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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
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BRIEFING ON THE STATUS OF OFFICE  
OF RESEARCH (RES) PROGRAMS,  
PERFORMANCE, AND PLANS  
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ROCKVILLE, MARYLAND  
+ + + + +  
THURSDAY, MARCH 27, 2003  
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The Commission met in open session at 10:00 a.m., at the Nuclear Regulatory Commission, One White Flint North, Rockville, Maryland, the Honorable Richard A. Meserve, Chairman of the Commission, presiding.

COMMISSIONERS PRESENT:

- RICHARD A. MESERVE: Chairman of the Commission
- GRETA J. DICUS: Member of the Commission
- NILS DIAZ: Member of the Commission
- EDWARD McGAFFIGAN: Member of the Commission
- JEFFREY S. MERRIFIELD: Member of the Commission

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

10:00 a.m.

CHAIRMAN MESERVE: Good morning. On behalf of the Commission, I would like to welcome you all to today's briefing concerning the Office of Nuclear Regulatory Research. I should note that this is the final scheduled Commission meeting over which I will preside as NRC Chairman and I am pleased that my final meeting should be this one.

I have sought, throughout my tenure as Chairman, to reinvigorate the NRC's research program.

My fellow Commissioners and I are pleased to have increased the Office of Research's budget in the last several years and we have sought to help the Office assume a more prominent role in the NRC's programs for both operating and possible future reactors.

Research has a very important function. The Office develops the technical bases that underlie the Commission's regulatory requirements and it helps to develop the analytical tools that the NRC staff uses to assess licensee compliance.

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

In fulfilling these vital roles, the Office faces many formidable challenges. It seeks to risk inform the NRC's reactor and materials regulations, prepare for possible reviews in advanced reactor concepts, improve the tools that support our revised reactor oversight process, and to support homeland security and Safeguards initiatives.

We look forward this morning to hearing about your past

1 accomplishments and your future plans and to learn how you aim to meet the  
2 many challenges that we, as an agency, face.

3 Dr. Travers, would you like to proceed?

4 COMMISSIONER MERRIFIELD: Mr. Chairman, before you  
5 turn to Dr. Travers I would like to say again what I said yesterday in public, and  
6 that is that certainly your presence on the Commission will be missed. The  
7 value you have provided to this Commission is very, very difficult to calculate,  
8 because it's been enormous. And it's been a real pleasure to get to know you  
9 and really understand you over these years, and so I do want to comment on  
10 that.

11 I also want to reflect on and acknowledge the presence you  
12 have had on the issue of Research in the terms of the attempt to reinvigorate  
13 it. And you mentioned that as an accomplishment you're satisfied in, and I  
14 would agree, that is indeed something you should be very proud of.

15 As is my want, I would perhaps quibble with one slight  
16 comment that you made in that presentation. I think the utility of the Research  
17 office should be measured by an increase in its effectiveness and utility, not  
18 necessarily an increase in its budget. But with that minor quibble, I would  
19 heartily reinforce the comments I made yesterday.

20 Thank you.

21 CHAIRMAN MESERVE: Thank you.

22 MR. TRAVERS: Thank you, Mr. Chairman.

23 It does seem fitting for your last scheduled Commission  
24 meeting that we talk about the status of our research program. And certainly  
25 we would agree that you have had a significant impact in emphasizing the  
26 importance of Research, and would certainly agree that it underpins our entire

1 regulatory program. And its entering into really a new year of importance, I  
2 think, as we look at the potential for new reactor designs and other matters that  
3 are going to becoming before the Commission. And so we appreciate that and  
4 we thank you for it, as well as the many other contributions you've made to the  
5 Commission in your tenure. And we were happy to recognize that in our  
6 proceedings yesterday.

7 We are here today to update the Commission on the status  
8 of the research program and highlight some of the significant activities, and  
9 certainly answer your questions on any matters that you would like to discuss  
10 this morning.

11 Ashok Thadani is going to introduce his team and carry out  
12 the briefing.

13 DR. THADANI: Thank you.

14 Good morning, Chairman Meserve, Commissioners.

15 Before I begin the briefing on the status of the Office of  
16 Nuclear Regulatory Research, I would also like to acknowledge the very  
17 important guidance and direction provided by the Commission. In particular,  
18 I'd like to thank Chairman Meserve for his invaluable support during his tenure  
19 as Chairman of the Nuclear Regulatory Commission.

20 Chairman, you have encouraged innovation and thinking  
21 beyond the box in order to prepare the agency for some of the challenges that  
22 might lie ahead. I think as a result of your focus in this area, that we as an  
23 agency are better prepared today than we might have been otherwise.

24 Again, I want to thank the Commission and you, in particular  
25 Chairman, for the support that you've given the Office of Nuclear Regulatory  
26 Research.

1                   And I also want to acknowledge a very important part played  
2                   by my colleagues at the table: Jack Strosnider, Deputy Director of Office of  
3                   Research; Farouk Eltawila, Director of Division Systems Analysis and  
4                   Regulatory Effectiveness; Mike Mayfield, Director of Division of Engineering;  
5                   and, Scott Newburry, Director of Division of Risk Analysis and Application. And  
6                   our staff involved in administrative functions are also here to support us as  
7                   necessary.

8                   I would personally like to thank the directors of the program  
9                   offices and the support offices, and their staffs as well, because I do believe  
10                  there have been a number of challenges this year and we have worked  
11                  cooperatively with others to accomplish quite a bit, in my view.

12                  So if I may go to the first chart, please.

13                  During this morning's briefing I'll discuss the overall state of  
14                  the office, followed by a discussion of some selected research program  
15                  highlights, as Dr. Travers noted.

16                  The time we have today permits only limited discussion or a  
17                  discussion of a portion of our projects, but we're certainly prepared to go  
18                  beyond and address questions you may have in other areas.

19                  Can I have viewgraph number 3, please?

20                  Let me begin with our safety research mission, and the  
21                  Chairman eloquently noted what that is. That is the mission of the office is to  
22                  compliment the frontline regulatory activities involving licensing, inspection and  
23                  oversight. We independently examine evolving technology and anticipate future  
24                  challenges, and we strive to have a center of technical excellence.

25                  We further the regulatory mission of the agency by providing  
26                  technical advise, technical tools and information for identifying and resolving

1 safety issues as well as looking over the horizon for future challenges and  
2 prepare the agency for timely future decisions.

3 The state of Research has been dynamic. We have had a  
4 large influx of work in both the areas of advanced reactors and homeland  
5 security. With the volume of work before us we need to continually ensure that  
6 we're doing the right work. In this regard, we interact with our partners, NRR,  
7 MNSS, NSIR, interact with the Advisory Committees of Reactor Safeguards  
8 and Nuclear Waste, interact with other external stakeholders to seek their  
9 views, and we work hard to effectively implement the planning, budgeting and  
10 performance management program. Obviously, we get direction from the  
11 Commission also that impacts the work we do in the office.

12 While striving to ensure that we're doing the right work, that  
13 is ensuring that our highest focus is on safety, we have also searched for  
14 efficiencies. I'd first note that there are different kinds of efficiencies. There are  
15 efficiencies associated with internal processes and there are programmatic and  
16 leveraging efficiencies.

17 The process efficiencies are often associated with business  
18 process improvements. Programmatic efficiencies are associated with external  
19 efficiencies realized from the utilization of research products. Leveraging  
20 efficiencies are realized when we're able to leverage our resources to obtain  
21 regulatory products at a reduced cost to the agency.

22 The vast majority of our work is one of a kind projects which  
23 involve development of new analysis methods and tools, new data and new  
24 approaches. This requires our processes to accommodate a variety of  
25 challenges.

26 Good project management is essential to efficient completion

1 of the type of work we do. We have implemented a renewed focus on project  
2 management, emphasized planning and execution. Doing the right work on  
3 time and within budget.

4 Management and staff use our detailed operating plan to  
5 track work and identify any problem areas. We do this quarterly.

6 We have also increased our efficiency by doing work in-  
7 house, work that in the past was done by contractors. Some examples are  
8 scaling analyses for AP-1000 and looking at the sufficiency of data for ESBWR,  
9 the new passive advance light water reactor. And some examples I'll cite later  
10 on as we go forward in the briefing.

11 Let me turn to the international and domestic activities, an  
12 area in which large efficiencies are actually realized. About 80 percent of the  
13 plants operating in the world are based on U.S. light water reactor technology.  
14 Major efficiency for research is achieved through leveraging research activities  
15 through domestic and international cooperative activities. We have 91 bilateral  
16 and multilateral agreements with over 25 countries. We also have 20 domestic  
17 agreements with utility organizations such as EPRI, Westinghouse, Framatome  
18 and General Electric. In addition we have memoranda of understanding with  
19 other federal agencies. For example, Department of Energy, EPA and NASA,  
20 and so on.

