but it's one where it isn't good public policy, in my view. I expressed that last year to the Congress when we were asked a question about funding research. I believe it belongs off the fee base, but I'm very realistic.

When you look at the Congress at the moment, the budget that they've put together, getting additional resources for anything that isn't education or defense or health research is going to be very, very, very difficult.

I was going to ask -- finally get to a question. That took about three minutes. Dr. Powers, we've talked in private; I'm trying to tease you in public. The quality of NRC's research, if you compare it with the research supported by other federal agencies, where would you place our research budget today?

DR. POWERS:: Research budget or research activities?

COMMISSIONER McGAFFIGAN: Research activities, the quality of the research activities carried out pursuant to the budget.

DR. POWERS:: I can only speak with my experience on the research. I would say that you tend to be relatively applied and relatively incomplete in the -- for instance, your experimental and analytic investigations, you don't tend to complete the story relative to other government research.

COMMISSIONER McGAFFIGAN: To complete the story sometimes costs about --

DR. POWERS:: That's right. Sometimes 90 percent of the funds comes to the last ten percent of the results, and so I think that's consistent with your strategy in many cases. In many cases, as Commissioner Merrifield, I think you yourself pointed out, that there's a point where you have done enough research to make regulatory decisions, which are always made under a certain amount of uncertainty.

But I was asked to compare it to other government funding agencies. I would say that would be the hallmark of it. Within that incompleteness, I think that the technical standards that you establish for the research are quite high. I think the quality assurances, the paperwork, and what not like that tend to be a little bit lower.

COMMISSIONER McGAFFIGAN: Okay. The issue of proprietary -- one of the things that keeps coming up, and Dr. Wallis is sitting by your side -- but in PRA space and thermohydraulic code space and the data that Mr. Lyman was talking about with regard to the quality -- whether there are any issues with the new cladding materials, we are constantly dealing in pretty much a proprietary basis, our staff dealing with an industry submission. And ACRS is about the only institution we have to help us ensure that things are going well. And it's a public confidence issue -- Mr. Lyman raised it; Mr. Lochbaum has previously raised it on PRA -- because it's invisible for the most part.

Do you have any thoughts as to anything more we could do to tackle this issue of proprietary research results or proprietary submissions that we have to go over in which we made fairly profound decisions?

DR. POWERS:: The biggest problem you face is not so much the alloys and what not, which have a way of becoming public even if they start proprietary. Your biggest area of difficulty is actually in the PRAs themselves and getting those -- when you're making decisions on probablistic risk analyses that are done by the licensee in a proprietary analysis, how do you make that -- I mean how do you give public disclosure to that?

And do I have any insights to help you on that? No. We passed the problem up to you.

COMMISSIONER McGAFFIGAN: Thank you.

DR. POWERS:: We said you have to find a way to do this. Remember our letter.

DR. WALLIS: This is Dr. Wallis. I suggest you challenge the industry. If the industry thinks this is a mature technology, then the characteristic of mature technologies is they tend to be open, and everybody knows it's mature, because it's there; you can see it. If you have to sort of conceal parts of it, maybe it's because you're not too certain. That may mean that research is needed, and it's not so mature as you thought. So maybe you could challenge industry. If it's really mature, then --

COMMISSIONER McGAFFIGAN: One corollary I get from this is it's really critical that we maintain a very high quality in-house staff, because if we are trying to go over -- we can't -- I guess we could rely on a contractor. I mean we can try to burn as much of the year that you all will give us as possible to oversee and provide a double check, but if we don't have the staff capable of seeing the errors in some of these applications we get, then we could get off into some pretty dicey situations.

DR. POWERS:: And I'll agree with you on that and simply, again, point out that in comparison to many federal agencies, your staff is second to none. In my experience, you have a staff commensurate in many respects to the staff of DARPA.

COMMISSIONER McGAFFIGAN: Of DARPA. I appreciate that. That's a good --

DR. POWERS:: That's a good comparison.

COMMISSIONER McGAFFIGAN: -- good comparison, right. I have a lot of experience with DARPA, and I think it's a compliment to our staff that you'd put them in the same boat.

I'm going to ask a really parochial question, then quit. In the section on radiation health effects, and I think it's an area where we don't have enough in-house capability. We tend to fund this, we send money out, but our best expert in this area is probably Carl Pepperella, and he's not in the Research Office, although he oversees it, and he does it in his spare time on his home computer on the weekends.

