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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

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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 value
7 you have provided to this Commission is very, very difficult to calculate, because
8 it's been enormous. And it's been a real pleasure to get to know you and really
9 understand you over these years, and so I do want to comment on that.

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

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

19 Thank you.

20 CHAIRMAN MESERVE: Thank you.

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

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

1 as we look at the potential for new reactor designs and other matters that are
2 going to becoming before the Commission. And so we appreciate that and we
3 thank you for it, as well as the many other contributions you've made to the
4 Commission in your tenure. And we were happy to recognize that in our
5 proceedings yesterday.

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

9 Ashok Thadani is going to introduce his team and carry out the
10 briefing.

11 DR. THADANI: Thank you.

12 Good morning, Chairman Meserve, Commissioners.

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

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

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

25 And I also want to acknowledge a very important part played
26 by my colleagues at the table: Jack Strosnider, Deputy Director of Office of

1 Research; Farouk Eltawila, Director of Division Systems Analysis and Regulatory
2 Effectiveness; Mike Mayfield, Director of Division of Engineering; and, Scott
3 Newburry, Director of Division of Risk Analysis and Application. And our staff
4 involved in administrative functions are also here to support us as necessary.

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

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

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

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

16 Can I have viewgraph number 3, please?

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

22 We further the regulatory mission of the agency by providing
23 technical advise, technical tools and information for identifying and resolving
24 safety issues as well as looking over the horizon for future challenges and
25 prepare the agency for timely future decisions.

26 The state of Research has been dynamic. We have had a

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

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

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

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

23 Good project management is essential to efficient completion
24 of the type of work we do. We have implemented a renewed focus on project
25 management, emphasized planning and execution. Doing the right work on time
26 and within budget.

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

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

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

18 The desired outcome of our cooperative initiatives, which cover
19 both operating reactors and advanced reactors, are to enhance our ability to
20 make sound realistic decisions based upon worldwide experience, high burn up
21 fuel would be an example in this category; obtain broader sharing of data and
22 practices among the national and international community; help ensure that the
23 international standards and technical studies that reflect current state of
24 knowledge; obviously, leverage or NRC resources, and; network with experts to
25 stay abreast of the state-of-the-art in any given subject area.

26 Well, for example, through networking we benefit from the

1 expertise of assignees even at the NRC and enhance our knowledge through
2 sending our staff abroad. We currently have 3 foreign assignees. One from
3 Sweden working in the materials degradation mechanism area and two from
4 Korea working in the thermal hydraulics area and the PRA field.

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

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

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

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

21 The new staff includes both interns and recent graduates, as
22 well as some mid-level to senior staff positions with considerable hands-on
23 research experience. Research's new staff members have already made
24 significant contributions to our work. A good example of such contribution is the
25 use of enhanced staff expertise in corrosion to evaluate the Davis-Besse event.
26 This was done by one of our newer employees.

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

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

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

14 May I have the next slide, please?

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

20 Next slide.

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

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

26 In our ongoing work, we have pushed the state-of-the-art in

1 several engineering disciplines to develop methods, data and guidance for
2 conducting engineering assessments of vulnerabilities of a variety of nuclear
3 facilities and operations. As the work proceeds on technical basis, development
4 and vulnerability assessments, insights from the work are incorporated as
5 appropriate in agency's decisions and communications including those related to
6 the advanced reactor designs.

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

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

25 The new analysis used a more representative scenario and
26 best estimate assumptions. The results indicate that severe fuel damage was

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

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

19 To help guide the staff's assessment activities, Research has
20 documented a risk-informed method for engineering assessments of
21 vulnerabilities for a range of NRC's licensed facilities and the range of threats. In
22 the coming months consistent with the Commission's PRA policy statement,
23 Research will be reaching out to experts in risk-informed regulation and to a
24 spectrum of staff and management in NSIR and NRR and NMSS to establish a
25 risk-informed approach to regulatory decision-making based on the results of
26 these vulnerability assessments.