21 The desired outcome of our cooperative initiatives, which  
22 cover both operating reactors and advanced reactors, are to enhance our  
23 ability to make sound realistic decisions based upon worldwide experience,  
24 high burn up fuel would be an example in this category; obtain broader sharing  
25 of data and practices among the national and international community; help  
26 ensure that the international standards and technical studies that reflect current

1 state of knowledge; obviously, leverage or NRC resources, and; network with  
2 experts to stay abreast of the state-of-the-art in any given subject area.

3 Well, for example, through networking we benefit from the  
4 expertise of assignees even at the NRC and enhance our knowledge through  
5 sending our staff abroad. We currently have 3 foreign assignees. One from  
6 Sweden working in the materials degradation mechanism area and two from  
7 Korea working in the thermal hydraulics area and the PRA field.

8 We also sent one of our own staff members for a 3 month  
9 assignment in the UK this past year. The purpose of this assignment was to  
10 increase NRC's expertise in graphite technology and capitalize on UK's gas-  
11 cooled reactor experience.

12 In the area of human capital, we have made strides. We had  
13 a long way to go. Research has incorporated a number of human capital  
14 investment strategies to ensure that we maintain the technical competencies  
15 necessary to sustain the accomplishments of NRC mission requirements.  
16 Some of the more effective strategies for Research have been double  
17 encumbering, hiring mid-level employees, training and the intern program.

18 As a result of our increased emphasis on recruiting, 25  
19 percent of the Research staff is new. 20 of 39 new employees and 3 or 4 new  
20 managers are women and minorities.

21 Our age profile has also improved. You may recall Research  
22 over 60 to under 30 ratio 2½ years ago was 15 to 1. Today it's 2 to 1, 2.2 to 1,  
23 to be precise.

24 The new staff includes both interns and recent graduates, as  
25 well as some mid-level to senior staff positions with considerable hands-on  
26 research experience. Research's new staff members have already made

1 significant contributions to our work. A good example of such contribution is  
2 the use of enhanced staff expertise in corrosion to evaluate the Davis-Besse  
3 event. This was done by one of our newer employees.

4 We have a commitment to training and mentoring, including  
5 rotation to other parts of NRC and national laboratories and other institutions  
6 to help develop our staff to enhance our capability to conduct research  
7 important to the agency's mission.

8 We continue to look for the necessary talent. And I must  
9 emphasize we're not done, and it'll take continuing attention on our part on this  
10 issue and that we're mindful of the importance and value of diversity in these  
11 decisions.

12 The results from the recent Office of Inspector General  
13 Survey, cultural survey, had some messages for Research and we're taking  
14 steps to evaluate these and respond to them. We're also supporting the  
15 recently formed EDO Task Group to assess the areas identified for  
16 improvement and develop an action plan for such improvement strategies.

17 May I have the next slide, please?

18 For our highlights we have selected programs that show the  
19 breadth and depth of the areas the office is engaged in. And these programs  
20 cut across all current arenas that the agency is involved in. They have a strong  
21 technical component and include issues that are before the Commission or are  
22 likely to come before the Commission.

23 Next slide.

24 Our work in the security area supports regulatory decisions  
25 and provides information to other parts of the Federal Government such as  
26 Homeland Security to assist in protecting the nation's infrastructure.

1                   As you know, a primary role of Research is provide technical  
2 basis required for realistic engineering analyses and regulatory decisions.

3                   In our ongoing work, we have pushed the state-of-the-art in  
4 several engineering disciplines to develop methods, data and guidance for  
5 conducting engineering assessments of vulnerabilities of a variety of nuclear  
6 facilities and operations. As the work proceeds on technical basis,  
7 development and vulnerability assessments, insights from the work are  
8 incorporated as appropriate in agency's decisions and communications  
9 including those related to the advanced reactor designs.

10                  A tangible benefit of the first of a kind engineering work we've  
11 done in support of Homeland Security is the new insights we gained from a  
12 recently completed integral analysis of a spent fuel pool accident scenario. In  
13 general, the analyses show a significant departure from the previous generic  
14 studies that have been cited in the media as representative of what could  
15 happen should a terrorist attack a spent fuel pool. The new analysis indicates  
16 that for the scenario analyzed, spent fuel is much more easily cooled. Also, the  
17 insights gained will help industry develop accident management strategies to  
18 further reduce the potential consequences from spent fuel pool accidents.

19                  But before I summarize the insights from this new analysis,  
20 I'd like to put into perspective previous NRC and contractor studies on the  
21 same subject. Of course, I'm referring here to the staff analysis that was done  
22 to support decommissioning, rulemaking and exemptions known as the  
23 NUREG 1738 study, and similar studies such as the Sandia siting study and  
24 BHL spent fuel pool study. These studies were done for specific purposes and  
25 were done conservatively using simplified assumptions. We did not try to refine  
26 these studies then because they met their intended use, and it was not cost

1 beneficial to expend considerable extra resources.

2           The new analysis used a more representative scenario and  
3 best estimate assumptions. The results indicate that severe fuel damage was  
4 limited to a small fraction of the fuel in the pool. By contrast, in NUREG 1738  
5 a significant amount of the fuel in the spent fuel pool undergoes severe fuel  
6 damage and was assumed to release a significant fraction of the fission  
7 product inventory. The total effect is a much smaller release and corresponding  
8 reduction in the off-site consequences compared to NUREG 1738 for the  
9 scenario analyzed there. We're, of course, continuing assessments of other  
10 scenarios and other spent fuel pool configurations and we'll provide the  
11 Commission with insights as they are developed. And we do plan to conduct  
12 a peer review of the final report.

13           During 2003 Research will complete the realistic engineering  
14 assessments of the vulnerability of nuclear power reactors to aircraft attack and  
15 the vulnerability of spent fuel pools to explosive attacks. Two pilot plant  
16 assessments are underway to assess the threats and identify any additional  
17 potential mitigation options. These engineering assessments are integrating the  
18 results of engineering, systems and consequence analyses. The results of the  
19 engineering assessments will be used along with other information to develop  
20 and evaluate potential additional strategies for mitigating the effects of a variety  
21 of threats and potential radiological releases. We will also have a peer review  
22 of this evaluation.

23           To help guide the staff's assessment activities, Research has  
24 documented a risk-informed method for engineering assessments of  
25 vulnerabilities for a range of NRC's licensed facilities and the range of threats.  
26 In the coming months consistent with the Commission's PRA policy statement,

1 Research will be reaching out to experts in risk-informed regulation and to a  
2 spectrum of staff and management in NSIR and NRR and NMSS to establish  
3 a risk-informed approach to regulatory decision-making based on the results  
4 of these vulnerability assessments.

5 Our assessment activities planned for 2004 are consistent  
6 with the Commission's guidance to expand these assessments to a variety of  
7 threats and we'll use the methods, models and data based on the technical  
8 basis developed during 2003 consistent with Commission guidance. These  
9 assessments will integrate the engineering models developed this year and any  
10 of the threat simulation models that derive realistic risk-informed insights.

11 As with the vulnerability assessments conducted in 2003, the  
12 results of these assessments are expected to be used: First, to development  
13 an evaluate potential strategies for mitigating the effects of such attacks and  
14 potential radiological releases, and; second to provide information to other  
15 government agencies and departments, including the Department of Homeland  
16 Security, to assist in their evaluation of the nation's critical infrastructure.

17 Research will continue to coordinate its activities with NRR,  
18 NMSS and NSIR to ensure our mutual awareness and efficient views of the  
19 information as it's developed while we conduct these evaluations.

20 Now let me turn to our efforts in the advanced reactors area.  
21 Viewgraph number 6.

22 I might note that we know from our experience that our  
23 independent research in the past has identified important safety issues and  
24 brought about a number of design modifications and safety enhancements. The  
25 work on the AP600 is actually a case in point of that value of the work that was  
26 done.

1                   We do have significant ongoing efforts in the area of new  
2 reactor designs and technology which include supporting NRR in the  
3 certification review of the AP1000, and the pre-application reviews of ESBWR  
4 and Advanced Candu Reactor 700 design. We're developing methods, tools,  
5 data, and expertise to provide sound technical basis for our decisions and  
6 reduce the need for unnecessary conservatism that normally results from lack  
7 of knowledge.

8                   As you're aware, last year we saw a resurgence of interest  
9 in advance reactor designs and technologies. We had to adjust our plans to  
10 work on newly submitted applications, the ones I noted. In order to do that, we  
11 had to de-emphasize our efforts in the area of high temperature gas-cooled  
12 reactor. However, to avoid being a bottleneck should as HTGR design be  
13 submitted for certification, some long lead time Research activities, those  
14 related to the HTGR fuel and materials, will be pursued at the much lower level  
15 of effort than we had previously planned.

16                   We have developed an advanced reactor infrastructure  
17 assessment and the research plan, which also includes passive light water  
18 reactor designs and designs basically that are in front of the Commission now.  
19 We believe the infrastructure assessment will provide valuable information to  
20 different stakeholders regarding the state-of-the-art, the tools, data and safety  
21 issues that must be addressed during the certification of these designs. The  
22 infrastructure assessment was presented to the Advisory Committee on  
23 Reactor Safeguards, and I believe, the Committee believes, the plan is  
24 comprehensive and reflects a good understanding of the issues, existing state-  
25 of-the-art, past and ongoing research as it pertains to future designs.