But you, in passing in that section, mentioned that ACRS is surprised that are not efforts focused on determining if NRC should upgrade its radiation protection standards from ICRP-30 to ICRP-60. In fact, we've been sort of doing it bit by bit in various rules. And I think there's a paper forthcoming later this month that's going to present the ICRP-60 issue to us a policy matter. And I just say that in passing. I think in that radiation health effects area, though, more broadly, that it is so central to what we do and it's so central to public dialogue on the safety of nuclear power, that having a larger capability in that area in-house would be very useful.

CHAIRMAN MESERVE: Good. I'd like to thank the entirety of the panel for their helpful contributions. We've gone a little over time. I think that just reflects the importance that we all attribute to the subject.

So why don't we -- in light of the time, why don't we take a three-minute break and then we'll have the second panel, which will consist of members of the staff. Thank you very much again.

(Whereupon, the foregoing matter went off
the record at 12:25 p.m. and went back on
the record at 12:30 p.m.)

CHAIRMAN MESERVE: Dr. Travers, you may proceed.

DR. TRAVERS: Thank you, Mr. Chairman, and good afternoon to you and the Commissioners. I couldn't help but think as I noticed the air conditioner begin to work that it's not very typical that the Commission turns down the heat when the staff comes to the table.

(Laughter.)

But we'll take that as a temporary condition. But we are glad to be here this morning to discuss the Agency's regulatory research program and specifically following on the presentation and discussion with this morning's first panel.

We'd like to provide you with some initial reaction to the three reports recently provided by the expert panel headed by Dr. Rogers, the ACRS and the DOE National Laboratories.

We asked these three groups to provide views and perspectives on the role and the future direction of our research program. In order to assist us, actually, and ensuring that we make vigilant focus on our safety mission for current projects and on-going programs, as well as providing assurance that the Agency is well positioned to meet future challenges. I believe Dr. Rogers and Dr. Murley both mentioned the importance of these future challenges and we certainly agree.

As you have already heard and read, the individual reports have provided an excellent and insightful compilation of use.

I want to add my thanks to the thanks of all of the Commissioners, really, for the considerable effort that went into the work of these panels. As Chairman Meserve indicated, I think the work has been significant and certainly impressive.

Of course, we plan to use these independent reviews in our on-going assessments of the research program as valuable input.

Now, I'd like to very quickly identify the staff members at the table and then turn it over to Ashok who is going to continue with the briefing.

Mike Mayfield, who is Director of the Division of Engineering Technology; Roy Zimmerman who is next to him is Deputy Director of the Office of Research. Roy has recently assumed that position; Dr. Carl Paperiello, of course, is my deputy for Research Materials State Tribal Programs; of course, Ashok Thadani is the Director of the Office of Nuclear Regulatory Research. Tom King is the Director of the Division of Risk Analysis and Applications and Farouk Eltawila is the Acting Director of the Division of Systems Analysis and Regulatory Effectiveness.

And with that, let me turn it over to Ashok.

MR. THADANI: Thank you, Bill. Good afternoon. I want to acknowledge the effort of my colleagues at the table and all these assessments that have been performed to date. And I also want to acknowledge many people who are not at the table from the Office of Research as well as from NRR, NMSS and Region 1, our members who have participated and some of the effort that went into these assessments.

I also want to particularly thank Margaret Faruline for her significant effort in going forward with these assessments.

May I have the first vu-graph, please?

[Slide change.]

MR. THADANI: Dr. Travers noted the reasons for seeking independent input regarding research programs. I also do appreciate the efforts of the ACRS, the expert panel and the DOE lab representatives for providing very valuable insights and recommendations to us.

The expert panel composed of distinguished members and the panel of the NRC voluntarily evaluated and commented on the role and direction of the nuclear safety research at the NRC.

The ACRS focused more attention on detailed technical evaluations, considering both research needs for future as well as our on-going activities.

The DOE labs' assessment of needed research was really in response to my request in recognition of their expertise in nuclear technology. We are studying these comments and recommendations carefully and I'm prepared to share our very preliminary views regarding these important assessments.

My briefing is divided in two major parts. The first part is to discuss what appears to us to be common themes amongst the expert panel as well as the ACRS recommendations. And then there's some additional specific recommendations coming from various groups that have looked at research program.

Next vu-graph.

[Slide change.]

MR. THADANI: Both as I noted, the ACRS and the expert panel has raised significant number of issues and they are common in terms of the focus. Regarding core competency research conducted an evaluation in 1998 and again more recently to look at our current status in terms of available capability and needed capability. We are working with human resources to bridge gap between our needs and availability. There are some gaps and they deserve attention.