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

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

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

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

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

23 We do have significant ongoing efforts in the area of new
24 reactor designs and technology which include supporting NRR in the certification
25 review of the AP1000, and the pre-application reviews of ESBWR and Advanced
26 Candu Reactor 700 design. We're developing methods, tools, data, and expertise

1 to provide sound technical basis for our decisions and reduce the need for
2 unnecessary conservatism that normally results from lack of knowledge.

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

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

21 I personally agree with the Advisory Committee that in order to
22 support building and operating a new plant in this country in 2010 to 2020 time
23 frame, it is critical for Research to develop the necessary data and tools in the
24 years 2003 through 2006.

25 I would like to take this opportunity to thank the Advisory
26 Committee for their investment of their time and attention to the work that the

1 Office of Research has been doing in this area.

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

9 May I have the next slide, please?

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

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

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

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

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

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

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

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

21 The project cuts across a number of Research and NRR
22 organizations and considerable credit needs to go to the staffs for their hard
23 work, team work and persistence for getting us to this point. We look forward to
24 final endorsement of this standard with the regulatory guide this summer.

25 Now, about 3 years ago the staff initiated a broad scope
26 reevaluation of technical basis for pressurized thermal shock regulation. Based

1 on research performed over the last several years, the staff has developed a
2 thorough understanding of the considerable conservatism in the current rule.
3 The staff undertook this re-evaluation making use of the state-of-the-art
4 techniques in PRA, thermal hydraulics, material science and fracture mechanics.

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

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

18 I must also note that there continues to be a need to improve
19 our PRA methods in selected areas. Users have indicated needs in areas such
20 as human reliability analyses, fire risk and passive component reliability to
21 support our licensing and inspection efforts. This work is an important part of our
22 program in user risk information area.

23 Now, there are many other areas where we and the agency are
24 using risk assessment methods. My staff coordinates and provides to you a risk-
25 informed regulatory information plan semi-annually. We believe communication
26 on these projects is important and hope that you find this plan useful. The next

1 semi-annual update is nearing completion and it should be with you fairly soon.

2 May I have the next slide, please?

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

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

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

17 Accident sequence precursor analysis is used for identification
18 of significant precursors and precursor trends by using a risk assessment
19 methodology. A paper is now on its way to the Commission. This paper
20 discusses some recent precursor experiences, trends, as well as program
21 modifications to explicitly consider uncertainties in ASP analysis which I believe
22 to be a critical element in any safety decision. And I'm very proud to say that this
23 is a significant enhancement in the models.

24 Our industry trends activity produces trends and thresholds for
25 initiating event systems and component performance, common cause failures and
26 accident sequence precursor events as part of the agency's training program in

1 support of NRR.

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

8 May I have the next slide, please?

9 Now in terms of generic safety issues, let me note that over the
10 past two years the generic safety issue program has received increased research
11 focus from senior management in terms of identifying, prioritizing and bringing to
12 closure a number of safety issues. The entire backlog of generic issues from the
13 1990s has been eliminated, and the program is quite active.

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

17 We monitor these programs very closely. Monthly updates are
18 also provided to the EDO for transmittal to the Congress.

19 Now go on to the next slide, please.

20 Take a couple of minutes on this important issue. And, as you
21 know, a major component of our Research program that directly addresses many
22 safety and regulatory issues is the degradation and aging of materials used in
23 reactor systems. Over the years we've seen many examples of degradation in
24 the pressure boundary components that have raised very serious safety
25 concerns. Examples include: The inter-granule stress corrosion and cracking of
26 boiling water reactor piping in the BWR reactor internals; degradation of steam

1 generator tubes; primary water stress corrosion cracking in many components
2 made from nickel based alloys; and, the cracking of the control rod drive nozzles
3 in PWRs.

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

9 We also are providing advanced fracture mechanics analysis
10 methods and evaluation techniques for non-distractive examination that can be
11 used in assessing some of the more complicated cracking problems we're
12 encountering today.

13 I think you're all familiar with our recent activities in terms of
14 supporting Davis-Besse, so I will not go into any detail on that, except to note that
15 we are continuing to work on lessons learned task force action plan, looking at
16 longer term issues of non-destructive inspection techniques and potential leak
17 detection methods. We're also developing data and adapting analysis methods
18 to support staff evaluations of this mechanism, including evaluation of operational
19 experience.