26                   I personally agree with the Advisory Committee that in order

1 to support building and operating a new plant in this country in 2010 to 2020  
2 time frame, it is critical for Research to develop the necessary data and tools  
3 in the years 2003 through 2006.

4 I would like to take this opportunity to thank the Advisory  
5 Committee for their investment of their time and attention to the work that the  
6 Office of Research has been doing in this area.

7 Finally, I would like to note that there is SECY paper on its  
8 way to the Commission. In that we have proposed option for 7 key policy  
9 issues. While they relate to non-light water reactors in particular, but we do  
10 recognize the impact of these policy issues on new light water reactor designs  
11 as well. And we believe Commission guidance on these issues will not only  
12 help us as staff, but I think it will be very helpful to designers to address these  
13 decisions early on their designs.

14 May I have the next slide, please?

15 Going on to our efforts in risk-informed arena.

16 As you know, we're deeply engaged to further the agency  
17 goal of being more risk-informed, and this is clearly consistent with the  
18 Commission's policy statement. And I'd just like to go through a few areas.

19 We have completed work that will support a revision to the  
20 technical requirements for the emergency core cooling systems at nuclear  
21 power plants. We would envision that we could replace the prescriptive ECCS  
22 acceptance criteria in 5046 with performance based and more realistic  
23 requirements. Revised requirement for ECCS evaluation model to support  
24 realistic analyses, and revised general design criterion 35 to provide an  
25 alternative general reliability requirements for emergency core cooling system  
26 safety function.

1                    Important aspects of this work include estimates for LOCA  
2 frequencies, estimates for conditional loss of off-site power given the loss of  
3 coolant accident, and the performance of safety systems. I know that you have  
4 given a great deal of thinking on this matter because of its complexity. And we  
5 look forward to following the guidance that we receive from you on this matter.

6                    Also, as you know, we have completed the technical work  
7 associated with risk informing the technical requirements of 10 CFR 50.44 on  
8 combustible controls. NRR is in the process of completing the rulemaking.  
9 Risk information, the research has all shown that there is little to no risk  
10 significance or benefit associated with some of the combustible gas control  
11 requirements of 10 CFR 50.44.

12                    I should also note that there are safety gains that can be  
13 achieved for hydrogen control using these risk insights. The balance use the  
14 risk analysis that yields improvements in safety and reductions in unnecessary  
15 burden is appropriate. And this is a good example of that.

16                    While the rulemaking is proceeding, follow on work indicates  
17 that there are potential cost benefits for backup power supplies for hydrogen  
18 igniter would be warranted for ice condenser and Mark III containment designs.  
19 This analysis has been forwarded to NRR.

20                    Work by staff along with the valuable contributions of  
21 stakeholders and ASME on risk-informed decision-making and PRA quality has  
22 now reached a common agreement on how to apply the standard and perform  
23 peer reviews of PRAs to support regulatory decisions. A few issues are still  
24 being discussed with stakeholders following receipt of public comment, and a  
25 pilot activity is being discussed with the industry as well.

26                    The project cuts across a number of Research and NRR

1 organizations and considerable credit needs to go to the staffs for their hard  
2 work, team work and persistence for getting us to this point. We look forward  
3 to final endorsement of this standard with the regulatory guide this summer.

4 Now, about 3 years ago the staff initiated a broad scope  
5 reevaluation of technical basis for pressurized thermal shock regulation. Based  
6 on research performed over the last several years, the staff has developed a  
7 thorough understanding of the considerable conservatism in the current rule.  
8 The staff undertook this re-evaluation making use of the state-of-the-art  
9 techniques in PRA, thermal hydraulics, material science and fracture  
10 mechanics.

11 I am personally very proud of this work and the efforts of  
12 Research staff. Considerably more realistic understanding of the over cooling  
13 events and their effects on the reactor vessel has been achieved. The results  
14 provide a sound technical basis to support revision of the pressurized thermal  
15 shock regulation and demonstrate that the operating life of the PWR reactor  
16 pressure vessels can be extended to 60, and perhaps to 80 years, effectively  
17 eliminating pressurized thermal shock as an issue for license renewal  
18 evaluations.

19 And, as you know, we are also working with NMSS to develop  
20 safety goals for their activities using our reactor safety goal experience. We  
21 have developed preliminary goals along with some key issues that need further  
22 consideration. We're planning to provide the Commission a status of this work  
23 early this summer.

24 I must also note that there continues to be a need to improve  
25 our PRA methods in selected areas. Users have indicated needs in areas such  
26 as human reliability analyses, fire risk and passive component reliability to

1 support our licensing and inspection efforts. This work is an important part of  
2 our program in user risk information area.

3 Now, there are many other areas where we and the agency  
4 are using risk assessment methods. My staff coordinates and provides to you  
5 a risk-informed regulatory information plan semi-annually. We believe  
6 communication on these projects is important and hope that you find this plan  
7 useful. The next semi-annual update is nearing completion and it should be  
8 with you fairly soon.

9 May I have the next slide, please?

10 As you know, Research is quite engaged in assessing  
11 operating experience. Our objective is to provide effective coordinated program  
12 to systematically review and develop tools to improve our capability to monitor  
13 operating experience and to communicate lessons learned. A collection review  
14 and analysis and evaluation of operational data includes the following:

15 Database systems to support systematic analysis of  
16 operating experience; Efficiency improvements are being put into place to  
17 improve data collection and make it more readily available on our public  
18 website.

19 Our SPAR Model Development is used to support accident  
20 sequence precursor, significant determination process and other risk-informed  
21 activities. We are on track with our development program previously brought  
22 to the Commission. Reliance on these models is increasing and we have in  
23 place a maintenance program to incorporate lessons learned from the  
24 application of these models.

25 Accident sequence precursor analysis is used for  
26 identification of significant precursors and precursor trends by using a risk

1 assessment methodology. A paper is now on its way to the Commission. This  
2 paper discusses some recent precursor experiences, trends, as well as  
3 program modifications to explicitly consider uncertainties in ASP analysis which  
4 I believe to be a critical element in any safety decision. And I'm very proud to  
5 say that this is a significant enhancement in the models.

6 Our industry trends activity produces trends and thresholds  
7 for initiating event systems and component performance, common cause  
8 failures and accident sequence precursor events as part of the agency's  
9 training program in support of NRR.

10 Performance indicator development supports the ROP. New  
11 mitigating system performance indicators have been developed and are being  
12 piloted. This performance indicator will, we believe, do a better job at  
13 realistically monitoring equipment performance. Consistent with the  
14 responsibilities transferred to Research from AEOD, we're also conducting  
15 selected studies of operating experience, and we share the insights with NRR  
16 and the regions.

17 May I have the next slide, please?

18 Now in terms of generic safety issues, let me note that over  
19 the past two years the generic safety issue program has received increased  
20 research focus from senior management in terms of identifying, prioritizing and  
21 bringing to closure a number of safety issues. The entire backlog of generic  
22 issues from the 1990s has been eliminated, and the program is quite active.

23 For example, between 2000 and 2003, 9 new generic safety  
24 issues were identified, 6 prioritized, 13 were closed and 2 were transmitted to  
25 NRR for regulatory action.

26 We monitor these programs very closely. Monthly updates

1 are also provided to the EDO for transmittal to the Congress.

2 Now go on to the next slide, please.

3 Take a couple of minutes on this important issue. And, as you  
4 know, a major component of our Research program that directly addresses  
5 many safety and regulatory issues is the degradation and aging of materials  
6 used in reactor systems. Over the years we've seen many examples of  
7 degradation in the pressure boundary components that have raised very  
8 serious safety concerns. Examples include: The inter-granule stress corrosion  
9 and cracking of boiling water reactor piping in the BWR reactor internals;  
10 degradation of steam generator tubes; primary water stress corrosion cracking  
11 in many components made from nickel based alloys; and, the cracking of the  
12 control rod drive nozzles in PWRs.

13 We have provided state-of-the-art technology that is helping  
14 resolve these issues. Our overall aging research has directly contributed to the  
15 understanding of the aging effects and has provided much of the technical  
16 basis the staff uses in evaluating aging management programs as part of the  
17 license renewal process.

18 We also are providing advanced fracture mechanics analysis  
19 methods and evaluation techniques for non-destructive examination that can be  
20 used in assessing some of the more complicated cracking problems we're  
21 encountering today.

22 I think you're all familiar with our recent activities in terms of  
23 supporting Davis-Besse, so I will not go into any detail on that, except to note  
24 that we are continuing to work on lessons learned task force action plan,  
25 looking at longer term issues of non-destructive inspection techniques and  
26 potential leak detection methods. We're also developing data and adapting

1 analysis methods to support staff evaluations of this mechanism, including  
2 evaluation of operational experience.

