

UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

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COMMITTEE

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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BRIEFING BY NUCLEAR SAFETY RESEARCH
REVIEW COMMITTEE

- - - -

PUBLIC MEETING

Nuclear Regulatory Commission
One White Flint North
Rockville, Maryland

Friday, May 20, 1994

The Commission met in open session,
pursuant to notice, at 1:00 p.m., Ivan Selin,
Chairman, presiding.

COMMISSIONERS PRESENT:

IVAN SELIN, Chairman of the Commission
KENNETH C. ROGERS, Commissioner
FORREST J. REMICK, Commissioner
E. GAIL de PLANQUE, Commissioner

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STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE:

JOHN HOYLE, Acting Secretary

MARTIN MALSCH, Office of the General Counsel

DR. DAVID MORRISON, Retiring Chairman, NSRRC

EDWIN KINTNER, Chairman, NSRRC

DR. NEIL TODREAS, Retiring Member, NSRRC

DR. SPENCER BUSH, Retiring Member, NSRRC

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

1:00 p.m.

CHAIRMAN SELIN: Good afternoon, ladies and gentlemen.

The Commission is pleased to welcome the members of the Nuclear Safety Research Review Committee to brief us on issues of mutual interest. This Committee provides a valuable service to the NRC by providing advice to the Director of the Office of Nuclear Regulatory Research on matters related to our program of safety research.

The Committee has served us very well over the years, continues to do so, and in large part that is thanks to the efforts of Doctor Morrison, Doctor Bush, and Professor Todreas, who are retiring from the Committee, I'm sorry to say, although we're pleased to have Mr. Kintner to be the new Chairman.

The Commission has thanked the members in the past, continues to appreciate your dedicated and distinguished service.

We'd also like to welcome several new members, Professor Baratta, Professor Golay, Professor Golay, Professor Mayo, and Professor Yukawa.

Today we're looking forward to hearing your views on the matters which we asked you about in

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1 the July 21st, 1993 staff requirements memorandum, and
2 we're looking forward to these discussions.

3 I understand copies of the SRM are
4 available.

5 Commissioners?

6 This is your swan song. Let's make it
7 good.

8 DOCTOR MORRISON: Thank you for the
9 confidence.

10 I'm indeed pleased and honored to be able
11 to open the discussions this afternoon. I would just
12 make sure we add one other person to the list that you
13 mentioned, Mr. Chairman, and that is Professor Robert
14 Hatcher who is new to the Committee since our last
15 meeting with you in July of last year. We have four
16 new members with us today.

17 I'll just make some summary comments, then
18 ask both Neil and Spence Bush, as the other long-in-
19 tooth retiring members, to add any thoughts that they
20 might have to mine.

21 We certainly have taken your questions to
22 heart and spent some time discussing them and what we
23 hope is that we will continue a dialogue here today.
24 I'm not sure that we have any real specific answers to
25 any of these questions, but I think we have some

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1 thoughts with regard to how things might proceed.

2 In general the questions, as noted in the
3 SRM, dealt with the content of the research program
4 and its ability to respond in a timely manner to the
5 regulatory mission. At the same time, there are some
6 real questions about being able to maintain essential
7 competence in terms of either staff size or skills or
8 disciplines to be able to have the ability to respond
9 as well as to anticipate regulatory needs.

10 I think the answers to all these questions
11 really have to be put in the context of the very
12 special role that research and I think in a broader
13 sense science and technology information have in a
14 regulatory agency. It's my belief that the
15 credibility of information and the fidelity of its use
16 within the Regulatory Commission is an essential
17 characteristic. Timeliness is of equal importance.
18 And to fulfill these requirements, nationally and
19 internationally recognized engineers and scientists
20 must be involved and the Agency must have a commitment
21 to continual improvement of its technical information
22 base.

