

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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BRIEFING RES PROGRAMS, PERFORMANCE, AND PLANS

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NUCLEAR REGULATORY COMMISSION

1 White Flint North  
Rockville, Maryland

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TUESDAY

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March 19, 2002

The Commission met in open session, pursuant to notice, at 9:30 a.m.,  
the Honorable RICHARD MESERVE, Chairman of the Commission,  
presiding.

COMMISSIONERS PRESENT:

RICHARD MESERVE, Chairman

GRETA J. DICUS, Member

NILS J. DIAZ, Member

EDWARD McGAFFIGAN, JR., Member

JEFFREY S. MERRIFIELD, Member

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NUCLEAR REGULATORY COMMISSION

Title: Briefing on RES Programs, Performance, and Plans

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## PROCEEDINGS

(9:30 a.m.)

CHAIRMAN MESERVE: Good morning.

On behalf of the Commission I would like to welcome you to today's briefing by the Office of Nuclear Regulatory Research.

The Office of Nuclear Research plays a vital role in support of the NRC's regulatory mission.

It develops the technical bases that underlie the Commission's regulatory requirements and the analytical tools that the NRC staff uses to assess licensee compliance with those requirements.

The office provides technical assistance to NRR and NMSS technical success through its research program and also conducts anticipatory research to help position the NRC for future developments.

The Office of Research faces a number of technical challenges: risk informing the NRC's reactors and materials regulation, preparing for possible reviews of advanced reactor concepts, improving the tools that support a revised reactor oversight process, and of course, supportive agency activities, stemming from the attacks of September 11th, to name just a few.

I look forward to hearing this morning about both past accomplishments of the office and the future plans to help meet the challenges that we face.

Dr. Travers, why don't we proceed?

WILLIAM TRAVERS: Thank you, Chairman. Good morning.

As you've already indicated, the Office of Research has always been a significant component of our regulatory strategy. In fact, as you've indicated, it's underpinned and continues to underpin much of the technical judgment that we bring to our regulatory programs.

So it's a great pleasure to be here to describe the status of the Office of Nuclear Regulatory Research's programs.

We have the Office of Research team here.

Carl and I are happy to be here as well.

And with that brief opening, let me turn it to Ashok who is going to make some introductions and begin this briefing.

MR. THADANI: Thank you. Good morning. Before we brief the Commission in terms of our programs and related policy and technical issues, I do want to acknowledge the crucial effort of my colleagues at the table and many who are not at the table with us today.

First, we have with me at the table are Roy Zimmerman, to my left, Deputy Director of the Office of Nuclear Regulatory Research, to his left is Scott Newberry, Director of Division of Risk Analysis and Applications, to Carl's right is Farouk Eltawilla, Director of Division of Systems Analysis and Regulatory Effectiveness, and to Farouk's right is Michael Mayfield, director of the Division of Engineering Technology.

May I have slide number two, please?

During the past several years, the nuclear industry has been going through significant changes, certainly to include deregulation, operating

license extension, power up rates and the move to new designs and use of new technologies, both for new designs as well as for the current fleet of plants.

Our job of research as the Chairman noted, is to develop data information and technical bases to prepare the agency for current challenges, as well as challenges ahead.

I particularly appreciate the support we have received from the Commission to help us position the Office to carry out its mission.

Although we've made significant contributions in 2001 to NRC's regulatory decisions and actions, today's briefing will largely focus on what we believe are the major current issues in front of us and what we think the Commission will be engaged.

The briefing is divided in certain parts, starting with the current state of research. And this will be followed by the Division Director's presentation on key research topic areas, particularly those with potential for policy implications.

And Roy Zimmerman will conclude with an overview at the end of where we are. Next slide, please.

In 2001, Research received valuable input from three independent assessments of our research programs.

I particularly appreciate the efforts of the Advisory Committee on Reactor Safeguards, as well as Nuclear Waste, the expert panel and the DOE's laboratory input to us in terms of their views on areas that research should be focusing attention on.

As you know, the expert panel, which is composed of distinguished members, independent of the NRC, voluntarily evaluated and commented on the role and direction of safety research at the NRC.

Of course, the focus of the advisory committees was more on technical issues, considering research needs as well as evaluation of our on-going programs.

The DOE laboratory's assessment, in terms of their views, I thought myself, in view of their particular strength and expertise in nuclear technologies.

We have, as you know, we have carefully evaluated comments and recommendations that we've received.

And some of the recommendations are, in fact, part of our plans, and others are being considered as we move forward in the next budget cycle.

In terms of enhancing our in-house core capabilities and preparing to meet future challenges, you must know that we made some progress to enhance our in-house capability in some areas, such as material sciences.

But it's clear that continuing attention is necessary still to fill some gaps, particularly, in the area of new technologies and to be able to deal with some potential emerging issues.

I must note though that we are working and continuing to make sure that the staff -- that there is in fact an environment within the office that

encourages constantly inquiring-mind attitude toward safety and making sure that we understand what we know and what it is that we do not know, where the gaps are, in terms of our knowledge.

As yet another recommendation, was to increase cooperative research, and we have continued to do so.

Some of the examples include recent agreements that I signed with the Electric Power Research Institute in the areas of fires.

We also have the Nuclear Energy Agency's option project which is an international project to consider various option mechanisms in terms of environmental transport issues.

There was another recommendation yet to improve and expand the role of PRA. In this area, we have moved forward. We have updated regulatory guide 1.174. We are continuing to look for opportunities to enhance it.

This is a guide that's very useful in terms of applications and decision making with risk related information.

You'll hear, of course, about the involvement in various standards, in terms of ensuring quality of PRAs, as well as specific activities in risk informing our regulations.

I do want to add that we are continuing to work in areas where we believe that the methods need to be enhanced as we move into increased use of these techniques.

The Advisory Committee had recommended some areas be sunset also. And we have either sunset or are in the process of sunsetting those specific areas that were identified.

The most common theme among all of these independent assessments is the need for research to enhance communications with all stakeholders.

In fiscal year 2003, we allocated FTE to enhance communication and to develop annual research activity report for stakeholders, all stakeholders and an annual report to the commission, particularly focused on, what did we accomplish through our anticipatory research efforts.

We're continuing to increase our coordination and cooperation with both the Office of Nuclear Reactor Regulation, as well as Office of Nuclear Materials Safety and Safeguards.

I've sent out calls for anticipatory research to both internal and external stakeholders. I've requested that input be provided by June 1st and it will be considered as we move forward in terms of our planning.

We will consider those areas which are particularly relevant to the needs of the agency as we go forward for the next year's budget process.

I might note that the ACRS letter to the Chairman issued just a month ago, February 14th, on research programs, noted that the Office of Research has generally been responsive in carefully considering and implementing the recommendations made by the committee.

As you know, we are also developing an advanced reactor research plan, which will be assessed by the ACRS in the next year's cycle.

We expect to meet with the Advisory Committee in April.

And I expect a number of meetings with the committee as we go forward. And Dr. Eltawila will discuss this matter further.

May I go to view graph number four, please? Areas where we want to make sure that the management is particularly focused on, we have assessed, in terms of the infrastructure issue, we have assessed our staff capabilities and identified gaps as well as assessed our bench strength in some areas.

Being mindful of diversity goals, we are aggressively recruiting, rehiring, and working within our staff to fill these gaps as well as to make sure we have appropriate bench strength. We are continuing to work with HR and I must note that we received very extensive support from the Office of Human Resources as we continue to look for opportunities to get some key people.

We are also focused on facilities maintenance, both domestic as well as international. We are working with domestic organizations, a number of organizations in this country as well as under bilateral and multilateral arrangements to pull resources to maintain important facilities.

Another issue that has been receiving a great deal of focus from management has been the issue of timeliness, quality, and usefulness of our products. I review our operating plan every quarter activity by activity. NRR and Research division directors meet monthly to assess issues.

We have also established an inter-office technical advisory group for some selected areas to facilitate resolutions of issues as they might develop. In addition, for each major activity result, I have directed research staff documents up front of how our research is also useful and could be used in making regulatory decisions.

We have also identified critical high-level priority areas and a number of key areas will be discussed later on.

Really, in order to make more effective use of our time, we have identified 10 such issues.

Some of the examples are certainly a follow up to September 11th events: Risk informing regulations, as the Chairman noted, new reactor licensing, and so on.

And you will hear about a number of these issues later.

Research management, of course, has to be focused on sound bases for budget development and to deal with emerging issues.

The budget is developed and executed using an established planning, budgeting and performance management process for setting strategic directions and budgeting resources.

Research ranks and prioritizes all research projects and activities in terms of their contribution to meeting the agency's four performance goals. And adjustments are made to meet emerging needs.

May I have the next chart, please? Number five.

As I said, many of these topics will be discussed by the division directors.

But I just want to note that there is considerable focus to ensure that we're achieving resolution of generic safety issues in a quality and timely fashion.

For example, we made significant progress in our technical assessments toward resolution of generic safety issue, 189, for example, which relates to the need for diverse power or lack of need, for hydrogen igniters and ice condensers, and mark 3 containments.

As another example, we have completed our technical assessment of generic safety issue 191, the potential for loss of ECCS, due to debris accumulation on PWR contaminant screens.

In summary, in 2001, we closed five generic safety issues.

So far, in fiscal Year 02, we have completed two generic safety issues. And we're currently working on eight additional generic safety issues.