3 Let me go on to the next slide, please.

4 This viewgraph basically outlines some of the major initiatives  
5 we have ongoing in the waste area. The package performance studies, we're  
6 going through some public meetings. We received comments and they reflect  
7 diverse views of what we ought to be doing. We'll be working closely with  
8 NMSS in evaluating these comments and we will be seeking Commission  
9 feedback on this subject.

10 There is an issue I'd like to point out to you having to do with  
11 funding. We had expected to receive a portion of the Projects Fund from  
12 Department of Energy's Office of Civilian Radioactive Waste Management.  
13 That office received a substantial reduction in its proposed funding for 2003.  
14 And at this time it is just not clear that DOE funding would be available to us.  
15 This could impact our program. We are preparing a paper for your information  
16 on this matter.

17 In order to save time, I just would say very briefly that we're  
18 actively involved in looking at various aspects of cask, extension of licenses for  
19 cask, getting the right technical basis, trying to understand what the risks might  
20 be. And I might note a fair amount of that work has been done in-house, again,  
21 by our own staff. And that we're supporting NMSS in terms of clearance and  
22 entombment activities.

23 I go to the next slide, please.

24 So, in summary I hope I have tried to illustrate how our  
25 programs further the regulatory mission of the agency. As the Chairman noted,  
26 by providing technical basis, tools and information. And this support requires

1 that our focus remain on human capital issue. And I assure you that we're  
2 going to keep focusing on that issue. And our attrition rate in the office is  
3 somewhere between 7 to 10 percent, so this is going to be an ongoing issue  
4 for us.

5 We're ready to answer your questions now. Thank you.

6 MR. TRAVERS: Thank you, Mr. Chairman. That completes  
7 our presentation.

8 CHAIRMAN MESERVE: We'd like to thank you. That's  
9 obviously a huge range of activities that you have underway in your office. And  
10 it's clearly a central activity for the agency. Thank you for your briefing.

11 Commissioner Merrifield, I believe it's your opportunity to go  
12 first?

13 COMMISSIONER MERRIFIELD: Okay. Thank you very  
14 much, Mr. Chairman.

15 The first comment I would like to make this morning, although  
16 this is not available to the public, there was a backup group of supporting  
17 material that numbers about 140 some pages.

18 I do want to comment that this was a significant effort on the  
19 part of your staff to come up with these materials, and I have to compliment to  
20 the individual or individuals who are responsible for assembling this.

21 I have to say, as I was reviewing this material, I think it gave  
22 me a better overall snapshot of many of the activities that are currently  
23 underway in the Office of Research. And so I would highly encourage the  
24 continued use of this kind of a document for briefing the Commission, because  
25 I certainly feel a lot more well-informed than I have in years past.

26 The first question I want to ask you, you talked a little bit

1 about significant efforts underway relative to managing aging and significant  
2 success that you had in bringing on new hires. With ever problem you solved,  
3 it always seems that there's always a problem that arises. And that problem  
4 is making sure that you're transferring that knowledge that is unfortunately  
5 leaving through a door to that new generation of staff so that you've retained  
6 those skill sets. And I'm wondering if briefly you could talk about what tools  
7 and methodologies you're using to make sure that we don't have that loss of  
8 our intellectual capacity?

9 DR. THADANI: Yes, there are a number of things we're  
10 doing. And I'm going to give you a couple of points and ask Jack to expand on  
11 that.

12 We've identified 10 areas where we think double  
13 encumbering approach is important to bring staff on board while we still have  
14 the talent in-house. And we've identified ten such areas where we're moving  
15 forward.

16 Knowledge transfer, there are a number of initiatives that  
17 other agencies have taken on. And we're learning from them as to what are  
18 the best mechanisms for such transfer, and we have initiated an effort in that  
19 area. And I can report what progress we make down the road.

20 But let me back up. We identified at the outset what we  
21 thought were critical skills that we need in the office. We looked at what  
22 strength we have in the office; the front line, the bench strength and so on. We  
23 prioritized the importance in terms of where we should be focusing our  
24 recruiting efforts. And we have pushed two areas that I think are important.

25 One is mentoring. I've asked our senior staff to become  
26 mentors to our junior staff.

1                   Second, we have tailored our intern program to be responsive  
2                   to Research needs, which means as I noted, it's important for our younger staff  
3                   to get out and meet and work with researchers perhaps at institutions such as  
4                   universities where we're conducting research or national laboratories where  
5                   we're conducting research. So they work closely with us. And there's some  
6                   examples I can cite of that.

7                   But Jack has also been giving a lot of attention to this issue.  
8                   Perhaps you want to add?

9                   MR. STROSNIDER: Yes. I think as Ashok mentioned several  
10                  of the important areas.

11                  There's two additional areas that I would mention. And one  
12                  is I think we're effective use of the strategic workforce planning system to  
13                  identify and target specific disciplines that we need in the short and the long  
14                  term. We know for example that in the near term we're going to need some  
15                  additional expertise in digital instrumentation and controls, PRA, thermal  
16                  hydraulics, and we focus our recruiting then in those areas.

17                  And we can look even further out than that, and we know that  
18                  down the road we're going to be looking for structural and electrical engineers.

19                  Using double encumbering as Ashok mentioned is part of  
20                  how we train and bring some of the newer people up to speed in these areas.

21                  The second strategy that I want to mention is that we have  
22                  developed a staffing model. And I think it's a fairly sophisticated model in the  
23                  sense that it looks at our attrition rate, it looks at the areas how the budget is  
24                  increasing and where we're going to need to increase staffing. It's a living  
25                  model. We update it as we get new information in terms of people's plans and  
26                  also in budget changes. And we're using that. And in the sense of a growing

1 organization, which we are, we're looking at how we can start staffing against  
2 our '04 staffing plan now so that we'll have the resources we need to  
3 accomplish the work that's been identified for '04 and achieve full FTE  
4 utilization. So we have a model that we use for doing that, and I think it's very  
5 helpful to keep us on track.

6 COMMISSIONER MERRIFIELD: I don't know the agencies  
7 that you're directly interacting with. I know I did have an opportunity in the past  
8 few weeks to spend a fair amount of time with the Director of NASA's Huntsville  
9 Center. They had a lot of difficulties that they have, obviously, been going  
10 through recently, but they provided some interesting examples to me of how  
11 they've been attempting to grapple with the same issues. And I'm attempting  
12 not only to capture that, some of it even in video form, but also to make sure  
13 that they appropriately integrate that with their training function to their HR  
14 programs so that it really is a living program that can be used for training  
15 purposes.

16 So if you haven't had an opportunity to engage with that  
17 particular NASA office, maybe I can put you in touch with some of those folks.  
18 I think that might be a useful one to touch base with.

19 On the issue of NASA, you mentioned in your slides, the  
20 backup slides, some ongoing work that we have relative to activities that they  
21 have on the Mars exploration Rover. NASA Administrator Sean O'Toole has  
22 also commented quite explicitly about some of his vision of the increased  
23 utilization of nuclear resources in space exploration. And I'd be interested,  
24 perhaps not today but at some later point, in a greater understanding of how  
25 our research efforts are appropriately coordinated with where they hope to go  
26 so that we can provide some backup and appropriate oversight in that area.

1 MR. NEWBURRY: Could I comment?

2 COMMISSIONER MERRIFIELD: Briefly. I have limited time,  
3 but yes.

4 MR. NEWBURRY: We'd be happy to do that. There's a  
5 number of things that go beyond, well beyond those slides that we could share  
6 with you on our interaction with NASA on formal and informal basis.

7 COMMISSIONER MERRIFIELD: Right. I know we've had a  
8 strong history of that in the past in having a supporting role. And I certainly  
9 encourage the staff to continue in that regard.

10 Obviously there's been a lot of work that the agency has done  
11 on the issue of high burn up fuel. I know Commissioner Diaz has had a number  
12 of comments about that in the past that I strongly agree with.

13 Where that manifests itself now is, to a certain extent, in the  
14 issue of dry cask storage. One of the concerns that has been raised, and I  
15 don't know whether it's legitimate or not, is the concern that as the time that we  
16 spend in terms of continuing our research on this progresses, utilities which are  
17 faced with dealing with the fuel are taking some of the fuel which has been a  
18 pool a much longer period of time, getting that into casks and leaving them with  
19 pools filled with fuel which is much hotter, to that extent. The complication as  
20 at least presented to me, is that down the line that won't give them the  
21 opportunities to use the older fuel in the outside of the cask with the hotter fuel  
22 on the inside. And I'm just wondering if that's one of the issues that you're  
23 grappling with and are we to see relatively soon a resolution one way or the  
24 other in terms of where we're coming on that matter?

25 MR. TRAVERS: Let me ask Dr. Eltawila to address that.

26 DR. ELTAWILA: I think we aware of the concern that you

1 mention. And we are working with the NMSS, and we have already developed  
2 burn up credit but for -- only. What's this new cask design to put the hot fuel  
3 inside and the cold fuel on the outside would need additional credit more than  
4 that -- and we are trying to get information from France about the fission  
5 product credit, and that will allow them to incubate this design.

6 So it's expansion on what we have done. We are waiting to  
7 get the information from France, and will provide this year update with NMSS.