23 Now over the last six years that the
24 Committee has been in operation we've observed
25 substantial improvements in the organization, planning

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1 and management of NRC's research program. It's become
2 very responsive to its internal users and its
3 customers, the NRR and NMSS, but at the same time it
4 has undergone a substantial shrinkage in its research
5 budget. On behalf of the Committee, I'd like to
6 express our credit to those improvements that really
7 belong to the senior management.

8 I think I'd also be remiss if we didn't
9 express the concern of the Committee of being able to
10 find capable replacements for Eric Beckjord and Jack
11 Heltemes who are going to retire over the next several
12 months or so. I don't want to overlook the role that
13 Themis Speis has played and I hope that he will be
14 with us for a longer period of time so that the
15 continued success of the program will depend upon it.
16 But, I think you have a challenge in front of you to
17 try to find some very capable replacements.

18 CHAIRMAN SELIN: Thank you. We're quite
19 aware of this and feel this need very sharply.

20 DOCTOR MORRISON: I think we'd like to
21 start out with just refreshing you and ourselves on
22 the dynamic environment in which NRC operates
23 nowadays.

24 The future of the nuclear power program in
25 the United States certainly is uncertain. There

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1 doesn't appear to us to be any state or federal
2 policies that are very supportive of the continuation
3 of nuclear power and certainly none supporting the
4 expansion of it.

5 Enthusiasm for license renewal has
6 diminished, whether it be only a financial concern or
7 an economic concern on behalf of the utilities or
8 maybe there's something hidden in that agenda.

9 Waste management is obviously an unsolved
10 problem.

11 Yet, the NRC has to fulfill its
12 obligations to the public with regard to the safety of
13 operating reactors as well as maintain the expertise
14 to look forward into the future where some of these
15 conditions may change or be altered.

16 Collectively we believe that there is a
17 strong basis for the continuation of a research
18 program. And this research program, if it continues
19 in a strong way while addressing, say, the concerns of
20 advanced reactors, the issues raised or possibly to be
21 raised by license renewal, decommissioning or waste
22 management, will provide that sort of capability that
23 will be necessary to extend and maintain and sustain
24 the competence that one needs for any anticipated
25 issues.

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1 Now, the two go very much hand in hand.
2 All of the subjects you've raised in your memo to us
3 are very much interlinked and one can't really
4 separate the content from the program from the
5 maintenance of capability to the skills that are
6 needed. But on the other hand, if there's not a solid
7 research program, all of these things become very
8 difficult to sustain and may indeed disappear over
9 time.

10 With regard to the general content of the
11 research program, which was sort of the substance of
12 your first question, the Committee, based upon its
13 deliberations, concludes that the program is in
14 general doing the right kinds of things.

15 We do want to point out that there must be
16 a balance between the experimentation, the
17 phenomenological modeling, and the numerical analysis.
18 The Committee has looked at this over the six years it
19 has been in existence and certainly will continue to
20 do so because without that balance we don't believe
21 that you have, even though you may be talking about
22 the right areas, the balance to be able to use the
23 kind of information that is generated from the
24 research programs.

25 Leading to one of your second topics with

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1 regard to the question of sacred cows, again the
2 Committee had difficulty dealing with those issues
3 given the previous comment where we feel that the
4 research program is working on the right areas.
5 However, we would like to bring to your attention some
6 issues more of procedure and policy rather than issues
7 with regard to substance in the research program.

8 First and foremost on the list is the
9 subject of independency, which I'm sure has been
10 discussed around this table and others for a number of
11 years. How much of the work that is being done by
12 industry or other applicants has to be duplicated by
13 the NRC? How much can remain just confirmatory
14 research? And the question of being able to perhaps
15 join efforts, funding capabilities, whatever it may
16 be, is something that we think needs to be looked at
17 under the broad heading of a sacred cow. It's an
18 issue that's of policy and procedure, not an issue of
19 substance.