Let me now turn to Scott Newberry who will discuss our initiatives in the use of risk information.

MR. SCOTT NEWBERRY: Good morning. I want to thank you, Ashok. As Ashok indicated, I'm going to provide an overview of the key risk informed initiatives and activities where we use risk analysis to support safety assessment of operating plants, the risk informed initiatives include studies that support potential changes to requirements and the development of risk assessment methods to support various regulatory programs.

Our operational event efforts include risk analyses that monitor reactor safety performance, and also the development of methods for potential changes to programs like the reactor oversight process and our industry trending efforts in support of NRR.

If we turn to slide six please ... Option Three of risk performing part 50 will provide technical support for changes to regulatory requirements.

As you know, our first work focuses on combustible gas control requirements and ECCS requirements.

A paper on the status of Option Three, primarily focusing on the ECCS work is on its way to you as requested following the reactor arena brief.

The main components of the work on the ECCS are listed on the slide. But just in summary, our work is focused on replacing the prescriptive ECCS acceptance criteria and 5046 with more performance based requirements, a revision of requirements for ECCS evaluation models that would optionally allow the models to be based on more realistic analyses.

And then a revision of GDC 35, emergency core cooling requirements, that would provide alternative general reliability requirements to demonstrate that the ECCS is functioning as opposed to the current requirements that are quite prescriptive and assume loss of off-site power and single additional failures.

The paper coming to you soon will describe our progress and schedules for each part of this work, as well as industry petitions on particular aspects of the Option Three work, such as use of more up-to-date standards and rulemaking to redefine the design, basis loss of coolant accident.

I think it's certain that significant industry interests continues.  
Feedback from the industry stresses their desire for progress. The work remains a high priority, as Ashok mentioned.

Although there has been some impact that due to 9-11 work, this will be discussed in the paper coming to you.

Personally, I continue to be hopeful that we can better align these requirements with our risk insights.

We're working on plant specific approaches as well as generic approaches.

We are meeting frequently with stakeholders to make sure that we understand their views on how these efforts should be focused.

Near term milestones approach in April and July where we will be forwarding to NRR the results of plant specific work and generic approaches, as I mentioned as well as the results of our look at the ECCS acceptance criteria and the ways that new DKE information could be used.

Let's go to slide seven, please.

Another important activity is our work with ASME to develop, review and endorse through a regulatory guide a standard for PRA quality that will support our risk informed activities and decision making.

The ASME standard is about to be published.

The latest information that I have is that it will be early in April.

The Commission will be receiving a paper this month with our plans for endorsement of the ASME standard.

The industry's PRA peer review program and guidance will be explicitly included in our plan.

The peer review program is referenced directly in the ASME standard.

A review of the final ASME standard to see what exceptions might be necessary is now underway and the proposed reg guide will be issued for comment this summer.

I expect continuing stakeholder and interaction on that reg guide and our endorsement of the standard. We've been meeting frequently with stakeholders.

And another meeting on the standard is scheduled for April 4th as a matter of fact. A recent meeting last week indicated that the ASME will continue work even after issuing the final standard.

They've identified sub-committee activity that will support and communicate on further implementation issues after issuance of the standard.

Let's go to slide 8, please? This slide lists several other important risk-informed initiatives.

We have sent you a series of papers on pressurized thermal shock in our work to use improved methods in analyses to see if there's unnecessary regulatory conservatism in the PTS rule.

Quantitative results to date from the first plant analyses are encouraging.

We still have critical review work left.

But we have had interaction with the ACRS and are continuing on three more plant evaluations this year.

We plan to provide a paper to the Commission in a few months on this work. But the next paper will focus on the underlying safety rationale that would be used in possible rule changes going back to the rationale for the first PTS rule.

We've just started another activity in a response to a request from NMSS to continue development of risk-informed safety goals, guidance, and tools in the nuclear materials area.

I won't go into details here but we will be coordinating plans and schedules with NMSS in the near future.

Three of the most significant methods for development activities are listed in the last bullet of the slide.

SPAR program, which develops plant specific PRA models will result in all models, that is level one model, being completed this year. This remains high priority activity.

QA of these models continues in accordance with our budget and plans into Fiscal Years 03 and 04 where they will be complete. Our programs on fire and human reliability methods are also important. And I wanted to mention them briefly.

The fire and human reliability areas are two of the most complex and difficult areas in risk assessment. They come into play frequently in our decision making and also are of importance in my division.

The fire requantification effort which Ashok mentioned is a major activity this year with EPRI as part of our memorandum of understanding work where we'll take research that's been done to date and move into actual quantification of methods that can be used in our regulatory programs.

Similarly, the human reliability area, where we have developed methods will move into application phases in our fire, PTS and steam generator tube rupture analyses programs.

Let's go to slide 9, please?

My last slide addresses our programs that help the NRC monitor reactor safety performance and develop methods to improve our efficiencies and effectiveness in doing this.

The Commission just received our accidents precursor paper. This analysis is an independent risk assessment of operational events and conditions that provides input into our reactor safety schools, providing an index measure of our margin to safety.

Based on past research completed last fall to develop risk-based methods and indicators that monitor reactor safety performance, at the request of NRR, we're taking these methods and applying them to produce trending methods and information to assist NRR in assessing reactor safety performance trends consistent with our agency performance goals.



We're also working with NRR to look at potential enhancements to the reactor oversight process performance indicators and are supporting an important pilot program with the industry throughout this year.

All of these efforts require plant specific data, I wanted to mention that here, where we continue to develop better and more efficient ways to obtain plant specific information that's used in all of these programs.

Lastly, I wanted to point out that all of these activities are discussed in our risk informed regulation implementation plan which we forward to you periodically and received feedback from you an direction on that plan.

We use the RIRIP, as we call it, to plan identify cross cutting issues, and also communicate with our stakeholders on where we are and where we're intending to go with these projects.

In particular, with respect to the risk informed work, we owe you our thoughts of our convergence of our framework and our processes as a result of the SRM after our arena brief and we're working on that now.

That concludes my presentation and I'll turn it over to Farouk to discuss it.

DR. ELTAWILA: Good morning. I'm going to give you an overview about our activity in support of the advanced licensing and another small presentation on our support for NMSS in the area of waste. If we go back please to slide number 10. In the area of advanced reactors, we have supported NRR in the pre-application of the AP1000 and we have completed our review.

We started the pre-application review of the PPMR last year. And we are about to start GTMHR review in April of this year.

In the IRIS design, we have very limited interaction with Westinghouse. So I'm not going to cover that in more detail.

I would like to just go over each one of these pre-application reviews and give you a status report. As I indicated for the AP1000, we completed our support for NRR for that review.

And it was mainly in the area of accessing the applicability of the AP600 to test the data to the AP1000.

As you'll recall the agency spent a lot of resources, and the vendors spent a lot of resources on testing for the AP600. Our conclusion is that the AP600 data is indeed applicable to the AP1000.

We've identified two phenomenon where there is the range of applicability and the codes need additional information.

And we have our separate effective programs at Oregon State University and DOE has an integral test program at the same university.

We believe the these test programs are going to provide the data needed for the AP1000, thus for the pre-application review.

For the PPMR, we sent the Commission a paper in April of last year identifying our research and review plan. Our hope is to identify the key safety issue in that design and from there, try to reach a path toward resolution.

Following the Commission paper, we interacted very actively with EXLON and we visited some of the countries that have advanced gas cooled reactor technology.

And all of this information helped the staff to identify fifteen technical issues that we sent to EXLON in September of last year.

And we requested that we get a white paper to address this technical issue so that we can identify the resources needed whether it's information and codes and so on, to be able to reach resolution in this issue as early as possible.

At this point, I would like to mention that all the issues that are identified are in Dana Powers' report to the ACRS and Tom Murley's letter to Tom King; all these issues are among the issues that we identified to EXLON. And we are pursuing this issue. And I will discuss briefly our research program, identify the same issues.

So neither Dr. Powers or Murley identified any issue that the staff is not aware of and working on it.

In November of last year, EXLON indicated to us that these issues are a comprehensive issue and it's going to take them a longer time than originally planned to provide us with a response to these issues. So now the schedule is to provide this information over a two-year period. We have received some of the white papers.

The staff is reviewing the white papers and generating a request for additional information.

The workshop that we had here in October of last year, as well as our interaction with the international community that has guest core technology, helped us to review this paper.

And we feel that we are moving in the right direction.

There are three major papers that they are falling behind schedule right now. They are very important. And they are interrelated.

The first one is related to the fuel performance. We just got it yesterday.

The second one is related to containment versus confinement. And the third one is related to the source term issue.

We feel that these three issues are inter-related to determine whether a confinement is acceptable or not. This is all hinged on the quality of the fuel.

So we believe that all of these issues should be built at the same time.

The schedule right now is to provide us with the source term paper and containment versus confinement paper by the end of this calendar year.

So that's why this review is taking longer than we anticipated at the beginning.

Now, I would like to turn over to our review of the GTMHR.

And we received a letter from General Atomic on February 18th in which they requested us to start review.

We are preparing a commission paper to lay out our plan for the review, some of the technical issues which are going to be similar to the

PPMR issue. And we'll provide you with the paper in April of this year. And we'll proceed to have meetings and interaction with them after that.

My second volunteer about my research plan, if you'll recall, we indicated that we are going to develop a research plan on advanced reactor.