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

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

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

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

13 I go to the next slide, please.

14 So, in summary I hope I have tried to illustrate how our
15 programs further the regulatory mission of the agency. As the Chairman noted,
16 by providing technical basis, tools and information. And this support requires that
17 our focus remain on human capital issue. And I assure you that we're going to
18 keep focusing on that issue. And our attrition rate in the office is somewhere
19 between 7 to 10 percent, so this is going to be an ongoing issue for us.

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

21 MR. TRAVERS: Thank you, Mr. Chairman. That completes our
22 presentation.

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

26 Commissioner Merrifield, I believe it's your opportunity to go

1 first?

2 COMMISSIONER MERRIFIELD: Okay. Thank you very much,
3 Mr. Chairman.

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

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

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

15 The first question I want to ask you, you talked a little bit about
16 significant efforts underway relative to managing aging and significant success
17 that you had in bringing on new hires. With ever problem you solved, it always
18 seems that there's always a problem that arises. And that problem is making sure
19 that you're transferring that knowledge that is unfortunately leaving through a
20 door to that new generation of staff so that you've retained those skill sets. And
21 I'm wondering if briefly you could talk about what tools and methodologies you're
22 using to make sure that we don't have that loss of our intellectual capacity?

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

25 We've identified 10 areas where we think double encumbering
26 approach is important to bring staff on board while we still have the talent in-

1 house. And we've identified ten such areas where we're moving forward.

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

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

11 One is mentoring. I've asked our senior staff to become
12 mentors to our junior staff.

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

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

21 MR. STROSNIDER: Yes. I think as Ashok mentioned several
22 of the important areas.

23 There's two additional areas that I would mention. And one is
24 I think we're effective use of the strategic workforce planning system to identify
25 and target specific disciplines that we need in the short and the long term. We
26 know for example that in the near term we're going to need some additional

1 expertise in digital instrumentation and controls, PRA, thermal hydraulics, and we
2 focus our recruiting then in those areas.

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

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

7 The second strategy that I want to mention is that we have
8 developed a staffing model. And I think it's a fairly sophisticated model in the
9 sense that it looks at our attrition rate, it looks at the areas how the budget is
10 increasing and where we're going to need to increase staffing. It's a living model.
11 We update it as we get new information in terms of people's plans and also in
12 budget changes. And we're using that. And in the sense of a growing
13 organization, which we are, we're looking at how we can start staffing against our
14 '04 staffing plan now so that we'll have the resources we need to accomplish the
15 work that's been identified for '04 and achieve full FTE utilization. So we have a
16 model that we use for doing that, and I think it's very helpful to keep us on track.

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

26 So if you haven't had an opportunity to engage with that

1 particular NASA office, maybe I can put you in touch with some of those folks. I
2 think that might be a useful one to touch base with.

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

11 MR. NEWBURRY: Could I comment?

12 COMMISSIONER MERRIFIELD: Briefly. I have limited time,
13 but yes.

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

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

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

23 Where that manifests itself now is, to a certain extent, in the
24 issue of dry cask storage. One of the concerns that has been raised, and I don't
25 know whether it's legitimate or not, is the concern that as the time that we spend
26 in terms of continuing our research on this progresses, utilities which are faced

1 with dealing with the fuel are taking some of the fuel which has been a pool a
2 much longer period of time, getting that into casks and leaving them with pools
3 filled with fuel which is much hotter, to that extent. The complication as at least
4 presented to me, is that down the line that won't give them the opportunities to
5 use the older fuel in the outside of the cask with the hotter fuel on the inside. And
6 I'm just wondering if that's one of the issues that you're grappling with and are we
7 to see relatively soon a resolution one way or the other in terms of where we're
8 coming on that matter?

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

10 DR. ELTAWILA: I think we aware of the concern that you
11 mention. And we are working with the NMSS, and we have already developed
12 burn up credit but for -- only. What's this new cask design to put the hot fuel
13 inside and the cold fuel on the outside would need additional credit more than
14 that -- and we are trying to get information from France about the fission product
15 credit, and that will allow them to incubate this design.