20 In the same manner, it's been our
21 impression based upon our discussions with the
22 research staff over the years that the federal
23 procurement rules indeed at least put barriers in the
24 way of an effective research program being conducted
25 in perhaps the most efficient manner. We'll give you

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1 that challenge to be able to solve how one might deal
2 with the federal procurement rules, but there is the
3 perception at least on the staff that these are
4 barriers for them to be fully effective in their use
5 of the funds that they are involved with.

6 There are some concerns with regard to the
7 nature of the research programs within this sacred cow
8 and we would only raise a caution flag saying that how
9 much should be done in a very fundamental research
10 area, especially in the waste management since there
11 are lots of activities underway within the Department
12 of Energy, and maybe there would be some questions in
13 the same role with regard to severe accidents. What
14 would you do if you didn't have the severe accident
15 research program? We have not formed a comprehensive
16 opinion in the Committee, but these are issues that
17 have been raised.

18 Now that leads us to another question that
19 is very much related to the sacred cow issue, and that
20 is in the development and maintenance of codes which
21 are very much the heart of the analysis activities
22 that the Nuclear Regulatory Commission does. Again,
23 we see this as an issue of process and policy, that
24 certainly independent analysis is necessary to confirm
25 the capabilities or the analyses presented by others.

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1 The question is, does that imply developing your own
2 codes or simply being able to maintain, understand and
3 use the information in a very informed way that the
4 applicant submits?

5 The most current issue that would relate
6 to that is the question, if the Commission has the
7 task of reviewing CANDU applications, is it necessary
8 to develop the necessary codes for that or can one
9 rely on either the experiences that go back many years
10 to the N Reactor or some of the experience that the
11 Canadians have rather than starting from scratch to
12 develop a whole new suite of codes for CANDU reactors?
13 Whether that's a sacred cow or not at least fits in
14 the same policy and procedure orientation.

15 There certainly is indication based on the
16 presentation made to us by the staff that the research
17 operations are staying ahead of many of the problems.
18 There were very few that were brought to our attention
19 that they feel that they are falling behind, so I
20 think we're comfortable with that answer based upon
21 the work that our subcommittees have done over the
22 last couple years in looking into these individual
23 activities.

24 Technical disciplines still remain a
25 challenge, especially in light of the reengineering of

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1 the government, the down-sizing, possible early
2 retirements, questions about the future directions of
3 the Agency, but we believe that it's certainly
4 essential to maintain those disciplines that are
5 really unique to NRC's mission.

6 Thermal hydraulics is perhaps at the top
7 of the list in that category that we see that there's
8 no one else in the country maintaining this kind of
9 capability other than perhaps that is done in the
10 universities, and then there's the question of being
11 able to access it on the timely basis needed for
12 regulation.

13 I think close behind that is the kind of
14 capabilities that are needed in probabilistic risk
15 assessment, some of the reliability and statistics
16 supporting that.

17 And severe accident analysis and
18 containment performance are again fairly unique areas.

19 As the advanced reactors go forward it
20 will be necessary for the capabilities to be able to
21 look at the technologies involved in advanced reactors
22 and those obviously will include some of the digital
23 information and control plus the human factors area.

24 As one gets farther down the list in some
25 of the technologies that are now residing within the

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1 Office of Research, while they're important and a
2 representative capability is necessary in areas such
3 as environmental science and radiation protection and
4 health effects, those are not as essential a
5 capability as we would designate to the ones that are
6 higher on the list.

7 We are aware of the proposal that you've
8 made, Commissioner Rogers, with regard to some of the
9 capabilities that you believe are necessary,
10 professional capabilities that are necessary in the
11 research operations. We certainly are comfortable
12 with those as a statement of the capabilities. What
13 the NSRRC would like is the ability to discuss this
14 subject with you in further detail and perhaps get
15 some sense of what the implementation aspects if this
16 might be. It looks like it's going in the right
17 direction, but sometimes the implementation causes it
18 to get off the track. If you would like the benefit
19 of our Committee's input, I'm sure the Chairman --

20 COMMISSIONER ROGERS: Well, I certainly
21 would, but I invite my other colleagues to join me as
22 well if they're so inclined.