8 COMMISSIONER MERRIFIELD: Thank you.

9 Two last comments before I pass the mike.

10 You did comment in your presentation about NUREG 1730  
11 and the concerns about spent fuel pools and how that report has been utilized  
12 in various arenas. I would strongly encourage the staff to proceed  
13 expeditiously in providing that information to the public.

14 One of the things, obviously, we are concerned about here  
15 is public confidence. And it is concerning, and I know many members of the  
16 Commission have commented previously that when we have a report that we  
17 don't have confidence in, as we did at the time, that we be able to provide  
18 updated information to the public so that that dated information is not used in  
19 a way in which we as an agency would not agree.

20 A final point is I did notice in the backup slides there is some  
21 efforts underway on the issue of safety culture, and taking a look at that in  
22 Research. As you are well aware, the Commission I know in particular, I have  
23 commented about the hesitancy about getting too involved in management  
24 issues at the units. Obviously, there's a careful balance that we need to strike  
25 there.

26 I would be interested in further briefings from the staff

1 subsequent to this to give me some better sense of where you're going on that.

2 DR. THADANI: Yes. We'll be pleased to brief you  
3 Commissioner. The only clarification I want to make sure and make right now  
4 is this is not focused as much on the organizational factors, aspects. It's more  
5 focused on actual data, root causes, what are we learning from that. And we're  
6 working with NRR and we're expecting to put together an information paper.  
7 And just to be sure, we have not embarked on any research in this area. And  
8 we won't until Commission says okay.

9 COMMISSIONER MERRIFIELD: Okay. Thank you.

10 CHAIRMAN MESERVE: In this forum, I don't want you to go  
11 further than you can, but you talk some about your spent fuel pool study and  
12 your efforts to revisit that with more precise analysis.

13 You indicated and emphasized in the summary of it that your  
14 analyses show that in contrast with NUREG 1738 that there was a much  
15 smaller release that is likely to occur and that the amount of fission product  
16 release from an incident of spent fuel pool is likely to be much smaller. So the  
17 consequence part of the risk component is less.

18 Could you say something more about the probability side?  
19 The risk, of course, is the probability of an event times the occurrence and you  
20 emphasize the consequence has gone down, but you didn't say much about  
21 the probability of there being an event. And I would have thought, for example,  
22 that based on our previous discussions that you had reached conclusions that  
23 it would be much more easy to cool the fuel than you had previously assumed,  
24 for example.

25 MR. THADANI: Yes. The probability is clearly lower than  
26 what one would have expected in the past. There are a number of factors that

1 go to that issue.

2 First of all is the location of the pools. Most of them are  
3 under grade and most of them have other structures around which protect from  
4 physical attacks.

5 We believe that the pools, as I indicated in my remarks, are  
6 much more easily cooled, which means there's extended time period available  
7 for actions.

8 All of these factors, including a number of actions of the  
9 utilities, the industry has already taken, all of these factors actually go towards  
10 reducing the probability of actual damage to the pool.

11 And Chairman, our objective is to lay out all these pieces, try  
12 and understand what these probabilities might be, even if there are discussions  
13 and difference of views about the initiating event itself. There may be different  
14 viewpoints on how likely that is. Certainly some of the initiators, likely, it has  
15 been reduced significantly by actions taken by the Government in a number of  
16 ways. But the reason for us doing these two plant integrated studies but was  
17 to lay out each piece in a systematic way and try to assess how likely is it, what  
18 is the outcome each piece of the way. And that's what we expect to complete  
19 this September.

20 CHAIRMAN MESERVE: The summary conclusion we should  
21 draw from this is that the risk associated with spent fuel pools is much less than  
22 one might imagine from NUREG 1738 or some of these other documents.

23 DR. THADANI: Significantly lower. And we're pretty confident  
24 of that view.

25 CHAIRMAN MESERVE: I know that from conversations I've  
26 had with licensees as they come through the office, that they seem to be

1 seeing increased numbers of fuel failures that are not necessarily associated  
2 with higher burn ups.

3 DR. THADANI: Right.

4 CHAIRMAN MESERVE: Is Research following that and what  
5 are you going about it?

6 DR. THADANI: I think the answer -- go ahead.

7 DR. ELTAWILA: We're trying to follow this information, but  
8 this is not our usually take care of the operating fuel characteristic and things  
9 like that. But if the fuel failure is due to corrosion and/or the water chemistry  
10 and things like that, we try to take that into account to test this cladding and try  
11 to identify the properties that could cause this to happen. And we will work  
12 closely with NRR and try to identify means to mitigating this sequence. But  
13 operating failure usually have very low consequences. It is important for the  
14 industry, but from a risk point of view, we don't have any risk significance. Yes.

15 MR. TRAVERS: There's quite a lot of suspicion on  
16 manufacturing issues. There certainly is a lot of attention to make sure that  
17 chemistry and other factors in the context of operation aren't at play here. But  
18 we do follow it. And, as I've mentioned, NRR is on point for most of that at the  
19 moment.

20 DR. THADANI: Go ahead.

21 MR. STROSNIDER: I could add one more comment in this  
22 area, that Electric Power Research Institute has what they call a robust fuel  
23 program looking at this reliability under normal operating conditions. In fact, I  
24 participated in a conference last week where they were discussing that. So  
25 we're familiar with what they're doing. And the interesting thing, from my  
26 perspective on that, is that when they resolve some of these operating

1 problems, that's going to open the door to go to higher burn ups and more  
2 advanced fuel. And that's what they're focusing right now, but that's the next  
3 step when they resolve some of those issues. And that's an area that we're  
4 focused on very carefully with NRR looking at those implications.

5 CHAIRMAN MESERVE: Commissioner Diaz.

6 COMMISSIONER DIAZ: So you're saying that this fuel  
7 failures and the interests of the industry in resolving them now rather than later  
8 is not going to impact in the high fuel burn up fuels coming into play? I thought  
9 that might delay the high fuel--

10 MR. STROSNIDER: Well, no. Actually what I was suggesting  
11 based on what I heard last week is that the industry recognizes they need to  
12 resolve some of their fuel reliability issues under normal operating conditions  
13 so that they can then move onward to going to higher burn ups.

14 COMMISSIONER DIAZ: So there might be a delay?

15 MR. STROSNIDER: Yes.

16 DR. THADANI: If I may just, talking to the industry they  
17 clearly, as what I understand, is that they are looking at going beyond 62,000  
18 megawatt days per metric ton. But certainly not looking at this time to go  
19 beyond 75,000 megawatt days per metric ton. And they recognize, they've said  
20 very clearly, that in terms of priorities they want to make sure that the problems  
21 they're having during operation are getting immediate attention.

22 So I think that's the path that at least I sense the industry  
23 taking.

24 CHAIRMAN MESERVE: Let me close with two very general  
25 questions, and if you can't answer them shortly, don't try.

26 One has to do with the really fundamental challenge that we

1 confront in our reactor oversight process, which is we've seen some situations  
2 where we've had licensee performance go from green to red very quickly. We'd  
3 like to have a capacity to be at greater predictive capability so that we can  
4 intervene and give guidance to the licensees to intervene if necessary before  
5 there is that degradation.

6 What is Research doing to help to increase the predictive  
7 capacity of various elements of the TOP?

8 If you can't answer that quick, I realize this is a very broad  
9 question.

10 DR. THADANI: Yes, it's very broad.

11 CHAIRMAN MESERVE: It's a very fundamental question for  
12 us and our activities.

13 DR. THADANI: I'll just say two things, and then perhaps  
14 Scott wants to add to that. But I know time is short.

15 First, I think we, as I indicated, the analytical tools need to  
16 recognize that there really is not a clear debarkation at any given point. There  
17 are continual that one has to think about. And we need to make sure we have  
18 the tools to help the staff in understanding that better.

19 Second, that there are some characteristics that you just can't  
20 go from green to red right away. So there are warnings so time is available.  
21 There are some cases where that could happen.

22 We are now looking at the recent set of comments provided  
23 by the Advisory Committee on TOP, and we've been working with NRR to see  
24 how best we can address some of the questions that they have raised in this  
25 letter.

26 CHAIRMAN MESERVE: Okay. My final question is one is

1 that, I think, central to the thinking of everyone in the Commission. And that is  
2 that we've had very a major effort of thinking through and attempting to revise  
3 our regulatory program to use risk-informed insights. It's gone much more  
4 slowly than any of us might have hoped, but we're working the problem. There  
5 are going to be some things I think the Commission is going to be doing in the  
6 near term that will help move the ball forward.

7 Where are we going to go next? I mean, we have ECCS  
8 issues, you mentioned. We have the combustible gas, 50.44, with special  
9 treatments that we're dealing with, pressurized thermal shock you mentioned.  
10 What's the next step?

11 DR. THADANI: I'll give you this as my own view. And that is,  
12 certainly we work with the industry, as you know, and our own staffs to identify  
13 targets that can and ought to be risk-informed in terms of existing regulations.  
14 And we identified that process in an earlier Commission paper, and we follow  
15 through on that, screening and deciding which parts to go through.  
16 Commissioner Diaz in the past has raised a question about coherence.