In terms of future challenges, as was noted earlier, we are mapping strategy and developing what I would call prudent planning to put NRC in a position to deal with future challenges on advanced reactors. Recently SECY paper on pebble bed marginal reactor and two memoranda to the Commission reflect our plans based on current understanding of the industry plans.

As noted in one of the memoranda, we are forming a small core group in research and since the pace of the activity seems to be accelerating.

Regarding synergistic or interdependencies issue, in fact, that is exactly what it is. These are interactions coming about because of various changes that are made. We have proposed in our current proposal to the PRC a modest effort to start looking at some of these issues.

There are the recommendations about improving and expanding PRA use. As you know, we are continuing to focus attention on enhancing methods where we believe enhanced methods are needed. We are focusing also on risk-informing some of the most important regulations in concert with the priorities discussed with others.

Now some of the recommendations suggest that we go beyond our current planned activities in this area. Yet, another recommendation is to enhance our communications by both the ACRS and the expert panel.

We are focusing attention on this issue. We have been working on developing plans. As you have heard, we've been working on the Research Effectiveness Review Board. We've conducted meetings with our colleagues from NRR and NMSS to be sensitive to their pressures.

We have established external websites. We have increased the number of public workshops that we conduct and we're always interested in getting external views. In fact, the formation of the expert panel was driven by this need to make sure we hear from external stakeholders.

Water reactor safety meting which will be called nuclear safety research conference to ensure that the focus is beyond reactors is another forum that we're making a number of changes to get additional insights from external stakeholders to reach out to them.

I do recognize, to address many of these areas, will be influenced by the issues of available resources and so on.

Next chart, please.

[Slide change.]

MR. THADANI: I should note that we are in general agreement with many of the recommendations that have been made by these groups. In terms of the infrastructure, you heard me mention to you some of the concerns and we're working to try to correct the potential problems. They relate to two key areas. Key expertise. We are, as I indicated, we have developed fairly good list of what we call critical capability that's needed. We've identified what the gaps are. We are working to fill those gaps and to also focus attention on hiring at perhaps lower levels and people who could be mentored by our senior staff. Obviously, age is a real issue, particularly for the Office of Research.

The other issue has to do with facilities, the potential or actual shut down of some test facilities. We are attempting to leverage by going to international community and utilizing some of the information that they have in order to fill some of these gaps.

In terms of anticipatory research, a number of areas have been identified by the ACRS, the DOE labs and so on. Currently, we have applied our prioritization approach that Dr. Rogers briefly touched upon and consistent with the available resources, high priority efforts are what we follow. And that we tend to focus on short term support activities that do get extra attention from us. We particularly pay attention to high and medium priority user needs and that does lead to continuing challenge in terms of what long-term efforts we can initiate.

In terms of cooperative research, we are continuing to seek increased opportunities for cooperative research. We have increased our research cooperation with Electric Power Research Institute,

with the Department of Energy. We have expanded the agreement with Electric Power Research Institute, and in fact, we plan to sign yet another agreement with EPRI next week to conduct some cooperative work in the area of fire research.

As I have mentioned before in previous briefing, we have significantly increased the number of cooperative agreements we have at the international community as well.

In terms of the contractor base, we have increased the use of the hybrid, I guess, organizations and university and in fact, just by way of numbers, just recently we have increased commercial work by $2.3 million from the previous year. So we're moving in that direction as well.

Next slide.

[Slide change.]

MR. THADANI: The Chairman did raise three questions at that first expert panel meeting and perhaps we can provide some preliminary thoughts on that.

In terms of level of funding, you've heard that many of the projects are funded, I believe, at the right level. Other projects are either unfunded or underfunded. Underfunded usually means stretching out the effort.

And not funded are largely areas which do tend to require longer lead effort.

Are we doing the right research? Perhaps we can come back to this issue again, but other than some of the limitations that have been discussed regarding the anticipatory research function, and within the available resources, I believe the focus of research is appropriate. As I said, high and medium priority user needs are addressed and I would look upon the recent ACRS report as confirming that view. By and large, the work supports the focus of the office.

In terms of the right performers, we made a tremendous investment over the years to build up certain level of expertise in different places and the mix of national laboratories and private contractors and universities is, in fact, being used currently.

I think the performers are, by and large, right, but there is a continuing challenge regarding the test facilities and some changes in core competencies not only here, but perhaps at some national labs as well.

Next chart, please.

[Slide change.]