23 DOCTOR MORRISON: I think I've just given
24 you a job.

25 CHAIRMAN SELIN: Doctor Morrison, I'd like
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1 to ask you or Mr. Kintner a little bit of a broader
2 question on this topic. We've effectively asked you
3 not only to take a look at the quality if the
4 research, the bottom-up, but take a look a little bit
5 from the top down. The disciplines and the sacred
6 cows are not so much central.

7 The really central question is, if our
8 research program is successful -- in other words,
9 carries out its goals -- will it meet the functions
10 that it's supposed to meet? And is that a question
11 that you're -- as opposed to the normal question of
12 will it carry out it's goals. Is this a question that
13 the Committee is comfortable in addressing or not?

14 DOCTOR MORRISON: The Committee certainly
15 has talked about those issues. I think I would be
16 remiss if I said we have a unanimity of opinion. I
17 can give you certainly my own. I'm comfortable that
18 the work will fulfill the mission as required, brought
19 to a logical conclusion.

20 Now, whether Ed or --

21 Neil, you've been around as long as I
22 have. Do you have a comment on that?

23 DOCTOR TODREAS: To me, the issue is
24 whether you're going to have the depth of people to --
25 the depth of people here and in the field with what

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1 you're able to maintain to respond to the emerging
2 questions that come up. I'm not sure that's going to
3 be the case. I think you may go into a transient and
4 dip below a reasonable comfort level.

5 DOCTOR MORRISON: Spence, do you have
6 anything you want to add to that?

7 DOCTOR BUSH: No, I don't think so. I
8 think that covers it pretty well.

9 CHAIRMAN SELIN: Thank you.

10 DOCTOR MORRISON: All right. That
11 basically sort of summarizes the overall conclusions
12 we've reached with regard to the questions you raised,
13 and obviously we're ready to address any other issues.

14 Neil, unless you have broader comments you
15 want to make at this time --

16 DOCTOR TODREAS: No, I'll come in after we
17 have a more focused discussion on this.

18 DOCTOR MORRISON: Spence, anything?

19 DOCTOR BUSH: No. I would prefer to wait,
20 I think.

21 DOCTOR MORRISON: Okay.

22 CHAIRMAN SELIN: Ken, do you want to --

23 COMMISSIONER ROGERS: Well, I'm not sure
24 where we want to begin, but I think your point is the
25 one that I'm most concerned about. What should we be

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1 doing? What steps should we be taking to make sure
2 that we have the capability to do the job for the
3 future?

4 We don't know entirely what that future is
5 going to hold, but we do know that we have 100
6 reactors out there right now operating. We have
7 problems that arise from time to time. Technical
8 questions arise from time to time. Those matters are
9 not entirely settled and we need an in-house
10 capability to deal with those as they arise, and that
11 is not always just purely from a strictly regulatory
12 point of view.

13 There are technical issues that come up
14 that in my opinion we must be able to deal with.
15 Sometimes they represent the rebirth of an old issue
16 that was thought put to bed many years ago, studied in
17 some depth but perhaps not all aspects of it entirely
18 covered, and then forgotten. And so it means to me
19 that one must maintain a kind of institutional memory
20 on technical issues, and therefore continuity is an
21 important aspect of what we do.

22 I think that we are unique. There is no
23 other organization that I can see in the United States
24 that is concerned with the technical issues related to
25 nuclear safety. There may be concern with technical

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1 issues in somewhat overlapping fields but that has no
2 interest in maintaining a fundamental capability to
3 deal with technical and scientific issues that are
4 related to the kinds of nuclear safety questions that
5 may arise.