17 One of the elements, one of the policy issues, and there's  
18 seven policy issues that I indicated for advanced reactors, quite frankly in my  
19 mind could apply to operating reactors, and that's the following. Regulations  
20 have to be driven by more than just core damage frequency and large early  
21 release frequency. Those are good attributes, but they're not sufficient  
22 attributes to look at regulations. And we have proposed an approach in this  
23 Commission paper which would provide this potential for even small problems,  
24 how to do deal with those, but use risk-informed thinking in addressing those  
25 issues.

26 And until in my view, until and unless the Commission says

1 that's the path we want to take, we want to adopt that thinking of goals which  
2 are not just driven by two points, I think we are forced in my view, we're forced  
3 to take a piecemeal approach. And if the Commission were to adopt a revised  
4 approach, then one could really take that as a driver to examine all the  
5 regulations and see how well they really fit with this philosophy. Until then, we  
6 are sort of looking where it has maximum value and the changes we might  
7 make from safety as well as cost perspective. And we do interact with various  
8 stakeholders to identify those areas. And it is piecemeal. It is one at a time.  
9 But I think a broader approach would probably require some Commission  
10 direction.

11 CHAIRMAN MESERVE: We could probably have a lot of  
12 discussion about that. Let me defer Commissioner DICUS.

13 COMMISSIONER DICUS: Thank you, Mr. Chairman.

14 I've always expressed a great interest in our international  
15 programs, and I still have it. I appreciate the comments that you made about  
16 it.

17 My question is do we really have a balanced two-way flow,  
18 are we getting as much as we're giving or vice versa, are we please with what  
19 we are getting? You mentioned, for example, learning from the French. So  
20 how are we doing?

21 DR. THADANI: If I may use some sort of a balance sheet,  
22 I would say in balance I think we're doing very well. We get significant amount  
23 of information for limited amount that we contribute to cooperative efforts,  
24 whether they're bilateral or multilateral.

25 We gain significantly also in that in some areas true  
26 expertise, really state-of-the-art expertise may lie elsewhere. And I mentioned

1 networking, and I think that's a very important element of what we do. We need  
2 to know whose truly up to date on what's going on in the information basis and  
3 so on.

4 There is a downside. And downside is when we participate  
5 in these programs, we can't necessarily drive them to an end point at a given  
6 time because that's what we want. We have to work in a cooperative  
7 arrangement. But I would say on balance, it works very well, not only in specific  
8 research areas, but also in the area of operating experience.

9 I mean, if there were time, I could share with you some of the  
10 rather useful information we get.

11 COMMISSIONER DICUS: We'll do it at another time, then.  
12 Because I recognize the time issue we're dealing with.

13 On your slide 9 on the overall effectiveness of the generic  
14 issue process is under review, and I might have missed it when you went over  
15 that particular bullet item. But, you know, one of the issues does relate to  
16 Davis-Besse, and we noted the head cracking problem. And we said, you  
17 know, licensees you need to look at this but then we didn't follow up to kind of  
18 be sure this was being done. So when you look at the generic issue process,  
19 are you incorporating into that a follow through?

20 DR. THADANI: Generally the generic process --

21 COMMISSIONER DICUS: And that would go to maybe  
22 NMSS or NRR, but we can't drop the ball.

23 DR. THADANI: No. As an agency I think that this is an  
24 important issue. And as an agency we have attempted to go from beginning to  
25 end. And what that means is when an issue is identified, it's prioritized and we  
26 think there may be some reasonable solutions to the problem. We identify



1 COMMISSIONER DICUS: By the recruit?

2 DR. THADANI: By the individuals.

3 COMMISSIONER DICUS: Because to me we don't have a  
4 real high success rate here, and I wonder if it's something different that we  
5 could do if only 3 have accepted and 4 have declined, and 4 we're trying to talk  
6 into coming, I guess is what I would interpret that to mean.

7 DR. THADANI: If I can, sort of from my personal experience.  
8 I went to Drexel University for recruiting purposes. And we were one of 73, I  
9 think. I could be wrong. Seventy-three organizations interviewing the  
10 graduates. There was -- that competition may be going down now, but there  
11 was pretty intense competition.

12 COMMISSIONER DICUS: Okay.

13 DR. THADANI: For good people. By and large, we're only  
14 looking at pretty much top notch graduates.

15 COMMISSIONER DICUS: We having a problem with the pay  
16 scale and trying to compete with private industry?

17 DR. THADANI: There is an issue there, but we have now got  
18 some flexibility, as you know, in terms of offering some incentives to new hires.  
19 And we're trying to utilize all of that in our recruiting.

20 COMMISSIONER DICUS: Okay. And the issue that 25  
21 percent of the staff is new, you addressed that. And then the bullet above this,  
22 and I'm looking, as I said, backup slide 9 that 11 of the 28, 39 percent of the  
23 direct technical new employees were interns or entry level. But I think you also  
24 mentioned that you have hired experienced staff?

25 DR. THADANI: Yes. Yes. We --

26 COMMISSIONER DICUS: What's the ratio, roughly? Do you

1 know offhand?

2 DR. THADANI: Jack, do you know?

3 MR. STROSNIDER: Look at the number of the 25 percent  
4 of the new staff that we hired, about 39 percent of those are interns or new  
5 hires. Okay. And you want that broken down. I think it's probably around half  
6 and half. We could get you the exact numbers.

7 COMMISSIONER DICUS: Okay. All right. Maybe that can  
8 be a follow up.

9 MR. STROSNIDER: But we have a good mix, I think, of  
10 people coming right out of school and people who are experienced  
11 researchers. And, you know, we've looked at maintaining that sort of mix in  
12 what we're doing.

13 COMMISSIONER DICUS: Okay. That's a little bit what I was  
14 concerned about. You had mentioned having historical knowledge transferred  
15 and having too many new people. And 25 percent staff is new is pretty  
16 substantial.

17 Well, at any rate. So I think you've answered my question.  
18 And I may want to follow up on a breakdown on that.

19 And, Mr. Chairman, that concludes my questioning.

20 CHAIRMAN MESERVE: Commissioner Diaz.

21 COMMISSIONER DIAZ: Thank you, Mr. Chairman. I also  
22 would like to take this opportunity to enter into the record that I do consider it  
23 a privilege and a pleasure to have worked with you all these years, both  
24 challenging and very productive.

25 I think you're special kind of leadership has been extremely  
26 productive to this agency. And I consider it a personal privilege to have been

1 working with you.

2 You have been effective and you will be missed.

3 Now, effective is something that Mr. Thadani has tried to talk  
4 about when you talk about efficiency, so I'll go from that word to you.

5 I'm just moving my chair a little bit in here, because I think  
6 this a word that we sometimes use around, but it does have some special  
7 meanings. And I sometimes get worried that I don't have all the information to  
8 really see where efficiencies are being achieved. And I, for one, having spent  
9 a couple of years of my life doing research, I always try to put efficiencies at the  
10 front end rather than on the back end. And I don't get enough information to  
11 know that that has been done.

12 And I think when we get into the budget cycle, I like to see  
13 how efficiencies are being considered at the front end of the spectrum, not at  
14 the back end. Not when you look at the process. That means being selective,  
15 being putting things in the proper perspective. And I think new functions are  
16 vital to this agency, and we need to know that the spectrum of issues are  
17 looked at the very beginning, things are properly discriminated, not only for the  
18 importance, but for the sake of so the how, the when are very important. And  
19 the what, of course, follows from the directions that you've been given. So I  
20 would look forward to receiving that information. Because I'm going to look at  
21 what is being done at the front end, not at the back end.

22 DR. THADANI: Commissioner, could I comment?

23 COMMISSIONER DIAZ: Yes, please.

24 DR. THADANI: I think it's an important point you've raised,  
25 and it's important for Research in particular, because some of these efforts  
26 can be rather expensive. And we have an extremely focused approach to

1 prioritize what we work on. We look at the agency's performance goals, but we  
2 go quantitative actually. And we look at impact on public health and safety in  
3 a quantitative way. This means potential for damage to core and that sort of  
4 stuff. We look hard at what sort of information would be needed to get to some  
5 end point. What the costs would be. And is there a way up front that we can  
6 utilize our resources in a more efficient way.

7 All of these things we try to do up front. We try and identify  
8 if there's cooperation and we sometimes if there isn't, we realize that this  
9 project is going to be expensive, we go outside and we seek partners.

10 So for Research, I think it's an important issue to look at  
11 these things up front. And we'll be happy to share those with you.

12 COMMISSIONER DIAZ: And, of course, it all starts  
13 sometimes with what are the fundamental assumptions that go to establish  
14 what the research project is and how those are realistically assessed and put  
15 into a program that at the end of the program we will come back with a  
16 significant number of deliverables rather than occasionally it happens that we  
17 end up with a recommendation for continuing work. And that's something that  
18 has worried us for some time.