And the focus, this plan is now complete. We sent it to NRR and NMSS for review.

As Ashok indicated, we are going to meet with the ACRS full committee on April 11th.

And after we get enough information from our internal stakeholder, we plan to send it to our internal stakeholder because some of the information in the plan may already exist or might be provided by the applicant themselves.

So the plan as it stands right now is very comprehensive, has a lot of information; but does not necessarily mean that NRC will be going after getting all of this information.

Some of them will be coming from the international community through a cooperative agreement or the vendor themselves.

And there has been research in the United States that was done over the past year. We've tried to recover this information and look at it.

Next graph, please?

One major element of the research plan is the technology infrastructure.

And as I indicated, this program is very comprehensive.

So we are looking at all aspects of our regulation, reactor and waste and materials.

So we cover all three arenas in our research program.

One of the issues that we are pursuing right now is to try and define a regulatory infrastructure that is based on the principle of risk informed and performance based regulation, try to identify at a very high level, what are the attributes of such a framework.

And then we'll go a step further and develop the regulatory requirement for each of the specific designs.

So we envision the framework to be technology neutral but we would assess it still in a reg guide to the framework.

The other important issue for that research program is the PRA. We know that PRA is going to play a major role in advanced reactor.

PPMR has some system that we are not familiar with like our familiarity right now with light water reactor. For example, the on-line fuel handling and the storage system, it is part of the operation plan to continue to operate.

And they rely on it to assess the integrity of the fuel.

So it is a very important system.

We need to do some research in this area to develop the model to see how that system would interact with the rest of the plan during normal operations so that we can assess the acceptability or the reliability of that system.

As I mentioned earlier, the source term is really strongly coupled to the performance and the fuel in the PPMR.

So we are paying special attention to the fuel issue.

For example, the fuel fabrication, the quality of the fuel, and the performance of the fuel during normal operation and excellent conditions will determine the magnitude of the source term which, in turn, will determine whether we need a containment or a confinement.

So we are paying special attention to this issue.

We're discussing with DOE cooperation in the test program.

And on March 28th of this year, we are planning to meet with EXLON and DOE to look at their test program for the fuel.

And hopefully, after that, we'll try to identify an area where we can cooperate on generating the data together.

But when it comes to interpreting the data, we'll go a separate way.

But as far as generating the data, we can cooperate in this area.

Another area, that's very important in our research program is related to the high temperature material issue.

And we want to look at the effect of the helium impurities.

For example, we want to look at the graphite particle and the high temperature and high irradiation and the effect of that on the different materials that are going to be used in the PPMR and GTMHR chart.

That would be a genetic program that we would like to again we get the information when it's available.

If we don't have the information we will either go out and ask the applicant to provide this information or develop our own program to get this information.

The waste in PPMR is completely different from the waste in current generation plans. So we plan to start the process here. And we want to get an early start on what the data is and the information that we needed to address the waste issue.

So we have elements in the program to look at this area.

There are activities in Europe that they are looking at this.

And we'll try to join these activities to be able to get information from them.

We believe that we would like to come to the Commission and seek your advice on a couple of very important issues.

One of them I mentioned already which is the role of fuel fabrication and the source term and containment.

We'll try to lump them into one policy issue to come to the commission and ask for your guidance on that the other issue is related to the framework itself and what we would like to ask you for guidance from you on the risk acceptance criteria for the modulator reactor

We have a site that might have up to ten modules, and how to establish the risk acceptance criteria for single units versus the site. That would be a policy issue that will require guidance on that.

That completes my presentation on the advance reactor.

I would like to turn now to our activities in the waste area.

And if I can go to page 12, please

As you're aware we're working with NMSS in support for clearance.

And we've developed the technical basis to support any rulemaking activity in that regard.

So we have conducted a survey, an evaluating method that conducts a survey for suitability for clearance.

We identified the material that can be available for clearance. And we also updated our dose estimate based on the new RCRP methodology. This will allow us to be able to compare our the dose to dose to the European community and IAEA.

All of this information is documented in new reg 16-40. This new reg has undergone an external review by the public. And as you might know, in the NMSS review Data Report, we believe the information in that report is going to be valuable in submitting the risk to the public from release of the material.

As you're aware, the ANS is going to issue its clearance report on Thursday. We have an inter-office task force from NMSS and Research that will review the report in detail, going to make recommendations to the senior management.

And the NMSS is planning to provide the recommendation in a Commission paper that is due to you in about three months or something like that.

Finally, I would like to mention that we, in cooperation with NMSS, developed a research program on the regular nuclear transport to the environment.

Again, this is identified as the other research area that's needed to be done to be able to reduce some of the conservatism in the models and the assumption that we're making.

And we are going to implement that the research program, and we believe that once it's implemented and we get this information we will be able to accurately calculate risk to the public from the Commission facility and risk sites.

So that completes my presentation. I give it now to Mike.

MR. MAYFIELD: Thank you, Farouk. Good morning. I'm going to discuss two program areas where engineering efforts support, NMSS and a third area where we're supporting NRR.

I would like to have slide 13, please. The first area is the dry storage of spent nuclear fuel. As I'm sure you know, there's considerable interest in renewing of the licenses for the ISFSI sites, and NMSS has asked Research to help in developing the technical basis to support these renewal reviews.

Over the last three years we have working cooperatively with EPRI and DOE in evaluating casks and fuels that have been stored at the Idaho National Engineering and Environmental Laboratory.

The program made use of casks that were part of an earlier DOE and EPRI demonstration program.

The fuel came from several reactors.

And as typical of burn up levels that were in spent fuels about twenty years ago.

The casks and fuel had been on a pad at Idaho for about 15 years before we undertook the program to examine them.

The cask we examined is representative of the casks currently at the Surrey site which is the first ISFSI site seeking license renewal.

As a bonus in this program, it turned out some of the fuel in the cask came from the Surrey site.

We've done visual examinations of the interior and exterior of the cask.

And we've examined visually all of the fuel in that cask.

We are also doing some limited destructive examination on a small number of pins that were removed from the casks.

So far the program results show no significant degradation of the cask or the fuel after that 15-year exposure.

We're currently working with EPRI to develop a plan for a follow on program that would include fuel with burn up levels that are typical of the fuel coming out of the pools today. We hope to be able to get this program underway in the next year or so.

We've also been asked by NMSS to develop a probabilistic risk assessment methodology for dry cask systems to assess the potential risk of dry storage and to identify dominant contributors to this risk.

We are performing this program largely with in-house resources. The pilot program is developing the PRA for a specific cask and sites.

We're considering initiating events, human reliability, mechanical and thermal loads the cask failure modes, and the consequences for cask failure.

The pilot program effort is nearing completion. And we expect to provide the initial study result to NMSS this summer.

May I have the next slide, please?

The next area I want to discuss relates to the transport of spent fuel. This is an area that has and I suspect will continue to receive considerable public attention in the future.

Our package performance study builds on three earlier studies and will examine the response of transportation casks to severe impact and fires.

The study was initiated to validate the analytical methods used in the design and evaluation of these casks and to support public confidence initiatives from NMSS.

We anticipate performing physical testing of the full scale cask to address high speed impact and severe fires. We are also planning impact tests of spent fuel and to look at surrogate materials that can be used rather than to actually impact spent fuel.

Our public outreach effort is a key element of this program. We're establishing peer review panels for both the fire and impact tests.

And we're currently reviewing the draft test protocols which will be published for public comment. We expect to be able to conduct these tests in fiscal year 2004 and have the program completed in 2005.

However, it's important to note that Research cannot fund this work alone. These are very expensive tests to undertake and we are seeking support from both national and international partners to undertake this program.

Without some significant cost sharing, we anticipate we'll be forced to terminate the effort. At this stage, we don't have anyone signed up. But we do note that there continues to be high interest, both nationally and internationally in this program.

And we're hopeful that we'll be able to get the necessary participation.

May I have the next slide, please?

The final area I want to touch on deals with corrosion and stress corrosion cracking.

These have been issues for nuclear plants for years going back to the stress corrosion cracking and boiling water reactor piping.

We have recently dealt with cracking in BWR internal steam generator tubes, pipe cracking at VC Summer, vessel head penetration cracking at several plants and this recent event of pressure vessel head corrosion at Davis Besse.

Research has a significant program in this general area.

And we're focusing staff and contractor resources on specific issues related to the vessel head penetration cracking and the pipe cracking at VC Summer and similarities between those two cracking incidents.

We're also currently supporting the Davis Besse evaluation and we'll include follow on efforts from that evaluation in our program if they are warranted.

Our emphasis on this program is on understanding the underlying mechanisms of the cracking so we can begin to anticipate degradation sites.

We're also looking at inspection methods and integrity analysis methods that would be used to define the required inspection capabilities.

Finally, we're looking at mitigation and repair technologies that may be proposed to address this type of degradation.

Our program will, of course, continue to support NRR's more immediate needs.

But we're working hard to get a better handle on predicting and managing the degradation before we find it in service.

That concludes the remarks I wanted to make. Roy?

MR. ZIMMERMAN: Thank you, Mike. I would like to take a few minutes to summarize our approach as we move forward and address several of the key challenges that face us.

We'll continue to be guided in our work by the four performance goals and accompanying strategies that are outlined in the strategic plan with an appropriate overriding focus on safety.