6 I see a little bit of a dilemma in
7 thinking about the question that you posed, Doctor
8 Morrison, about whether NRC has to maintain this
9 independent stance and whether perhaps we've viewed it
10 too much as a sacred cow. I think in some ways
11 perhaps in the past we did, but today I think there's
12 no other show in town and that as funds dry up for
13 support of research in universities and industrial
14 facilities shrink and even cooperative research
15 activities for the utilities such as at EPRI have
16 shrinking budgets in the nuclear area, how is the
17 nation going to be served adequately by being able to
18 call upon technically knowledgeable people concerned
19 with safety issues in this important area? Because,
20 we have a vast investment in this country in existing
21 nuclear plants and in nuclear technology applied
22 commercially and in medicine and so on and so forth.

23 And so what I do see is a very serious
24 difficulty in our maintaining an ability to deal with
25 technical issues in the future. We obviously can't

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1 maintain all that technical expertise in-house, and
2 yet it is shrinking outside of the Agency. I think
3 it's a very serious problem. I've had some thoughts
4 about how one might approach it here, but they're
5 somewhat idiosyncratic I think in their approach,
6 rather different from what the classical approach is,
7 but nevertheless I think that these are issues that we
8 must think about very hard.

9 It's all very well to say, well, we've got
10 shrinking budgets we have to shrink. We've got
11 shrinking FTEs we have to shrink. But we have a
12 mission to carry out as well and at some point we
13 better be darn sure we can do that. Your ability is
14 not always measured in dollars or numbers of people.
15 It's quality is what counts, and how do we maintain
16 that quality within the organization? How do we do
17 that? It seems to me that's the really essential
18 question. I don't think we've lost it, but I look at
19 derivatives and the derivatives are all in the wrong
20 direction from that point of view.

21 MR. KINTNER: The Committee has spent a
22 lot of time on this subject, yesterday three or four
23 hours and previous to that, because we see the same
24 factors at work. And I guess I speak for the
25 Committee when I say it seems to me one thing that the

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1 Commission should establish is that research and
2 technical competence in it is the bedrock of
3 regulation. I mean, you can talk about all the other
4 factors, but if you don't have that you're going to
5 make some mistakes.

6 And therefore, in my view, in terms of the
7 things that are happening in the nuclear industry
8 generally, there should be and can be -- and this is
9 maybe a very subjective statement -- a definite
10 decision that the research activity is going to have
11 some preferences with regard to not necessarily
12 budget, not necessarily in numbers of personnel, but
13 the ability to maintain, get and train the competence
14 that's required to fit the principles that you have
15 established. And that's -- it seems to me quite clear
16 that the best interests are served from every point of
17 view that it be the Commission's responsibilities if
18 you did that. And that doesn't require a lot of
19 people, doesn't necessarily require a lot of budget,
20 but it does require that thought be given at every
21 step to maintaining the excellence in the core that's
22 capable of responding in the way you mentioned.

23 COMMISSIONER ROGERS: Well, to me the key
24 is people of the highest quality, enthusiastic about
25 their work, who look forward to coming to work every

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1 day because there's not only interesting problems to
2 work on but interesting people to bounce ideas off and
3 to argue with from a technical point of view. And so
4 it's an atmosphere that's very important, and you
5 don't create an atmosphere with just dollars. You
6 don't create it with just numbers of people. You
7 really have to work at it, and I think every great
8 university understands the challenges of attracting
9 and maintaining people. It depends very much on the
10 environment in which they find themselves. Good
11 people want to work with other good people. I don't
12 think it's very attractive for somebody to be paid a
13 high salary to come to work every day and have nobody
14 to talk to that makes any sense.

15 MR. KINTNER: Doctor Todreas has written
16 down some thoughts on this subject.

17 You ought to state them.

18 They go beyond what I've said, but --

19 COMMISSIONER ROGERS: To me this is very
20 fundamental.

21 MR. KINTNER: -- things that could be
22 considered in terms of retaining the sort of
23 capability you're talking to.

24 COMMISSIONER ROGERS: Well, I for one
25 would certainly be interested in hearing them.

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1 DOCTOR TODREAS: Well, let me first
2 clarify that where I'm coming in is under this general
3 principle discussion we've talked about and I'll put
4 it in the framework of where we are in the Committee
5 in terms of our discussion and what we see.