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

18 COMMISSIONER MERRIFIELD: Thank you.

19 Two last comments before I pass the mike.

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

24 One of the things, obviously, we are concerned about here is
25 public confidence. And it is concerning, and I know many members of the
26 Commission have commented previously that when we have a report that we

1 don't have confidence in, as we did at the time, that we be able to provide
2 updated information to the public so that that dated information is not used in a
3 way in which we as an agency would not agree.

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

9 I would be interested in further briefings from the staff
10 subsequent to this to give me some better sense of where you're going on that.

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

18 COMMISSIONER MERRIFIELD: Okay. Thank you.

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

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

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

8 MR. THADANI: Yes. The probability is clearly lower than
9 what one would have expected in the past. There are a number of factors that
10 go to that issue.

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

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

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

20 And Chairman, our objective is to lay out all these pieces, try
21 and understand what these probabilities might be, even if there are discussions
22 and difference of views about the initiating event itself. There may be different
23 viewpoints on how likely that is. Certainly some of the initiators, likely, it has been
24 reduced significantly by actions taken by the Government in a number of ways.
25 But the reason for us doing these two plant integrated studies but was to lay out
26 each piece in a systematic way and try to assess how likely is it, what is the

1 outcome each piece of the way. And that's what we expect to complete this
2 September.

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

6 DR. THADANI: Significantly lower. And we're pretty confident
7 of that view.

8 CHAIRMAN MESERVE: I know that from conversations I've
9 had with licensees as they come through the office, that they seem to be seeing
10 increased numbers of fuel failures that are not necessarily associated with higher
11 burn ups.

12 DR. THADANI: Right.

13 CHAIRMAN MESERVE: Is Research following that and what
14 are you going about it?

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

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

24 MR. TRAVERS: There's quite a lot of suspicion on
25 manufacturing issues. There certainly is a lot of attention to make sure that
26 chemistry and other factors in the context of operation aren't at play here. But we

1 do follow it. And, as I've mentioned, NRR is on point for most of that at the
2 moment.

3 DR. THADANI: Go ahead.

4 MR. STROSNIDER: I could add one more comment in this
5 area, that Electric Power Research Institute has what they call a robust fuel
6 program looking at this reliability under normal operating conditions. In fact, I
7 participated in a conference last week where they were discussing that. So we're
8 familiar with what they're doing. And the interesting thing, from my perspective
9 on that, is that when they resolve some of these operating problems, that's going
10 to open the door to go to higher burn ups and more advanced fuel. And that's
11 what they're focusing right now, but that's the next step when they resolve some
12 of those issues. And that's an area that we're focused on very carefully with NRR
13 looking at those implications.

14 CHAIRMAN MESERVE: Commissioner Diaz.

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

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

23 COMMISSIONER DIAZ: So there might be a delay?

24 MR. STROSNIDER: Yes.

25 DR. THADANI: If I may just, talking to the industry they clearly,
26 as what I understand, is that they are looking at going beyond 62,000 megawatt

1 days per metric ton. But certainly not looking at this time to go beyond 75,000
2 megawatt days per metric ton. And they recognize, they've said very clearly, that
3 in terms of priorities they want to make sure that the problems they're having
4 during operation are getting immediate attention.

5 So I think that's the path that at least I sense the industry
6 taking.

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

9 One has to do with the really fundamental challenge that we
10 confront in our reactor oversight process, which is we've seen some situations
11 where we've had licensee performance go from green to red very quickly. We'd
12 like to have a capacity to be at greater predictive capability so that we can
13 intervene and give guidance to the licensees to intervene if necessary before
14 there is that degradation.

15 What is Research doing to help to increase the predictive
16 capacity of various elements of the TOP?

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

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

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

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

24 First, I think we, as I indicated, the analytical tools need to
25 recognize that there really is not a clear debarkation at any given point. There are
26 continual that one has to think about. And we need to make sure we have the

1 tools to help the staff in understanding that better.