To accomplish our tasks, as the Chairman mentioned in his opening comments, we intend on maintaining our in-house capabilities, maintaining access to research facilities, and maintaining updated, analytical tools.

As Ashok mentioned, we intend to continue to work closely with NRR and NMSS to provide support in the areas they have requested assistance to the user needs process.

We've also requested input from our internal and external stakeholders for proposed anticipatory research projects, as Ashok mentioned.

We're looking forward to receiving those suggestions and engaging in stakeholder dialogue later this year.

Regarding our office infrastructure, we've accelerated recruitment activities in light of anticipated retirements.

Over the last year and a half, we've reduced our over age 60 to under age 30 ratio from 15 to 1, to 5-1.

That brings with it a number of challenges.

We're focusing increased attention on the intern program, on summer hires, on our training needs, and on including rotational assignments.

There's a strong need for us to pay attention to the new hires that we're currently bringing on board.

Another example of our infrastructure initiatives is that in the areas of information technology, we are bringing on additional staff to assist us in monitoring and analyzing our labor rates, and the necessary information associated with the PBPM process to ensure that we have the necessary management tools to be able to do our work effectively.

We're also using the IT support to help us with our website activities.

Ashok mentioned in his opening comments the importance of communications. And communications remains one of our largest challenges. We've made head way in this area. But we need to continue to maintain focus.

Our plan is to continue to use initiatives of all available forums, both verbally and in writing to discuss how our accomplishments and our work that we have under way support the agency's strategic plan and performance goals.

We need to welcome that opportunity to be able to make that connection.

We need to further increase communications in all directions.

We need to ensure that our internal staff office communications are effective as well as across the other NRC offices, including the regions.

We need to continue to get out to the region, to be able to talk at resident conferences, to talk to regional management so that we strengthen the connection with the regions.

In addition to providing information and status, it's important that we listen.

We need to get feedback of where the needs are and how the products are being used, where they can be improved.



Similarly, we need to reach out to external stakeholders the same way. We need to keep them informed of our work activities, how they tie into the strategic goals, and also to solicit feedback from the industry as well.

Our plan is to keep the Commission engaged on our policy issues early, keep the Commission also informed on the status of our significant work products.

And I think we're definitely on the right road.

And with that, that ends our presentation. And I'll pass it back to Dr. Travers.

MR. TRAVERS: Thank you.

That is the completion of the staff's presentation.

Mr. Chairman, we'll be happy to try and answer your questions this morning.

CHAIRMAN MESERVE: Thank you very much.

You've demonstrated what I think I indicated in my opening statement that you have a comprehensive array of activities underway that really undergird many of the very important activities that we have underway at this agency.

Commissioner Merrifield has indicated that he has another obligation that may require him to leave a little bit early. So we're going to go first with him this morning.

COMMISSIONER MERRIFIELD: Thank you, Mr. Chairman. I'll try to move through my questions quickly. We are currently relying on a program that has been around for decades in Appendix B to deal with quality assurance of materials that go into the construction of reactors. At a time when we're considering the possibility of new reactor orders, I've previously asked others where are we on Appendix B, vis-a-vis an ISO-9000 process that's been developed in industry and that has arguably to some, moved ahead of where we were relative to Appendix B.

So I'm interested in some comments on that issue. And also, as a tangent to that whether you are aware of the work that EPRI has underway relative to ISO-9000 as it relates to Appendix B.

MR. MAYFIELD: Commissioner, by and large, my role as the standards executive of the agency, I find myself engaging periodically with industry representatives on this question.

We do not today formally have a program working with EPRI or evaluating EPRI's program on the ISO-9000.

We have periodically engaged with the industry through the codes and standards activity.

And we have specifically asked the industry if there is interest in updating, for example, the MQA 1 standard.

There's also been some discussion of interest in trying to impose or make use of ISO-9000.

So far, the industry has not stepped forward and asked us formally to do that.

There are mechanisms whereby they can get around the in-stamping requirements. So as the vendors are giving up their in-stamps, the industry is not left totally helpless in the matter.

That said, if the industry approached us with a request to specifically use ISO-9000, there are mechanisms to evaluate that and make adjustments to the programs as warranted.

Now, I should also note, in Farouk's division, we're beginning to formulate a plan - a program to go back and look at the requirements of Appendix B as part of the regulatory effectiveness program. So this is not something that's lying unattended.

But ISO-9000 per se, we have not picked up as a staff initiative.

COMMISSIONER MERRIFIELD: Well, I think there are a couple of things out there that warrant, one, given the fact that EPRI has picked it up, this indicated to me that industry is thinking about it, except that we haven't had a direct appeal from them.

I think there has been at least one utility that has contacted the Commission seeking to have some further look into the whole issue of ISO 9000.

That having been said, it remains a troubling issue that there are suppliers, though not appropriate to name them, there are suppliers out there who have a long standing history in the supply of such things as pumps and valves and whatnot, which have very positive safety records and are well known in the field but are recently choosing not to be in the field any more because they can't put up with the in-stamp program.

And knowing the parallel history in the military which had very prescriptive standards of what was required and not required, we became very aware that, after a long period of time that despite the fact that the military was sticking to its standards, that a higher quality of products were available in the commercial marketplace with better quality assurance, and it was in fact in some case, mom and pop shops that were providing a lot more expensive and not necessarily as good a product to the military.

That's not to say that we have the same problem here but I think that since we're taking a fresh look at issues associated with new reactor orders, it's probably worth it to take a fresh look at whether Appendix B is still relevant in 2002 versus where it was when it was developed.

But I appreciate the comments on that.

MR. THADANI: Commissioner, if I may just add to the comments that Mike made, as you know, under Reg Guide 1174 we did take a look at the issue of Appendix K and the 17 elements that come with Appendix K.

We gave some initial guidance in terms of relevant importance of the elements, what Dr. Eltawila's branch on reg effectiveness is looking at now - has initiated this work to look at what is experience teaching us by way of reliability of various components and how might one try to better understand the importance of the contribution of the many elements within Appendix B.

And it could be that there may be two or three or four key pieces within Appendix B which really contribute to the high reliability of components.

And I believe that this effort would be very useful as we move forward in assessing new designs.

COMMISSIONER MERRIFIELD: I appreciate that. This work is one that we're very comfortable with, Appendix B.

But at the same time, recognizing that there may be a way that we can have the same level of safety or greater using the same or a better system, maybe, maybe not, I assume ISO 9,000 may not get us there. But this may be a way to release undo and unnecessary burden. This may be a way where that would make sense.

I guess this goes back to Mike Mayfield. You talked about where we are relative to some of the cask issues. For some of the licenses, we have particularly the licenses where they are in the day commissioning process - the issue of high burn up fuels and how those may get into the casks and the limitations that we have right now in terms of some of the vendors and the certifications.

I know that the Commission is due an update in April as to where things stand on that but I'm wondering if you could give some preview as to where we may be overall in terms of looking at high burn up and high damage fuel, vis-a-vis getting those into cask?

MR. NEWBERRY: I think the best I could do on the high burn up is to return to Farouk.

DR. ELTAWILA: With regard to the high burn up fuel, we have a test program right now at our national lab which we address both the reactor area and waste area.

We had missed some milestones or times in getting the fuel to the lab because of, you know, just negotiation with the utility and so on.

But finally, the fuel is at our national laboratory right now. We started the failure tests in which we would provide the information that would be needed for retrievability of the fuel from the cask if we have to.

We expect to finish that test program or get results for this particular issue in about a year from now. So we feel that we are going to be providing the necessary information about high burn up fuel for the cask.

Having said that, there is one issue that might be, that we need to think about is that the other, the test program that we have right now is going to be on the cladding, which is most of the spent fuel cladding right now.

But down the road there would be the M5 and zero, and we need to start planning for testing this fuel unless we can come up from the test program that we are doing on. If we can come up with a generic requirement that can be regarding to other planning, we would be looking into that, too.

COMMISSIONER MERRIFIELD: Quick question relating to the MFP 805, which has been an issue that is on-going and a resolution to try to get to a point where that's useful for ourselves and for our users.

And I'm referring to National Fire Protection Association 805. I'm wondering if I can get an update, from this panel of where we are, where we're going, and how soon we can get this resolved.

MR. NEWBERRY: I think I can just give you just a general comment, Commissioner.

My focus has been on the other list. There's a long list of standard work from the level one into the external event to the low power shut down, and then of course you've added the fire aspect of this.

And I could only, I would only respond to it that I agree with you.

Our focus has been on the aspect of methods. I mentioned the methods and our work with EPRI to help make the tools available that would support that standard work.

But my understanding is that there's an effort off the ground now to work on a consensus standard in the area of fire, and that there's a ways to go in terms of additional detail. I would have to get back with you on that.

MR. HOLAHAN: Mr. Commissioner, this is Gary HOLAHAN, Office of Nuclear Reactor Regulation. The NFPA standard has been issued as a standard document, it's out officially, last year, I believe.

The staff is in the process of developing a rule which would reference that standard. A rule is in the draft process.

It's owed to the Commission, I believe in June of this year.

In parallel with that, NEI is developing a guidance document that would be used along with the rule and the NFPA standard and there's some development work still going on.

But we expect to deliver a proposed rule to the Commission this summer. It's either June or July.

But I think we're still on that schedule.