6 There's two areas we've talked about. One
7 is maintaining competence in the contractor group,
8 which I'll hit first, and the second is within the
9 NRC, within the staff, two separate areas.

10 Within the contractor area, what we have
11 done by reviewing what the staff laid out to us is try
12 to identify or review area by area, piece by piece the
13 importance of the area, say I&C, say thermal
14 hydraulics, and then review what's the nature of the
15 program proposed that will attract first-rate people
16 at a contractor organization and how do you keep them
17 there while they're waiting for the key questions that
18 might come up. And part of the answer to that is
19 generating really interesting important questions to
20 work on that are at the state-of-the-art. When you go
21 through that you can by area line up the size of the
22 contractor group you need, the dollars that are
23 required, and pretty soon you'll come up against the
24 total budget you have and then you start to do the
25 priority searching. But I think in the contractor

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1 area that's underway by the staff here to examine it.

2 One other point associated with that, I
3 realize in the advanced reactor program, for example,
4 we had the chance, which we didn't capitalize on
5 completely, to actually use some of the funding that
6 we had to spend there to maybe start this process. We
7 didn't do it because of the timeliness of the results
8 that we needed relative to the certification process,
9 running experiments in a timely way versus the process
10 versus building.

11 But you may have other opportunities
12 coming up which involve, again, the CANDU activity --
13 if that's opened up, that's rather large -- and maybe
14 some activities in the international programs area.
15 If there's enough time flexibility there, you could
16 accomplish a programmatic goal at the same time as
17 leveraging the money to secure and maintain a top-
18 notch organization or group.

19 So I'm saying in the contract area the
20 Committee has reviewed what the staff is doing and
21 there's a step by step progression by area to work on
22 it. The question is how much money does it build up
23 to.

24 Now if I shift over into the staff, which
25 is what Ed was referring to, the distinction there at

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1 the staff, since they're not doing the hands-on
2 research, you really want somebody who's very
3 technically knowledgeable but also can implement
4 contractually what they can understand and conceive
5 of. So that requires breadth of personality, but we
6 fundamentally are imploring a very, very strong
7 technical capability in the staff as the underpinning.

8 And the specifics there would be for the
9 Commission first to identify people in the
10 submanagement area who are really your technical stars
11 or your potential technical stars and create some kind
12 of activity to nurture them -- maybe it's through
13 education and special assignments, either labs,
14 universities, maybe it's a mentoring arrangement under
15 somebody here who is about to reach a retirement
16 plateau but there's a few more years where you can
17 really develop them -- but to identify a group of
18 people and really make an effort focused on them.

19 The second point would be you've got to
20 fill up the pipeline and you've got to fill up the
21 pipeline with people who you can inculcate your
22 values, your objective goals, and that really in my
23 mind requires an intern program with graduate
24 engineers at the bachelors and masters level but
25 brought in fresh to refill your pipeline.

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1 And then the third point is when you do
2 those things you're liable, which is what I fear, to
3 fall short in this transient because people are
4 retiring faster than you can build in this strength.
5 And the only way to plug that gap is by selective
6 hires of very technically competent people, specific
7 areas, from people available in industry and in labs.
8 That's been done here in some specific cases. John
9 Gallagher is an example of that. You have
10 constraints. I hear all the time about hiring
11 constraints, numbers, things like that, but you're
12 going to have to fill that gap.

13 But those were the three points and we can
14 elaborate on the specifics of them, but that's what Ed
15 Kintner was referring to.

16 CHAIRMAN SELIN: I just had one question.

17 I think you made an assumption that the
18 senior technical folks also in effect have to be the
19 people who are managing the contractual aspects of the
20 research in their areas. Is that true or is it
21 possible to have a couple of experts in a number of
22 areas who aren't necessarily directly acting as the
23 contracting officers' technical representative? I
24 mean, you don't have to teach here. Remember there
25 are some advantages to working at NRC, even if you're

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1 a highly technical person.