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

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

8 CHAIRMAN MESERVE: Okay. My final question is one is that,
9 I think, central to the thinking of everyone in the Commission. And that is that
10 we've had very a major effort of thinking through and attempting to revise our
11 regulatory program to use risk-informed insights. It's gone much more slowly than
12 any of us might have hoped, but we're working the problem. There are going to
13 be some things I think the Commission is going to be doing in the near term that
14 will help move the ball forward.

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

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

25 One of the elements, one of the policy issues, and there's
26 seven policy issues that I indicated for advanced reactors, quite frankly in my

1 mind could apply to operating reactors, and that's the following. Regulations
2 have to be driven by more than just core damage frequency and large early
3 release frequency. Those are good attributes, but they're not sufficient attributes
4 to look at regulations. And we have proposed an approach in this Commission
5 paper which would provide this potential for even small problems, how to do deal
6 with those, but use risk-informed thinking in addressing those issues.

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

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

19 COMMISSIONER DICUS: Thank you, Mr. Chairman.

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

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

26 DR. THADANI: If I may use some sort of a balance sheet, I

1 would say in balance I think we're doing very well. We get significant amount of
2 information for limited amount that we contribute to cooperative efforts, whether
3 they're bilateral or multilateral.

4 We gain significantly also in that in some areas true expertise,
5 really state-of-the-art expertise may lie elsewhere. And I mentioned networking,
6 and I think that's a very important element of what we do. We need to know
7 whose truly up to date on what's going on in the information basis and so on.

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

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

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

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

24 DR. THADANI: Generally the generic process --

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

1 DR. THADANI: No. As an agency I think that this is an
2 important issue. And as an agency we have attempted to go from beginning to
3 end. And what that means is when an issue is identified, it's prioritized and we
4 think there may be some reasonable solutions to the problem. We identify them,
5 look at cost benefit and so on. And then when we provide that information to, let's
6 say if it's a reactor issue to NRR, NRR would go forward to interact with the
7 industry, develop a pathway to get ultimate resolution which would be whatever
8 change is made at the facilities.

9 And with NRR there is a tracking system that not only does
10 that, but then it follows up to see if that part needs to be inspected or not and has
11 the inspection been carried forward. So they're sort of -- there's cradle to grave
12 approach that says we want to be sure where we have identified areas for
13 enhancement, that that is actually happening and that we have verified that.

14 MR. TRAVERS: But I think your point is very important, and
15 it's one that as we look at lessons learned from Davis-Besse, we take an account
16 of, I believe, and are going to be emphasizing going forward. And that is what is
17 and how should we manage the appropriate follow on activities that result from
18 generic use of this.

19 COMMISSIONER DICUS: Yes.

20 MR. STROSNIDER: I could just mention that the action plan
21 that was put together in response to the lessons of the task force in tasking,
22 includes the explicit item that they'll look at licensee commitments and they'll
23 follow up on them.

24 COMMISSIONER DICUS: Okay. Thank you.

25 And final question it goes to your backup slide number 9 and
26 follows on comments, questions that Commissioner Merrifield made.

1 You say for FY 2003 intern recruiting, you've made 11 offers
2 and 3 have been accepted, 4 declined and 4 are pending. What is pending?

3 DR. THADANI: The decisions by --

4 COMMISSIONER DICUS: By the recruit?

5 DR. THADANI: By the individuals.

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

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

15 COMMISSIONER DICUS: Okay.

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

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

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

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

1 mentioned that you have hired experienced staff?

2 DR. THADANI: Yes. Yes. We --

3 COMMISSIONER DICUS: What's the ratio, roughly? Do you
4 know offhand?

5 DR. THADANI: Jack, do you know?

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

10 COMMISSIONER DICUS: Okay. All right. Maybe that can be
11 a follow up.

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

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

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

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

22 CHAIRMAN MESERVE: Commissioner Diaz.

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

1 I think you're special kind of leadership has been extremely
2 productive to this agency. And I consider it a personal privilege to have been
3 working with you.