COMMISSIONER MERRIFIELD: Well, I know Commissioner Diaz, as much as anyone here has been interested in making sure that we're continuing our efforts to risk inform our regulations productively and quickly.

And it seems to me that this is one where, despite a lot of hard work by our staff, our draft ended up with something that was not going to be used by anybody.

And if we come up with a risk informed alternative that is not useful, that is a significant under-utilization of resources.

So I hope with the assistance of research that the folks in NRR can come up with something that will meet both of those goals in that respect.

COMMISSIONER MESERVE: I just want to clarify a little bit, I'm not sure I will really clarify, but nevertheless, the issue with an NFPA 805 is the encouragement to use risk informed approaches.

The next step is well, what does that really mean, what methods would one apply, what data one has, and is there a standard way to conduct fire risk analysis?

And that's where Scott was focusing his efforts on, working with the industry and the Electric Power Research Institute and the American Nuclear

Society to engage them, to assist in development of high quality fire risk analysis, which I think is pretty fundamental.

COMMISSIONER MERRIFIELD: In light of time, Mr. Chairman, I'll call that a day.

CHAIRMAN MESERVE: Good.

Thank you very much.

I appreciate the fact that several of you have mentioned the problem of attracting staff and trying to build the bench strength and fill gaps in our research activities. This obviously is an essential activity for the whole of the agency.

I am curious of the extent to which, in your recruitment efforts you're able to attract people who have actual research experience.

I mean, it's always it seems to me that I recognize that a lot of your people are ones who are not themselves, necessarily directly engaged in research, and they're supervising work that's done in contractor or national labs, what have you.

I have the view that you may dispel, that, in order to be effective in the job that there is a need that they appreciate how the research enterprise works and ideally have had the experience conducting research so that they can be effective in the role.

Is this proving to be a big barrier or a burden in how successful you are in actually attracting people who have real research experience?

MR. THADANI: We've had what I would call, modest success. And fundamentally, I think you're absolutely correct.

We need to make sure that the staff we are hiring is -- there is a reasonable mix of people with substantial experience and background both in research and the technology areas as well as staff at perhaps entry level or with limited experience.

But in Research, we've encouraged the concept of mentoring young people who come in. We've tried to assign our senior levels advisors to mentor young staff.

An area that is new that we've added in terms of training considerations is to send staff to perhaps places such as national laboratories or universities where we're conducting some research to get more hands-on experience that we're not able to provide at the headquarters certainly.

Another element we've used to try to fill some of these gaps -- and I'll give you an example, having to do with high temperature materials issues, particularly graphite technology issue, UK has extensive experience, perhaps not as the temperatures that we're talking about, nevertheless, they have a great deal of capability in graphite technology.

The University of Manchester is the center of excellence in the UK, I believe basically in the world, in graphite technology. We have relatively senior staff members with a fair amount of research experience.

We expect to send this individual to UK, spend a few months there. This is an agreement we reached with NII and UK. And the person would spend some time at NII, and a fair amount of time at the University of Manchester as we move on. We are, as I said, the two areas where I think we need to really do more extensive search -- there may be others but two that really come to my mind, one having to do with the whole area of fuels.

I think it's not only with us now but it's going to be with us for many years to come. And we need to be sure that we have very sound bench strength.

We have some staff, very, very capable staff researchers currently. But I think we need to be looking down the road.

And that's an area that may be challenging and perhaps even more challenging is going to be getting staff with actual research experience in the high temperature gas cool designs.

I think, in my judgment, when I step back and look at many of the areas, those areas in engineering are going to be challenging.

And the third one where we have tried and have not been very successful has been the area of digital technology. We have a hard time competing.

We think we've found an individual with great background and experience. We're not always able to offer the same sort of financial salary and so on. We have even considered bonuses, but we have not been successful.

I would say those three areas will probably continue to be challenging for us. But otherwise, I think we've got a reasonably good mix.

I may have -- I just want to ask my colleagues if they want to add because I may have left off areas of importance.

MR. MAYFIELD: I would just note that out of the recent hires we have made from the outside world they have all come with practical research background.

All of them at the PhD level, with years experience in the research laboratories.

CHAIRMAN MESERVE: All at PhD levels?

MR. MAYFIELD: Yes, sir.

The recent external one that is we've made.

That's more senior people as opposed to the entry levels.

But the senior people we're bringing in at the higher grade levels will all come in at the PhD level with hands-on research experience in the laboratory.

CHAIRMAN MESERVE: Ashok, when you were talking about the budgeting process you mentioned very quickly in passing that you do try to prioritize your research activities and that you use the PBPM process and that you sort of weigh projects using the four performance goals.

We've never spent any time discussing this before and it seems to me, and I may be wrong, I remain to be educated on this, that the performance

goals may be quite a crude tool to use to be able to discriminate among the various research projects and trying to make judgments on research activities as to which ones are most important and building public confidence something which would have a huge measure of judgment engaged in it, and similarly, I think for most of the other performance goals.

And it seems to me that for the anticipatory research where you've been, with the Commission encouragement, has been trying to make sure that you maintain, it would be easy to have that kind of research and actually not be able to have solidity in being able to demonstrate against those measures that you can achieve them just because of the fact that they're looking over the horizon to some extent.

And are you using the right tools for being able to prioritize?

Do you have any concerns?

Or am I missing something here?

MR. THADANI: Well, as with any tool, the tool is useful, but then at the end you have to step back and bring some sort of raw judgments of what the tool results are telling you, what the analysis results are telling you.

The prioritization scheme that we have, we apply to all of our work basically.

Confirmatory, anticipatory, wherever we have user needs, we prioritize user needs as well in anticipatory research.

Now, the approach we use is basically called analytical hierarchical approach.

It's used by a lot of organizations.

We take the four performance goals and get down to next level, try and understand how certain activity, how much safety benefit would there be from engaging in some activity.

If that result is to apply to all 100 plants, versus just one individual plant, we'll prioritize the one that applies to 100 plants as being of greater importance.

So there are mechanisms for using various weighting factors, for example, risk informed regulation. If we think there's going to be some saving, again, we'll try to get a sense of how much saving.

If it's \$100 million versus \$1 million, that would get higher priority. And so there's some mechanisms that we apply weighting factors to try to discriminate.

The most difficult one happens to be the one you touched on, which is the issue of public confidence and making absolutely sure that we are developing sound technical basis. And if it takes -- if it's not a need in the short term, it tends to get, it would tend to get a lower priority in general.

However, when we go through this process, we interact with our colleagues from NRR and NMSS. We break things down in high, medium and low categories.

And we do step back.

And there are areas and times when we would indicate that something that's anticipatory research, we believe that it is important. We think those issues may be coming down the road.

Certainly, there are examples of going to higher and higher burn up levels by those currently approved by NRC.

We will assign certain priority at the end.

And if there are differences of views, we would go forward to PRC regardless because this is the prioritization of the Office of Research. And there will be dialogue at the end.

But fundamentally, I think you have touched on a difficult issue of how we quantify value in terms of public confidence.

CHAIRMAN MESERVE: I just have one final question.

Dr. Eltawila, you had talked about the two policy papers that are coming forward eventually to the Commission for the advanced reactors.

And I understand one framework document for the risk acceptance criteria for modular systems, I understand how that's a policy issue.

The other one you mentioned was that there was a policy issue associated with the three white papers on the fuel performance, confinement, containment and source term.

And I understand they all interact with each other.

And those are ones that I'm sure we'll all interested in seeing those papers and understanding the technical side of them.

What exactly is the policy issue that you envision that the Commission will be confronted with in connection with those papers?

DR. ELTAWILA: In the area of fuel quality fabrication, the NRC never got into the business of making any regulatory requirement on qualification of the fuel.

But if you look at the Pebble Bed design that each kernel is considered to be a confinement by itself, this is the barrier to the deficient product. So, we're talking about billions of these in a reactor load. So the statistical variation in the manufacturing process itself can lead to a very large source term during normal operation.

So this is one area of policy, does the Commission want to get involved with the fuel and set the standard for the quality of the fuel or we should rely on the operation of the plant itself where they have an on-line fueling system that would continuously be measuring the fission product released from the pebble itself because each pebble has to go through the refueling system once every 100 days.

So these are the things that we have to think about, how much you accredit the reliability of this equipment on line, refueling equipment, versus having a requirement on the fuel fabrication.

The other issue that we traditionally have in a containment. But that again, for current generation of plant, that's for retention of the loads.



Most of the accident scenario in PBMR might not have that load and you might be able to see, if there's a decontamination factor that you can credit a confinement versus containment.

So that's something that we have to come to you for that.

MR. THADANI: Mr. Chairman, if I may add to that.

CHAIRMAN MESERVE: I could see a whole cluster of policy issues that could come out of these studies.

I just wondered which one you're bringing to the Commission.

MR. THADANI: I think they're all interrelated.

In my mind, the most fundamental issue is how do we decide -- for example what would be a design -- let me use traditional language, what would be a set of design basis accidents for let's say, PBMR?

We have talked about risk analysis, however, there are a lot of new technology issues here and very limited experiences in some areas. How do you develop risk analysis? Do we have methods that questions about data? How would one utilize such a risk analysis?

The current safety goal policy statement, at least in my view, is incomplete. It would be insufficient by itself if one would make significant use of risk analyses.