2 DOCTOR TODREAS: I guess what I think I've
3 learned in life and I think at the NRC is you've got
4 to control the destiny of your program. And the
5 medium that you do that with is your contract and
6 money, so you cannot give up the leverage relative to
7 that. Now you're going to have to help me relative to
8 what that means in terms of details of timing that you
9 have to spend, but I'm very leery of a technical
10 expert in an agency like this who has no leverage
11 relative to ability to control the expenditure of
12 funds because I don't think you've got the follow-
13 through on the program.

14 CHAIRMAN SELIN: We don't have the
15 internal resources to run a research program. If you
16 don't have the contracts, then you really don't have
17 anything to fall back on to get the work done that you
18 need to get done.

19 DOCTOR TODREAS: Yes. Put another way
20 maybe, what I'm saying, if you're a hired technical
21 gun and you go around solving everybody else's
22 problems who brings them through the door, but you
23 have vision as to what really ought to be done and you
24 don't have the ability to carry through and implement
25 that vision because you don't involve the real medium

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1 of exchange here, you're missing something. So I
2 don't see this break.

3 CHAIRMAN SELIN: That's interesting. It's
4 very helpful.

5 COMMISSIONER de PLANQUE: The issue of the
6 procurement rules being an obstacle, could you
7 elaborate a little more on that? Is this a problem
8 that you see as fixable by administrative changes or
9 is it something that's fundamental and inherent in the
10 rules themselves?

11 DOCTOR MORRISON: I think there's probably
12 two elements to that question. One is really an
13 internal one, which I'm not sure whether it's
14 administrative or management or outlook, is that one
15 should be sure that all of the administrative
16 functions, whether they be procurement or what else,
17 do recognize that their customers are the people that
18 are trying to get the projects done. And so there's
19 the TQM concept of making sure that your customer is
20 satisfied on that. We're sensing that that is
21 improving, but still has a way to go.

22 The other aspect I think is perhaps well
23 beyond the immediate control of the Agency but in
24 consort with some of the other agencies in trying to
25 reinvent the government. The question is, can some

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1 things be done with regard to the streamlining of the
2 procurement process? The horror stories obviously run
3 from a couple years to get a procurement done to some
4 that get done fairly readily.

5 It seems like the major resource that NRC
6 has used over the years, the national labs, is now
7 becoming more difficult to access and perhaps even
8 more expensive from what we hear as well. That's
9 something that I think you had little to do with
10 creating the problem, but nonetheless you're probably
11 tarred by the same brush, and has to be handled at a
12 higher level.

13 COMMISSIONER REMICK: If I may follow up
14 on that, that's an area that has concerned me since
15 coming as a Commissioner for a couple reasons, one
16 because I've had a lot of staff members complain about
17 the ability to get a job done because they can't get
18 things out contractually, and I've at least in my
19 earlier days as a Commissioner maybe even made some
20 comments that from a standpoint of contracting at
21 least with universities it's a not enlightened agency
22 compared to some that in my own personal experience
23 I've had interaction with, and ONR is certainly a good
24 example.

25 I realize there are different types of
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1 agencies, but I am concerned that sometimes in asking
2 staff why they selected this particular research
3 provider they indicated that, well, they could get
4 that out in a hurry and if they went to the preferred
5 place where they thought the real expertise was it was
6 going to take nine months to a year. I must say, I
7 don't care what the federal procurement regulation is.
8 For a safety organization, there's something wrong if
9 we're driven in trying to get safety-significant
10 answers if we continue to accept that. So it's a
11 continuing concern.