MR. THADANI: The scope of the assessment by the ACRS was not only future needs, but particular attention was paid to the on-going research programs. By and large, we're in agreement with the recommendations of the ACRS. Three areas. They have suggested additional research is appropriate in certain areas they identified earlier in the briefing.

Our constraints are the availability for resources and in some cases, the Commission direction has really guided our focus or lack of focus in some instances, if you will.

They have made recommendations for closure of certain activities. We agree with most of those recommendations and we don't agree with some. We plan to bring to orderly closure areas that we agree with, having to do with common cause value and so on. There are several areas where we agree with the ACRS.

Some of these we had planned to sunset, but we have accelerated that plan in view of the recommendations coming from the Advisory Committee.

We will also consider areas for additional research identified by the ACRS as part of our PBPM process and next year's proposals, because our proposals for this year are in with the program review committee.

And we certainly would be looking forward to the guidance and the direction from the Commission on some of these matters as well.

Next chart, please.

[Slide change.]

MR. THADANI: Now in view of the DOE's labs tremendous experience in nuclear technology and safety, I made an informal request at the October 1999 Water Reactor Safety Meeting for the DOE labs to provide their views regarding areas requiring nuclear safety research.

Each year I do meet with the labs during the Water Reactor Safety meeting. It provides a good forum for us to discuss issues. And in my view, they have made several very good suggestions for research focus.

Generally, their recommendations are more specific in terms of the research activities to be considered and prioritized. Many recommendations will likely be captured under our proposed plans regarding new reactor concepts. Other recommendations will be prioritized again as part of our next year's PBPM process.

Next chart, please.

[Slide change.]

MR. THADANI: Some summary key points would be, I think, all three reports offer valuable comments and recommendations. We are studying the reports in more detail. We will consider all pertinent and technical comments and recommendations. We will also consult with NRR and NMSS to ensure that their views and their insights are considered before we proceed further.

I do want to note that some of the existing programs do address a number of the recommendations that have been made. An issue of core expertise we're working on. We're working on issues related to risk-informed initiatives and activities. We have made plans as reflected in some of the papers, the Commission, on how we might want to deal with the advanced reactor concepts. We have a number of initiatives to conserve resources. Much of our focus is on cooperative agreements, as I've indicated to you before. We are focusing very closely on competing efforts, sunsetting efforts or deferring what we think we can reasonably defer our activities based on their needs.

We have instituted a number of processes to improve ourselves and these are reflected in our operating plan, research operating plan, as well as a memo that I issued to all research staff. The motivation there was to enhance our communication, both internal and external, to ensure accountability and timeliness of our products and to improve articulation of the value of research and how really it adds to certain decision making.

As I said, we will evaluate the recommendations from these assessments against NRC's performance goals. Ultimately, it's clear to me that it will be difficult to address many of the recommendations with the current constraints that we have as we're looking, very much looking forward to Commission guidance and direction on some of these issues.

Thank you.

DR. TRAVERS: That concludes our presentation, Mr. Chairman.

CHAIRMAN MESERVE: Thank you very much. It's very helpful and I'd like to compliment research in that some of these activities were ones that were undertaken at research's initiative and they've opened themselves for critical analysis by outsiders. I think that that's something that would be encouraged and welcome and appreciated by the Commission.

In light of the time and in light of the fact that this is a matter that you are going to be conducting continued activities and will have extended interactions with you on these issues, I'm sure, in the budget process and no doubt in other contexts, I have no questions at this time.

Commissioner Dicus?

COMMISSIONER DICUS: I'm going to follow suit and pass on questions at this time.

COMMISSIONER DIAZ: I guess the stage has been set.

(Laughter.)

I'll pass.

COMMISSIONER McGAFFIGAN: I think there's something in the air conditioning.

CHAIRMAN MESERVE: Ed, we can turn the air conditioning off.

COMMISSIONER McGAFFIGAN: Let me just ask one question. You heard compliments from the

previous panel, but there are a couple of things you heard that, as I said, my comments earlier, it bothers me. How true is it that for some of your staff, Mr. Thadani, that -- how much of their time is taken up in reviews with the likes of us and you and God knows who else, justifying their programs so that they can go back to the desk and can actually work on it?

MR. THADANI: It's more time than I like.

COMMISSIONER McGAFFIGAN: Anything that you all can do to allow people to actually do their jobs without micromanagment from everybody above them, I think that's part of good management. They have to be managed to some degree. But I think managing every $50,000 thing that they do gets to be pretty ridiculous.