And then there has always been the traditional thinking and the, so-called I'll use the ACRS language, of determinist whereby you have certain barriers, the cladding, the reactor coolant pressure boundary, the containment, and the emergency planning being yet another layer of defense in depth.

All of these are philosophical issues but they are tied closely to very technical elements.

In my mind, that is going to require a great deal of intellectual capital up front. That is the one area where I would like to get something pulled together and get to the Commission because details in technical areas can follow.

But I think there would be a need for a lot of thinking.

And the Commission's views will be very critical as to how far we proceed in certain directions.

CHAIRMAN MESERVE: I think early engagement from the Commission on those issues would be valuable for everyone.

Commissioner Dicus?

COMMISSIONER DICUS: Thank you.

Going to slide 14 in the package performance study, you indicated that to do an actual test of a cask is going to be very costly and partners are needed to help with that.

And that if the partners cannot be found or do not become part of the system, probably you will not do the test.

And I think from a public confidence issue, we have to test. I'm not sure it's a choice from public confidence issue.

So my question goes to just what is your feel for our being able to get partners?

I mean, is it unlikely?

Likely?

For sure?

Or I don't know yet?

DR. MAYFIELD: It's certainly not in the for sure category.

We have, just in the last two weeks, I had the senior project manager on this was in Asia.

We got a commitment for a participation that helps, every bit helps. We're talking about a bottom line price tag in the \$8 to \$9 million range, assuming there are no surprises, no price escalation you could see this going to \$10 million without having to work at it very hard.

The cost of the cask alone is something - cask is something on the order of \$3 million.

So this is an expensive undertaking.

We had initially had lukewarm interests from some of the domestic participants or potential participants.

And just in the last few weeks that interest has heated up and we're back engaged with them.

So I'm still optimistic but it's certainly not in the done deal category.

MR. THADANI: Mike, if I may just add, besides the international partner, we're also talking to Department of Energy as well to see if they can join us.

COMMISSIONER DICUS: Okay.

Well, I think that the issue is important enough that definitely keep the Commission informed if it looks like this is not going to happen, because I think we'll have to address it some way or another.

Let me go to slide 16.

I'm interested in maintaining the infrastructure.

My curiosity was up when you went to the over 60 -- the ratio of over 60 to under 30 from 1 to 15 to 1 to 5 which is tremendous change.

I was curious about how you did this.

Did we get a bunch of retirements are or did we hire a lot of entry level folks to offset this?

And then let us just go back to the question, or the issue, that the Chairman brought up about being able to hire people with actual research experience.

And the answer was, we've been able to bring in PhD's with some years of experience in research, which means they were probably over 30 to get the PhD and to have the years of research.

So I'm a little curious about the numbers here if you could shed some light on it.

MR. THADANI: Roy has been particularly engaged in this area.

But let me note that we have, since last July, we have filled -- hired 28 new staff members. And we've lost, I believe the number is 15.

My response to the Chairman's question was that it's modest success at various levels.

Mike Mayfield happens to one who has hired a number of people with PhD's, but I just want to make sure that that is not necessarily throughout the office.

And if I recall correctly, we have eight interns, I think. We have hired eight interns, and the remaining people are at various level, some at lower levels, and others at higher levels.

When you look at the number of retirements and number of people that we've hired who are under 30, the real challenge in my mind doesn't change very much because we still have a number of people who could walk away in the next year, two years.

Just because the ratio looks different does not mean that the challenge isn't there still. You can get different ratios by just hiring a small number of people today under 30.

To me, the real substance is, are we carefully looking at where our next losses are likely to be and what is it that we're doing to make sure that we are looking out, really out there aggressively looking for that kind of that talent.

I think that, to me that is a real central message.

But Roy has been personally engaged in this.

MR. ZIMMERMAN: I agree with all the points that Ashok made.

I think that a short answer would be that the reason, the biggest reason why the ratio has come down the way it has is our new hires that are -- more of our people are right out of school that will be going to our intern program. That percentage is larger.

And for the size of our office, it changes that percentage faster and I think that's what we've seen.

What we have has been said. We have had success, not and in hiring some of the younger folks. We've brought in people with talent. We're working on the skill sets that is we need.

We have about 25 percent of our staff that is eligible for retirement right now. And as Ashok indicated, we're targeting those areas so that we can aggressively hire individuals now so that we can begin that knowledge transfer and provide as much time as we possibly to do that turnover because there's a wealth of knowledge that's going to walk out the door.

We want to be able to recover as much as that as possible and buddy up the new hire with our experienced person as early as we can.

COMMISSIONER DICUS: Okay.

You've answered my other question on this slide because it did have to do with historical knowledge. When I saw such changes in ratios and concerns, it was really retirement, a lot of new people coming in, what was happening there. But you've answered my question. That's all I have, Mr. Chairman.

Thank you.

CHAIRMAN Meserve: Commissioner Diaz.

COMMISSIONER DIAZ: Mr. Chairman, I've noticed that everybody has a lot of challenges and I think one of the challenges that Research has is to do very good with resources that are not unlimited, notice that I say not resources that are limited but resources that are not unlimited.

Let me just make an observation here on this issue of doing good and meeting an objective.

I think that there's an obvious challenge that you have in increasing the focus of what you do on quality.

And the reason is that if you do very good quality work, that work becomes self limited.

It does not continue.

You reach a point in which you say, I did it, it's good.

And I think that that is a very, very good perspective on how to utilize resources better is to try to do work that has some finality.

I'm not going to talk about fire -- oh yes, I will.

In this sense I've been trying to make a couple of points. And let me use a phrase that keeps coming up in different studies. And I want to use it for asking you a question of this.

You know, we have used, in several occasions now -- I went back a few years. And this phrase, it is not possible to preclude, which, to me, is not a scientific statement because, especially if you used that phrase and established, from the beginning boundary conditions that will support your statement then that's not a very good thing.

It is definitely not possible to preclude something getting hot if you limit heat transfer from it. It is definitely not possible to say a structure will be able to maintain the system's functions if you rule it from the beginning that the systems are going to fail.

But in this sense, it is possible for Research to preclude doing bad work. And that is something that I'm sure is very, very, very key to the way you approach things. It is possible to preclude the deficiencies that come up with bad assumptions, with bad boundary conditions by limitations.

And I think that it is paramount at this time of age, and with the state of knowledge that exists, to preclude work that we commission or that we do that is not final and that is not really providing the quality that you need with the lack of unlimited resources.

And that's you know, that might look like a very broad statement. But I hope that the message is clear, that I believe that there should be an additional focus on quality.

Quality limits the work. When you limit the work, you get additional resources to do other things. And therefore, research in this agency is not to continue doing research.

And we're not a welfare agency for any institution in this country. But we have a very, very clear mandate. And that's important. It is possible to preclude, by doing all of the right amount of work, bad work, or work that is not going to reach, you know, a point which will be usable.

In that sense, you know, I think it is important that we align our resources and do projects that do have finality that can be concluded.

I would not mention fire because it's something that's been going on for years. It seems that the issue of closure and fire protection have become oxy-morons.

And they shouldn't be.

It keeps going on and on forever.

And it might very well be that we're trying to do it very good rather than put some practicality on it and say, there is a time to close this issue and to put out in regulatory space what needs to be done.

I very much worry that we keep going on with the fire issues and never close them. And they have to be closed. And it might very well be that we will admit that we're not as smart as we should be.

And we need to say, this is it. This is where we need to be, and put it in terms that are usable.

So after that short introduction, let me go to my first question.

How does Research intend to resolve technical issues in a matter that includes consideration of how the resolution will be implemented in regulatory space?

How do you bring the balance that, you know, you do resource not to do research, which I'm sure you know very well but that research will have some implementation?

How are you making this process better so that when you get to a product, it is implementable in regulatory space or you might say it doesn't need to be implemented which might be a very good result after all.

MR. THADANI: Let me respond.

And then certainly, I expect others to jump in. If you don't mind, I might go back to some of the statements that you made just, again, to make sure that I understood your point.

I said some words about inquiring minds creating an environment such that people are constantly looking to make sure, in terms of safety, that we have looked at important elements.

I think that's a fundamental part of the job we do as a public health and safety agency. And that means that we need to make sure that we're developing sufficient confidence in the quality of the work that we do. Now, there will be times, and it seems to me certainly appropriate, that certain decisions have to be made, and one has to recognize that.

And while one of the goals that we firmly believe in is to develop sufficient information for the agency to be able to make realistic decisions, realistic with whatever appropriate margin one is looking for, but nevertheless, first try and understand what reality might look like. That's certainly an important goal.

Sometimes it's very difficult to get there because that does require a great deal of information. And it may be, in some cases, that the expense is not justified in chasing or following certain traits, so to speak.

Typically, we would complete -- let me distinction between the completion and maintenance. Sunset is sometimes not completely understood by all parties unless you lay out what is meant by sunset.

To me, sunset can be two different things. One would be we've completed an effort, let's move on, there's no need to do anything else in this area. Another aspect of sunset could be that all the developmental work is complete.

Now we just need to maintain whatever tools we have, analytical tools. We just make sure we're maintaining it. If there's a change in technology, adapt to the new technology and so on -- just in terms of making sure that as an office, we are recognizing that this is what we're all about -- pay attention.

In terms of fires, I think you can make regulatory decisions and recognize that there is some uncertainties in that decision.