19 And I know you're making significant improvements on those  
20 areas, but it's an area that I think it's important for the Commission to look at.

21 I am going to add my voice to what has already been said  
22 regarding the importance of the vulnerability assessments, spent fuel pool. I  
23 believe that is not only our responsibility, but is our obligation to tell the  
24 American people what we believe are the best, you know possible results  
25 scenarios. Whatever they look like, we need to do that and we need to do that  
26 sooner than later.

1                   Whenever we leave these gaps open to speculation, the  
2 results are not that, you know, somebody just publish a paper. It actually goes  
3 into many times creating fears in papas and mamas, which are the heart of this  
4 land. And I think we need to be very conscious that we need to accelerate the  
5 efforts. Not to put them out before their time, but in any manner that we can  
6 responsibly put these things in the public so they can be put in the proper  
7 perspective, I think it will be invaluable to the agency and to the nation. And I  
8 encourage you to proceed as expeditiously as possible in this direction.

9                   I'm very pleased with the results on the PTS. I think this is a  
10 very good piece of work. I think these are, you know, issues that when we  
11 isolate on them and we master them, it can show what results can be done.

12                   I believe that in the area of risk-informed regulation, or I'm  
13 predicting that you're going to have -- although most of the time I'm wrong --  
14 but I'm predicting that you will have a totally new slate of things to look at. And  
15 we are very interested in looking at those kinds of things.

16                   The Chairman already asked you the question where are we  
17 going, and I think that is a valid question for the Commission. You said there  
18 is a paper coming. I look forward to receiving that paper and having the proper  
19 interactions with you trying to make sure that it is.

20                   And that's all, Mr. Chairman. Thank you so very much.

21                   CHAIRMAN MESERVE: Mr. McGaffigan.

22                   COMMISSIONER McGAFFIGAN: Thank you, Mr. Chairman.

23                   I join Commissioner Diaz and all my colleagues in reiterating  
24 how much of a pleasure it's been to have you here. And I won't repeat all of my  
25 remarks yesterday, but --

26                   COMMISSIONER DICUS: My remarks yesterday are on the

1 record.

2 CHAIRMAN MESERVE: We'll have them incorporated in the  
3 record.

4 COMMISSIONER McGAFFIGAN: Right.

5 I'm going to talk -- I think you did a valuable thing today, Dr.  
6 Thadani, in talking at least initially about the results of your work on the spent  
7 fuel pool work. But there's a couple of things that you said that I don't  
8 necessarily agree with, and so I'm just going to tell you that.

9 I want to talk a little bit about the history of 1738 on the  
10 record, NUREG 1738, just so the public understands how the Commission --  
11 and I think I'm speaking for the Commission, but if not others can chime in.

12 The Commission had great skepticism about that document  
13 when it was presented to us in January of 2001. I underscore great; very, very  
14 large skepticism about that document. We thought it was making bounding  
15 assumptions that in many cases were not physical. But staff felt so  
16 passionately about putting it out, that we put it out.

17 Then we held a Commission meeting in February 2001. That  
18 Commission meeting transcript, unless something has changed in the last  
19 couple of days, is not on our web page. Because when we redid our security  
20 review, one of the few documents that did not past muster by the staff for  
21 putting back on our web page was the transcript of that meeting.

22 Now, NUREG 1738 remains on our page web.

23 ANNETTE VIETTI-COOK: They put it back on. It's back on.

24 COMMISSIONER McGAFFIGAN: Is it back on? Okay. Well,  
25 I'm glad it's back on. Because the skepticism displayed by the Commission on  
26 that day was not on our web page.

1                   Now the skepticism demonstrated by the Nuclear Energy  
2                   Institute using EPRI and other research was not on the web page. I'm glad it's  
3                   back on the web page today. It hasn't been for a year.

4                   So then we didn't in the SRM on that meeting say we hate  
5                   NUREG 1738 because the staff convinced us that we were going to get a  
6                   paper, and it was ultimately SECY-01-0100 that we did receive, I think in June  
7                   of 2001 where the staff basically again said, more or less what you said today  
8                   Dr. Thadani, that we don't really think that it's worth getting a peer review of this  
9                   paper. We've done enough, it's not resource effective for our purpose, which  
10                  is do we need to do anything with exemptions of decommissioning reactors.  
11                  Even though we've made these wildly conservative nonphysical assumptions,  
12                  we still get the right answers. So please let us not do it. We never voted on that  
13                  paper. That paper was withdrawn after September 11, correctly. And we never  
14                  really were given the opportunity as a Commission to say whether we thought  
15                  that document should be peer reviewed.

16                  I personally, you can tell from my remarks, was going to vote  
17                  for having that document peer reviewed even before September 11th.

18                  The danger we have with these documents that you all  
19                  produce where I think your words were "simplified assumptions," "not cost  
20                  beneficial to expend additional resources for fixing it" -- those are the words I  
21                  took down -- the problem you have with those papers when you do them is the  
22                  unintended consequence. That, you know, you are Exhibit A in this Princeton  
23                  paper that we received on the 29th of January and was briefed to the Congress  
24                  on the 29th of January and which was allegedly peer reviewed for publication  
25                  in this Princeton journal.

26                  Apparently peer review at Princeton means you get

1 somebody like Per Peterson, a distinguished professor at the University of  
2 California Berkeley telling you it's not a very good paper and you say "Thank  
3 you very much, and we're still going to publish it." And that apparently is what  
4 peer review means in the house journals of some of these anti-nuclear  
5 activists, which I guess Princeton has become.

6 We could see that coming. We could see that this document  
7 would be misused. And I think it's terribly important. We have all these NUREG  
8 CRs and NUREGs, and you guys make these simplifying assumptions, and  
9 they get you past the day, and then they come back and haunt us. And so you  
10 can't fix all the problems of the past, although I personally think a lot of those  
11 documents should simply be withdrawn or, you know, big red marks have to be  
12 put at the front "This document does not mean what various people interpret  
13 it to mean, misinterpret it to mean." But going forward our analysis has to be  
14 more realistic.

15 And it doesn't just happen here. NUREG 1717 that I think  
16 your office is responsible for is another document. I mean, it's hard sometimes  
17 in NMSS and material space to tell which office is responsible. But it's another  
18 document where it's at least a factor of 40 off in its estimates as to what  
19 zirconium sand -- somebody working in the zirconium sand industry would likely  
20 get in the way of dose. Because it made a bunch of, you know, simplifying  
21 assumptions that are wrong.

22 But that case, that influences us to do a lot of potentially  
23 stupid things in rulemaking, or whatever it is. People sort of carry in their head,  
24 oh my God somebody working in the zirconium sand industry can get 4 rem  
25 dose when it's hard to imagine anybody getting more than 100 millirem working  
26 in that industry.

1                   So I urge you going forward to do reasonable best estimates  
2                   sorts of research and to not allow you or your contractors to come up with silly,  
3                   you know, bounding research because it has a lot of unintended  
4                   consequences. Okay.

5                   Let me ask you, I'm going to just try to get a couple of other  
6                   things out in the record about spent fuel pool stuff.

7                   The Academy of Sciences last year in its report to Congress  
8                   and to the President, and to the nation about terrorism said the following: "The  
9                   threat of terrorist attacks on spent fuel storage facilities like reactors is highly  
10                  dependent on design characteristics. Moreover, spent fuel generates orders of  
11                  magnitude less heat than an operating reactor so that emergency cooling of the  
12                  fuel in the case of an attack could probably be accomplished using low tech  
13                  measures that could be implemented without significant exposure of workers  
14                  to radiation."

15                  Is there anything in our research that would do anything but  
16                  endorse what the Academy's preliminary judgment was?

17                  DR. THADANI: No, I agree with this. And that's coming out  
18                  of the result of our analysis.

19                  COMMISSIONER McGAFFIGAN: Okay. I know you're trying  
20                  to produce your piece of research, but is there any chance that the staff can do  
21                  a critique of the Alvarez study shortly that gets -- what is happening at the  
22                  moment, if you read our press clips, is that the authors of that study are merrily  
23                  going around the country to whatever site, you know, recently it was Diablo  
24                  Canyon, Indian Point is another one of their favorite sites, saying things that  
25                  result from their study that are wrong, but there's nothing that we have out  
26                  there that says that this study is deeply, deeply flawed and makes assumptions

1 that are wrong, partly using our own studies, unfortunately, that we have to  
2 withdraw.

3 But is there a chance that we can have a hard hitting critique  
4 of the Alvarez study anytime soon?

5 DR. THADANI: A critique can be done. I have to ask Dr.  
6 Eltawila. Because the key staff are also engaged in some of the high priority  
7 efforts. But we'll have to go through our system -- I'm hesitating on timing  
8 because I need to make sure we know what it is that we're not going to deliver  
9 to you, basically.