4 You have been effective and you will be missed.

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

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

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

24 DR. THADANI: Commissioner, could I comment?

25 COMMISSIONER DIAZ: Yes, please.

26 DR. THADANI: I think it's an important point you've raised, and

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

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

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

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

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

23 I am going to add my voice to what has already been said
24 regarding the importance of the vulnerability assessments, spent fuel pool. I
25 believe that is not only our responsibility, but is our obligation to tell the American
26 people what we believe are the best, you know possible results scenarios.

1 Whatever they look like, we need to do that and we need to do that sooner than
2 later.

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

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

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

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

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

23 CHAIRMAN MESERVE: Mr. McGaffigan.

24 COMMISSIONER McGAFFIGAN: Thank you, Mr. Chairman.

25 I join Commissioner Diaz and all my colleagues in reiterating
26 how much of a pleasure it's been to have you here. And I won't repeat all of my

1 remarks yesterday, but --

2 COMMISSIONER DICUS: My remarks yesterday are on the
3 record.

4 CHAIRMAN MESERVE: We'll have them incorporated in the
5 record.

6 COMMISSIONER McGAFFIGAN: Right.

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

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

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

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

24 Now, NUREG 1738 remains on our page web.

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

26 COMMISSIONER McGAFFIGAN: Is it back on? Okay. Well,

1 I'm glad it's back on. Because the skepticism displayed by the Commission on
2 that day was not on our web page.

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

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

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

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

1 this Princeton journal.

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

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

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

24 But that case, that influences us to do a lot of potentially stupid
25 things in rulemaking, or whatever it is. People sort of carry in their head, oh my
26 God somebody working in the zirconium sand industry can get 4 rem dose when

1 it's hard to imagine anybody getting more than 100 millirem working in that
2 industry.

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

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

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

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

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

21 COMMISSIONER McGAFFIGAN: Okay. I know you're trying
22 to produce your piece of research, but is there any chance that the staff can do
23 a critique of the Alvarez study shortly that gets -- what is happening at the
24 moment, if you read our press clips, is that the authors of that study are merrily
25 going around the country to whatever site, you know, recently it was Diablo
26 Canyon, Indian Point is another one of their favorite sites, saying things that

1 result from their study that are wrong, but there's nothing that we have out there
2 that says that this study is deeply, deeply flawed and makes assumptions that are
3 wrong, partly using our own studies, unfortunately, that we have to withdraw.

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

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

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

25 But I don't know that they're doing it based on guidance. I
26 haven't seen any guidance from you guys that the average branch chief from a

1 region should use when this infamous study is brought up to them.

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

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

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

17 COMMISSIONER McGAFFIGAN: Right.

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

24 COMMISSIONER McGAFFIGAN: That's exactly what I'm
25 asking for, and I suspect a good critique -- although the staff in all honesty when
26 they finally did the Tooth Fairy critique, as you had pressed for Commissioner

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

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

11 COMMISSIONER MERRIFIELD: Really what you're calling for
12 is for our staff to get out there and knock down bad signs and provide accurate
13 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 took
17 our big report and condensed it to about 2 pages.

18 COMMISSIONER McGAFFIGAN: Well, I'm glad that -- and she
19 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 the
21 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, May
24 of 2002, when the Chairman was testifying before the Environment and Public
25 Works Committee and words were expressed. And so the Alvarez study, I could
26 see that punch coming and I could see it coming last May. And the frustration that

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

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

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

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

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

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

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

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

1 DR. THADANI: No.

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

4 DR. THADANI: Yes.

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

7 DR. THADANI: Yes.

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

10 DR. THADANI: Yes.

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

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

21 And NMSS has real --

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

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

25 COMMISSIONER McGAFFIGAN: I think she's a great person.
26 I think she does great work with minimal resources. But I think you have to think

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

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

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

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

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

20 COMMISSIONER McGAFFIGAN: Even if nothing has
21 changed.

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

24 CHAIRMAN MESERVE: Good.

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

26 COMMISSIONER MERRIFIELD: You will really miss this at

1 Carnegie, aren't you?

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

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

7 With that, we're adjourned.

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

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