And the responsibility seems to me, if we're moving towards more realism for us as an office to see if those are important uncertainties, the judgment, are there important uncertainties, and what would it take for us to try to fill the gap there again?

As you know, there are a number of issues with fires in terms of hot shorts, in terms of single conductor cables, multiconductor cables and how they might behave, how the insulation might behave, leakages, et cetera, in the event of a fire, and moisture presence. Some of these issues are important.

And it is important for us then to not say that we will wait and make regulatory decisions X-years from now but that those decisions will be made.

We would interact with the appropriate office, make sure that they understand what we believe the state-of-the-art is.

But for us to proceed, for example, in the area of fire, to say that there are some elements where we need to develop tools, methods, we would go through our prioritization scheme. I just want to keep re-emphasizing that.

We would go through the same prioritization scheme. We would work with our colleagues from other offices. And if it is deemed at the end that this is an area we would pursue, only then would we pursue that area. And today I believe there are some issues related to fire that do need some attention.

COMMISSIONER DIAZ: Going back to the question, resolving technical issues in a manner that really -- outside of fire in general, that will actually be implemented in regulatory space, and that doesn't mean, you know, the anticipatory research. There's more room on the confirmatory research side.

MR. THADANI: I indicated that I had asked that for every major product that we put out, that we articulate up front, why did we go forward and do this work, what are the result, and how could these results be used in helping to make regulatory decisions.

Where we need to do a better job, it seems to me, is to make sure, at each step of the way, we are communicating with the offices that are

responsible for implementation and making those regulatory decisions in the end.

I believe that -- and I can use generic safety issues as an example that when we complete some work, we believe it's good quality work, we've reached appropriate technical solution, so to speak, we have enhanced our interactions, for example, in this case with NRR, to make sure that they have a better understanding of what results we're getting as we move on at some periodic basis, to try and increase their comfort level with what we're doing, the results we're getting, and more of their buy-in and the use of those results.

I think we made some progress in that area. And I know Roy you --

MR. ZIMMERMAN: There's a number of checks and balances that are in the process.

When NRR and NMSS decide that they have an issue that they want some support from Research on, as it goes through their processes they need to satisfy their own management team that the work needs to be done, there's adequate bounds about the work that needs to be done.

There's discussion that takes place, in addition to the written forms that are completed that explain how this work is to be used, to make sure that both parties fully understand what the work is, what the scope is, why it's being done.

And then the next step is to periodically monitor it to make sure that what's being done is in fact what was requested. And then there's the feedback loop afterwards about, now that the user need is complete, is it actually going to be used?

That's the closure needed to be able to keep track of that and be able to say yes, or no, and why, because we would expect that if NRR or NMSS is going to take the time to say that they need something and if Research works it and does it in a quality timely way, timely product as it should, then that should continue to live and move the agency forward with regard to our goals.

So there's that additional tracking that is being developed to try to keep book on how the user need responses are actually being used.

Did we hit the mark? And if so, let's continue on, which would affect licensing decisions or inspection procedure, developmental or whatever fits.

So there are a number of those checks and balances that are built into the process.

COMMISSIONER DIAZ: Thank you. You talked a little bit about risk informed. I think Commissioner McGaffigan said at the RIC that I used the RIC as the -- let me quote him, the bully pulpit or something like that, to talk about the risk informed.

That was not the bully pulpit. This is! Let me go back to something that Roy just said about the need.

And I just want to make a point in here and then I want to see how I can address this.

I think we're being caught in an issue of whether this is going to be widely used by industry or it's not or whether what is good and what is what.

And I think sometimes we need to provide some clarity on that on what is it that we believe is right for this country and this agency.

I happened to have been a very young man -- I'm prefixing this, when Appendix A and B was being done.

We asked industry at the time what Appendix A and B, which are the two most fundamental pieces of reactor safety regulation ever been done.

We would never continue doing it, because it complicated everybody's life. It brought in a series of things.

So I think there has to be a balance in there.

What is it that we believe is needed to move the agency forward in our four major tasks of maintaining safety, providing public confidence, reason, burden, all of those good things.

And I think that needs to be the part of how we look at risk informing our regulations.

And of course I do believe that sometimes by just taking tiny pieces we complicate our life.

Do you have a comment on how are we trying to resolve issues in a manner that provides balance, but at the same time, allows us to go forward with these initiatives?

MR. THADANI: You want to take it?

MR. NEWBERRY: I resonate with your comments in terms of an approach which is considered strongly stakeholder input in terms of which parts, pieces of the regulation we should focus on versus stepping back and looking more broadly.

You've come out on that before.

It's a valid comment.

I must say, we -- I personally think that when you do go in and go piece by piece it does create difficulties because our regulations are so intertwined.

We're finding that on the look at the ECCS reliability, how you can make that change one that interfaces with the thermal hydraulic analysis with the Appendix K etc.

So those thoughts are certainly true.

I guess, in that regard, I would make two comments.

There's a meeting this week to rethink that.

And I mentioned we have the action item from the Commission in terms of the convergence, we're going to talk about that, options this week.

And the options will get into what you just mentioned, Commissioner, in terms of staying the course on where we are, or should we rethink and we will get back to you on that.

We plan on doing that.

We plan on having a workshop probably toward the summer to relook at part 50 again.



That is, we have our priorities right now, which are largely based on stakeholder input.

But are there other areas or other ways that we should look at part 50?

And I expect that we will ask the questions that you are asking.

Perhaps it will come back to the Commission.

Right now, certainly, we are on the course that we have set off for ourselves, going back to the Commission paper, 98-300.

MR. THADANI: If I may add to what he's say.

There's no question, Commissioner, that clearly the most logical way, respective of the forcing functions would be to step back and, for example, look at this through the Appendix A, if you will, and just to sort of see what areas would be appropriate to risk inform or what's the sort of high level thinking.

And that would have to be, in my mind -- I could be mistaken, my mind would have to be driven from some Commission decision on appropriate level of safety.

And that, to me, would be the Commission safety goals.

One would start with something like the safety goals -- going back to the issue of quality, that means then the tools have to have appropriate quality, risk analysis tools, et cetera.

And from that, derive what I would call a subset of functional, reliability, capability considerations, so on.

In my mind that would be some sort of hierarchical approach that one would use, going from safety goals to partitioning concept because there are several elements that make up the impact safety goals.

So that has to have some good quality.

Then going back to another point that you made, that in the end these things -- I mean, they would be very useful if these things are actually utilized by the industry.

So a very important component is the industry support of that approach.

Now, quite candidly, as you know, the industry sent us a letter, NEI, representing the industry, sent letter to the Commission indicating what areas they were particularly interested in. To me, it maybe the second best thing to do.

But that's the path that we have chosen to go down on.

Now, looking forward to these new designs, it seems to me that that thought process has a lot of validity for new designs to not go piecemeal, one piece at a time.

This is the time to really step back and think.

And as I indicated earlier that in my judgment at least at this stage and we need to think this through, more is needed than just the commission safety goal policy statement because that's really based on current technology and that current regulations are in place and are being used by the industry.

So one has to fill gaps in several other areas if one is to utilize this approach.

COMMISSIONER DIAZ: Okay.

Let me quickly -- I know I'm taking a lot of your time.

The controlling release of solid material that potentially have a rule, I remember that when the commission agreed on this study at the National Academy of Sciences and in the same time, in parallel, the staff worked to continue developing all of the basis for potentially proceeding the levels to force the level that are needed.

And I know that there's a group that is going to look at the study and going to do this.

But I wanted to get a feeling.

Are we ready to put all these things together in a manner that makes sense?

Did the staff continue to progress on the issues in a manner that, coupled with the NAS study, would allow the Commission to make some decisions?

DR. PAPERIELLO: My understanding is that we have.

We have looked at inventories of what material is out there. We have looked at the other things like soil disposition of soil, looking at even uses of soil, how is soil reused.

We've been interacting heavily with the international community that is doing parallel work.

I think that we are in a position to address what has been recommended by the National Academy in the context of the Commission's desire, at my briefing, to move forward.

Yes.

I think we have made progress in a lot of the parallel areas as directed by the Commission.

COMMISSIONER DIAZ: Okay.

Thank you, Mr. Chairman.

CHAIRMAN MESERVE: Commissioner McGaffigan.

COMMISSIONER McGAFFIGAN: Thank you, Mr. Chairman.

First, I want to thank the staff for giving us 50 back up slides.

I think that was a useful thing and made it a more fruitful meeting.

And I think it's a good thing for other arena briefings or whatever, in the future to think about providing that similar level of detail, although they may gripe about Research having set up standards that they don't want to pursue.

But that would be my view.

One issue that I'll just address at the outset.

The ACRS fired off a letter last Thursday at the end of their meeting basically complaining about NRR's withdrawal of its support for confirmatory research on high burn up fuel and implying that they were not very happy with that, that they felt that this was important for the area of power uprates, et

cetera, and being sure that high burn up fuel can be safely used in the higher power regimes.

What is the process? Maybe this goes to Mr. Travers? What is the process when ACRS comes in and disagrees so vehemently with an NRR recommendation for deciding whether Research continues with the research or it doesn't?

WILLIAM TRAVERS: Well, I've just gotten this thing. I haven't discussed it with Sam yet, I have had a chance to discuss this briefly with Ashok.

I think I'll let him discuss the program that's in place that we wouldn't expect to substantially change.