10 COMMISSIONER McGAFFIGAN: Well, see, I think that part  
11 of your answer there demonstrates a tendency in the staff -- I think you can get  
12 a hardhitting critique that sort of undermines the study deeply by spending a  
13 day on it if you have somebody who knows their stuff. You can then do the  
14 perfect critique, on which I don't know how many days you could spend, but it's  
15 a large number. And waiting for the perfect critique at day infinity means that  
16 we don't play for all those days. If coming up with the one day critique, which  
17 I think your staff should be able to do, puts us on the mark and gives our public  
18 affairs people and the various regions, gives the Commissioners, gives the  
19 senior staff -- you know, they're getting beat up with it. Our staff is getting beat  
20 up with this study as they do the annual performance reviews at various reactor  
21 sites as part of the reactor oversight process at the moment. And without  
22 guidance, they're doing I think a decent job, you know, of fending it off and  
23 saying that we don't believe the study.

24 But I don't know that they're doing it based on guidance. I  
25 haven't seen any guidance from you guys that the average branch chief from  
26 a region should use when this infamous study is brought up to them.

1                   COMMISSIONER MERRIFIELD: Can I jump in for a second  
2                   on that. I don't want to have any mis-impressions left out there, which I'm  
3                   certain you're not intending to do. Your intention wasn't to sort of give an  
4                   outcome determinate to the staff. It was really saying let's take a look at that,  
5                   at the report, and let's get --

6                   COMMISSIONER McGAFFIGAN: I'm just saying I personally  
7                   am sure that the report is deeply, deeply flawed. I can do my own analysis on  
8                   the report. When it talks about fuel air explosives, it's absolute nonsense, and  
9                   I know that from my past. But --

10                  COMMISSIONER MERRIFIELD: Don't take it the wrong way.  
11                  I just want the public to recognize, we want our staff -- the public expects us to  
12                  provide accurate, honest, balanced information. And what you're asking of our  
13                  staff to do, I think, from your question is to provide it in a timely manner. And  
14                  we had an example -- if may make one further comment. We had equivalent  
15                  example of this with the Tooth Fairy issue.

16                  COMMISSIONER McGAFFIGAN: Right.

17                  COMMISSIONER MERRIFIELD: Where there were  
18                  individuals who had a report that was talking about Strontium 90 exposure in  
19                  various nuclear plants. Our staff did an analysis of that and ultimately we put  
20                  that out. That was a very helpful document for the state regulators and for  
21                  others who recognize a more balanced, fair and honest perspective on those  
22                  actual exposures. And I think that's what you're asking?

23                  COMMISSIONER McGAFFIGAN: That's exactly what I'm  
24                  asking for, and I suspect a good critique -- although the staff in all honesty  
25                  when they finally did the Tooth Fairy critique, as you had pressed for  
26                  Commissioner Merrifield, we probably did more than was actually necessary.

1 I mean my recollection is our critique of the Tooth Fairy Project is quite a  
2 voluminous document. And I think, the States probably -- Jill Lipoti,  
3 Commissioner Dicus' friend, would have probably been happy with even a  
4 shorter answer, a little more timely.

5 But it's out there now and every time we have a meeting  
6 where the Tooth Fairy Project folks show up on a license renewal  
7 environmental impact statement meeting, we can rebut it. So I think that is a  
8 good precedent for what I'm looking for here. And my guesstimate is that the  
9 answer is going to be very similar to the answer that the staff gave us on the  
10 Tooth Fairy Project.

11 COMMISSIONER MERRIFIELD: Really what you're calling  
12 for is for our staff to get out there and knock down bad signs and provide  
13 accurate information to the public so they can make a better judgment.

14 COMMISSIONER McGAFFIGAN: Promptly knock down bad  
15 science.

16 COMMISSIONER DICUS: I have to tell you that Jill Lipoti  
17 took our big report and condensed it to about 2 pages.

18 COMMISSIONER McGAFFIGAN: Well, I'm glad that -- and  
19 she probably circulated to her fellow Conference of Radiation Control Program  
20 Directors, and I'm sure it's much more relevant to a news media person than  
21 the thicker report that we produced.

22 But let me mention one last issue. I probably hit that one. The  
23 frustration here is high because this issue first came up in May of last year,  
24 May of 2002, when the Chairman was testifying before the Environment and  
25 Public Works Committee and words were expressed. And so the Alvarez  
26 study, I could see that punch coming and I could see it coming last May. And

1 the frustration that we don't have good information to share with the public,  
2 other than this first effort.

3 I mean, I commend you for making this first effort today to put  
4 some words down as to what we think the truth is. But I think we need, as all  
5 of my fellow Commissioners have said, we need to follow that up.

6 DR. THADANI: First of all, let me say that the Princeton  
7 study certainly we can put together a critique. There are a number of areas  
8 where we do question what's in that study.

9 I think it's also important that we do this, and I'm sort of  
10 reacting to one day, only because we need to do it in a way that it doesn't  
11 become counterproductive down the road. We need to be thoughtful and not only  
12 cover the technical basis, which we will, but we would also coordinate with our  
13 colleagues, NSIR and NRR, in terms of making sure that there aren't things  
14 we're missing in terms of what's claimed in that study.

15 So I'm only indicating that I don't think one can do that in a  
16 day, probably it's a matter of weeks, I think.

17 COMMISSIONER McGAFFIGAN: Could you imagine -- I  
18 mean I'll just --

19 DR. THADANI: A couple of weeks, perhaps.

20 COMMISSIONER McGAFFIGAN: I was hoping I was finished  
21 with this, but I'll ask a leading question. Could you imagine the staff making a  
22 recommendation at the end of the research you're currently conducting that we  
23 launch a crash national program which is underestimated in the study to cost  
24 \$3½ to \$7 billion because they don't take into account all the costs that would  
25 be required, to get all spent fuel more than 5 years old out of spent fuel pools  
26 and into casks? Can you imagine that being a possible conclusion of a sane

1 NRC study?

2 DR. THADANI: No.

3 COMMISSIONER McGAFFIGAN: No. Okay. We can say  
4 stuff like that the first day.

5 DR. THADANI: Yes.

6 COMMISSIONER McGAFFIGAN: Per Peterson said that in  
7 his critique that we have.

8 DR. THADANI: Yes.

9 COMMISSIONER McGAFFIGAN: He said that to Princeton,  
10 and they said thank you very much, we'll publish the study.

11 DR. THADANI: Yes.

12 COMMISSIONER McGAFFIGAN: Okay. One last issue I'll  
13 just mention in passing.

14 I personally think that one of the problems this office has is  
15 there isn't enough emphasis on materials. If I go through all these backup  
16 slides, and basically what happens in the materials areas in all honesty is  
17 NMSS does most of its own research. It came up in the RDD report this  
18 summer, and I understand it. Because the competence is there. I mean, I see  
19 Cheryl at the back and she's a fine upstanding person, and she does a great  
20 job. But she's a tiny afterthought, and her group a tiny afterthought in this  
21 office dominated by all you reactor guys at the table.

22 And NMSS has real --

23 COMMISSIONER MERRIFIELD: I'm going to rise to the  
24 defense Cheryl Trottier. She's in no way an afterthought to this Commission.

25 I mean, Commissioner, I would correct the record on that  
26 one.

1                   COMMISSIONER McGAFFIGAN: I think she's a great  
2 person. I think she does great work with minimal resources. But I think you  
3 have to think about some day fixing this issue, which is that we have to grow  
4 the research that's being currently done in NMSS and get into research. That  
5 is a delicate dance that is going to have to be done over a period of time. But  
6 I think the competence to do a lot of the health physics research and to monitor  
7 the work that is done for us by contractors in the health physics arena, most of  
8 that competence resides in NMSS, and therefore we use it. Therefore, when  
9 an RDD issue comes up and we have Sandia doing reports, we run it out of  
10 NMSS.

11                   At some point a much more robust materials focused  
12 program, which basically will move some of that stuff from NMSS to you and  
13 do it such a way that Marty Virgilio is comfortable with, that he's not losing the  
14 ability to do things rapidly and all that, that would be a useful thing.

15                   I think it's going to take years. I'm not proposing we do it  
16 today. But I think it is a weakness in your office, and some day I hope there's  
17 enough materials research going on in your office that the person who is in  
18 charge of the materials research deserves a seat at the table. But that's, you  
19 know, not in the second row.

20                   So I just say that in passing and leave it as a final comment.

21                   COMMISSIONER DICUS: I have this feeling that at the next  
22 briefing of Research Cheryl will be sitting at the table.

23                   COMMISSIONER McGAFFIGAN: Even if nothing has  
24 changed.

25                   COMMISSIONER DICUS: Having my strong belief in health  
26 physics and obviously the materials program.

1 CHAIRMAN MESERVE: Good.

2 Well, we've come again to the end of another happy hour.

3 COMMISSIONER MERRIFIELD: You will really miss this at  
4 Carnegie, aren't you?

5 CHAIRMAN MESERVE: I'd like to thank you for a very  
6 helpful briefing.

7 And let me say again how much I've enjoyed working with all  
8 of you, both the staff and all my colleagues on the Commission. I have the  
9 greatest respect for all of you, and I am going to miss you.

10 With that, we're adjourned.

11 (Whereupon, at 11:41 a.m. the briefing was adjourned.)

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