DR. TRAVERS: I just want to add that it's not just information that Commissioners want. It's a host of information that's part of the federal system, hearings, a host of things that drive the equation and direction of some of this being problematic.

COMMISSIONER McGAFFIGAN: We may need to push back in terms of allowing people to do their job.

You said you agreed with most of ACRS's recommendation for closure, but some you did not and I didn't get a sense of on the "some" what they were and why you want to continue programs that they believe are ready to be closed.

I think that's something you can give us more in detail for later. But if you want to give me an example right now, to whet my appetite, I'd be interested.

MR. THADANI: Certainly, and in fact, let me as Tom King to give you --

COMMISSIONER McGAFFIGAN: That's like what Powers did with us. He passed the proprietary --

MR. THADANI: I have the issues, but I think as the key owner of the issue, I want him to address it.

MR. KING: There was one particular one that stood out in my area, had to do with radionuclide transport codes. AS I recall, the recommendation was decommissioning at those levels that are associated with that, represent low risk to the public, why are we putting so much resources into developing analytical tools in that area.

We disagree with that. We think it's an important area. It's important for compliance with the license termination rule and that's one we want to push back on.

COMMISSIONER McGAFFIGAN: That comes from the AC&W; part of this overall report? Does the ACRS report consult with AC&W; --

MR. KING: This was in the ACRS report. I don't recall it being in the AC&W; part.

MR. THADANI: It was not in the AC&W;.

COMMISSIONER McGAFFIGAN: Okay, that may be a good one.

COMMISSIONER DIAZ: Could we get the stuff to send to the Commission, which areas that you disagree? That certainly would be a good --

COMMISSIONER McGAFFIGAN: Okay, areas you disagree and a brief explanation as to why. It helps you because it will help you in the budget process. I assume Dr. Travers and his colleagues probably already asked you that question as you're putting the 2003 budget, but it probably would be useful to have.

In that particular case, I just happened to talk to Carl Paperiello this morning about the importance of radionuclide transport in certain decommissioning and other applications and it may well be that it's one where we should be increasing rather than decreasing resources.

That was pretty light and the air conditioning didn't go down very far or up very far. I'll turn it over to Commissioner Merrifield.

COMMISSIONER MERRIFIELD: Thank you, Mr. Chairman. I agree with Commissioner McGaffigan that we should not overly focus or micromanage what you folks are doing. They should be trying to be the most productive they can be. Similarly, however, we should have no greater or lesser scrutiny on your programs than we do of the other program offices in the Agency.

I will discuss with you privately -- I would be interested in your insights on how we may increase our productivity through appropriate use of consultants like Arthur Anderson and others, but my question is this. The expert reports indicates that you presented their panel with a list of unfunded research projects that totaled in the range of between $4 and $12 million per year. I'm not familiar with this particular list. I'm interested in knowing why you didn't include these needs in your budget that you proposed to the Commission.

I'd like to get a little better understanding of the basis for the list, the scrutiny that it got from Agency management and whether the research activities you included on there are consistent and linked to the Agency's strategic and performance goals?

MR. THADANI: Yes, I'd be happy to address. If you don't mind, I would like to make a comment and it has to do with Arthur Anderson. We did work with Arthur Anderson some time ago and we have looked at the issues of efficiencies and effectiveness. I'd be delighted to talk to you about those.

In terms of areas that are unfunded, by and large, the process that we work under, assumptions are laid out up front of our offices to come in with their proposed budget. Typically, the guidances, not to be unreasonable in terms of what you come back with, stay with them pretty much what the allocation has been.

We go through our priorities. We end up with usually a pretty long list of efforts. Our prioritization methods are driven by the Agency's performance goals and in fact, we're probably -- I'd say we're very quantitative in a way in assessing relative importance of our work.

And we always find ourselves in a situation where there are a number of areas which I judge, at the end not to go forward with in light of some of the boundaries and constraints. I don't want to go in with what would be viewed clearly as unrealistic expectations on my part.

I'm responsible for not going forward with some of the initiatives. Occasionally I'll go in with some areas that might go beyond the allocated budget, but the experience tells me it doesn't always work, so there's no sense in my going further than that.

COMMISSIONER MERRIFIELD: Thank you, Mr. Chairman.

CHAIRMAN MESERVE: I'd like to thank you for -- both panels -- for a very helpful discussion. This is an enormously important area to the Agency and this has been very illuminating for us. The reports will be very helpful as well. With that, we're adjourned.

(Whereupon, at 12:57 p.m., the meeting was concluded.)