So I think in the main what we're talking about is a program continuing to explore these issues which we agree are important. But in a process sense they may not be fundamental to the activities that the Office of Nuclear Reactor Regulation is engaged in at the moment.

I intend to find out more about this.

But at the moment I think that the key issue is, as I understand the ACRS' concern is whether or not we are going to have a vigorous examination of these issues in the context of the research program.

And I think the short answer of that is that we are.

COMMISSIONER McGAFFIGAN: The basic point is that we've been relying on engineering judgment and I would like to see a little bit more to buttress that engineering judgment.

MR. THADANI: This really goes back to a fundamental issue and I think Commissioner Diaz raised about quality and decisions.

And judgments have to be made sometimes.

And that's why we call certain things confirmatory research. Judgments are made, and we need to make sure that those were appropriate judgments.

In the case of high burn up fuel, our program was at least up to now is a mixture of what I would call confirmatory research and anticipatory research simply because there are facilities where you can get data from.

It didn't seem to us that we ought to stop at something like 62,000 megawatt days for metric ton which is the current burn up limit for reactors.

And we're quite certain that the industry is going to push the envelope and go further, and that part of the program we had called anticipatory research program.

We do believe that there are some issues, albeit they may be of lower probability, nevertheless, there are some issues that come up and could be important in terms of safety.

And it is for that reason that we are planning to continue with the program.

And frankly, the facilities, for example, could be facility, et cetera, the information that will be generated is going to take some time.

So the judgments have to be made in the interim.

COMMISSIONER McGAFFIGAN: I'm just glad to here that the NRR support doesn't terminate the program.

I really don't need any NRR's perspective at moment.

I need however to get back to my question.

The package performance study, I want to associate myself with Commissioner Dicus's view.

It looks like you're going to be looking at this for the 2004 budget.

I honestly think that we have to do these physical tests.

Just as a point of clarification, these tests will be conducted at Sandia.

SPEAKER: Yes.

COMMISSIONER McGAFFIGAN: I would think that the Chair as a ranking member of the Senate Appropriations Engineering and Water Subcommittee would have an interest in these tests being conducted for different reasons.

And so a \$8 to \$10 million increment in our budget, if we sold it as a one time thing, even if we had to absorb the whole funding -- and I'm not trying to chase the partners away. I want them to contribute.

But the choice of not doing it, I don't think is something that can be sustained.

So I would urge you all, as you're looking at the 2004 budget to build this into it and, if necessary -- and I don't think it should be -- we can't do it at the expense other research programs.

You guys are so small, as a research budget, we can't knock you \$10 million, get rid of all the high burn up fuel and any other programs that we have just to make room for it for one year and then start those all up the next year.

That's not the way research works.

So a one-time effort in this area, I think could be sold to OMB and to Congress even if we don't get partners.

COMMISSIONER DIAZ: I was just going to say that we, occasionally we should make his life easier.

I want to also say myself, with your comment, that that certainly will make her smile.

COMMISSIONER McGAFFIGAN: Well, you've got three commissioners at this point. And I suspect five. Let me get on to another issue. GSI 189.

There's a backup slide on it and you addressed it in one of the lead slides.

How quickly is that going to get resolved? I mean, we basically are talking for the BWR Mark 3's and the ice condenser contaminants, coming up with an additional power source for hydrogen igniters, a very inexpensive power source.

And I suspect they're going to say fairly quickly, if we put that into a rule -- it seems to be taking a while. And you're briefing ACRS in June.

But how quickly can that rulemaking be put together? You've identified in previous studies that have been submitted to the Commission this vulnerability, the station black out, the igniters not being operable. But you know, it's been almost two years. It was two years this September, it's a year and a half since we got that paper.

It's now a GSI. It's being handled separately from the rulemaking.

I may be the anxious Commissioner but it just strikes me this is a bite size thing that we could get through fairly quickly.

MR. THADANI: Commissioner, you are correct.

It is a bite sized thing.

I think we ought to be able to get it done quickly.

And I mean to say that our safety analysis and cost analysis, et cetera, that means the regulatory analysis for backfit purposes we're talking about will be done in two months for that.

COMMISSIONER McGAFFIGAN: So you're going to take that to ACRS and you can give us a recommendation in partnership with NRR very quickly?

MR. THADANI: Exactly.

COMMISSIONER McGAFFIGAN: It strikes me if the ice condenser folks realize the very conservative way we are approaching credit for containment and SDP and smaller models and all of that, it seems they would be anxious to spend the small amount of money that's required to make sure that the igniters are operable in a station black out condition.

MR. THADANI: I would hope that that's the path that we will be on in the end.

But I also expect that some utilities might argue the issue of frequency of stamping blackout events. So one could get into these probabilistic estimates.

COMMISSIONER McGAFFIGAN: The cost of the additional power source you're talking about is in the thousands of dollars, less than \$10,000, something like that?

MR. THADANI: I would expect the non-safety power source would be fairly inexpensive.

DR. PAPERIELLO: If we argue about thousands of dollars, wait until we -- whatever.

COMMISSIONER McGAFFIGAN: Mr. Eltawila, you mentioned, -- and this is just a comment more than a question although you are welcome to comment back if you like. Last September, the 15 issues that you all had identified with regard to pebble bed, you mentioned that Mr. Powers and Mr. Marley had not come across anything you guys had not already thought of. I'll tell you the thing that's more powerful about Mr. Powers' write up and Dr. Marley's write up; Mr. Marley's write up is the document is plain English.

It's hard to get out of some of the stuff that we get from you all the same sort of plain English, judgment as to what the real problems are, and how likely they are to be resolveable and all of that.

And so I just urge you, to sort of hand out Powers' trip report something that we wouldn't mind seeing in SECY papers from Research; if you could possibly get them through concurrence process that way.

He has a concurrence process for one, himself.

COMMISSIONER McGAFFIGAN: But that may be what our problem is.

MR. THADANI: I would just like to add to what Dr. Eltawila said.

We had a workshop in October and we invited a number of experts, including Dr. Powers and Dr. Cress from the ACRS.

And so probably the most accurate statement would be that it was a collective discussion during the workshop of all the experts that led to the identification of these issues.

And Dr. Powers certainly was an important part of that.

COMMISSIONER McGAFFIGAN: One issue that was mentioned, at least in the cover slides, more on the backup slides, SDP, the significant determination process and the accident sequence precursor process can lead to different results, to different judgments.

And one of the key issues and challenges identified is to reduce the differences and results resolving this issue is the focus for this year on that program.

Could you tell me a little bit more about what's going on there?

MR. NEWBERRY: I don't have a lot of detail on it.

But certainly, I think you're quite familiar with the issue, and recently my staff has been starting to talk about what will be done this year.

And in that area Commissioner, there's a program that's been set up to look at what improvements can be made, and that just got off the ground in the last week or so.

COMMISSIONER McGAFFIGAN: Is there also going to be a coordination issue?

We recently decided - the Commission -- that we would participate in the INES system.

I forget what INES stands for -- events scale -- and that we would make calls about events and that we would make those calls very quickly in the INES scheme.

And so you potentially have differences that are going to arise there.

We made a quick call in the INES scheme as to whether the event of Davis Besse, what it should be scaled at. And later on, perhaps years later, you all in ASP space will decide whether that was a significant precursor or not.

So we have an SDP; we have an INES and an ASP process, all of which are trying to in different time scales. INES fastest, SDP second fastest, ASP slowest, most comprehensive -- they make judgments.

I'm just wondering how all that fits together.

MR. NEWBERRY: I don't know.

I would have to look into the international aspects. We have more experience with all of this in terms of the process and technical issues.

And there's competition between, you know, striving for better analysis versus the timeliness of a decision.

And I would hope that we can take the experience and see if we can try an analysis.

COMMISSIONER McGAFFIGAN: I think you all should just talk.

INES, I think IRO is in charge of making that call. Hopefully, they do it in conjunction with the appropriate program office and Research to some degree than SDP has done. And you all have a seat at the table, as I understand it, for anything that goes to a phase III, if research is involved in there. And then ASP comes along at the end.

And hopefully there's a seat at the table for the other folks if they think you're overestimating or underestimating what's been previously called obstacles.

MR. NEWBERRY: That's correct.

COMMISSIONER McGAFFIGAN: That's a process issue.

We may end up with different results in those three calls. We may have an INES call that's different from the SDP call, different from the ASP call.

And that's appropriate.

But I think we just need to have the three things interact.

MR. NEWBERRY: We agree.

There's a process for considering that now.

But I know there are questions that need to be looked at there.

COMMISSIONER McGAFFIGAN: Mr. Chairman, I'll conclude with that.

COMMISSIONER DIAZ: I just realized that while he was cleaning up, I missed one thing in here.

ASME standard, with exceptions the Commission has been concerned for some time that we take a standard and then we beat it to death and we put all kinds of things in there.

And I just want to know whether the Commission concerns have been heeded in this effect.

We would like to have the standard usually as close as it can be to its original form rather than a modified version.

MR. NEWBERRY: Short answer is a yes.

We provided ASME comments in September. They responded with a long disposition list in those comments and it's under review. And we appreciate -- it will be a very high threshold, should we want to take exemption there.

CHAIRMAN MESERVE: Good.

I would like to thank you all for a very helpful briefing.

This has been a wide ranging discussion this morning, very illuminating.

With that, we're adjourned.

(Whereupon, the proceedings were concluded)