12 I am encouraged by some of the things that
13 the staff has provided you, some of the innovations
14 ongoing at the moment. I'm hopeful that that will
15 improve the situation, but I hope also that the
16 Committee will follow it because I certainly -- that
17 particular subject, hearing from technical staff
18 members, is one of the frustrating things that they
19 face in trying to get their job done.

20 And I realize there are limitations and
21 one must do this legally, but, if any agency has an
22 argument sometimes to make exceptions or try to find
23 ways of doing something innovatively, it's an
24 organization that needs an answer to a safety
25 question. And I don't think we are always willing to

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1 step out. We're too willing to accept nay-sayers.
2 And so I think it is an important area and I think
3 it's an area which you should continue to follow,
4 because it is frustrating a number of people trying to
5 get a job done.

6 DOCTOR MORRISON: Well, certainly the
7 Committee would support your view that quality should
8 be number one, that expediency is not a good
9 substitute for quality. The credibility of the whole
10 program depends upon it.

11 COMMISSIONER REMICK: It sure does.

12 DOCTOR TODREAS: That's an item in our
13 charter. It's been there from day one and it is
14 brought up in discussions, so maybe we've sensitized
15 the presenters that that's a question that will always
16 be asked.

17 COMMISSIONER ROGERS: If I could come back
18 to the list of important topics, which I totally agree
19 with -- I think those are the important areas for
20 research, from thermal hydraulics to human factors --
21 you did comment in one of your documents, January 14th
22 I think it was, on the need for an over-arching
23 strategy to integrate digital I&C and human factors.
24 The staff responded to that in some way.

25 My reading of the staff's response was

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1 that it didn't quite answer what you were saying and
2 I wonder if perhaps this might not be a good
3 opportunity for you to say a little bit more about
4 what you really had in mind there, because I think
5 there may have been some confusion in reading your
6 remarks on the part of the staff as to what you
7 intended for an over-arching strategy because it seems
8 to me there are many ways one could view this and I'd
9 like very much to hear what your own thoughts were.

10 My own personal experience over the years
11 with the things which they would call human factors
12 has always been very frustrating, it always seemed to
13 me, particularly in a research sense, because it
14 always seemed to me that this was one of the areas
15 that had the most promise and yet the most difficult
16 one to evaluate, to separate the truly useful from the
17 really pedestrian, and I always had a great deal of
18 difficulty with it whenever I had to make some kind of
19 a decision about human factors research, industrial
20 and organizational psychology or man-machine interface
21 problems and things of this sort.

22 And so, I wondered really what your
23 thought there is when you say "over-arching." Where
24 does the arch start and where does it end in this
25 process?

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1 DOCTOR MORRISON: Let me make a quick
2 comment, Ed, and toss it to you.

3 I think the response that we did get back
4 from the staff perhaps misinterpreted what we were
5 trying to say, that we were in no sense in the
6 Committee trying to drive the design of advanced I&C
7 systems and using the human factors as a way to get
8 into the driving of the design.

9 On the other hand, this is not a new issue
10 because our Human Factors Subcommittee has been
11 dealing with this now for several years. And
12 fundamentally it says you do have a human in the loop
13 and it's a three-legged stool. It's not just
14 hardware. It's not just software. There's a human in
15 that loop and unless you have a strategy that starts
16 from the guidelines that say, you know, how are we
17 supposed to be really factoring in this system that
18 has three components, NRC is falling short of being
19 able to give the guidance to the industry.

20 Ed, since your subcommittee dealt with it
21 in a lot of detail --

22 MR. KINTNER: The "over-arching" was
23 Neil's word, but I think we all agreed with it and I
24 think what the Chairman has said is correct.

25 You asked me a number of questions about

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1 this last time we sat before you, which was almost a
2 year ago. Didn't answer it very well, but it does
3 seem to me there's two ways to look at it. One of
4 them is that this should be looked at as a system,
5 from a system point of view with the man being one
6 part of the system. A good example of the dichotomy
7 is the ACRS is asking for the National Academy study
8 and wants to talk about the software and the hardware,
9 the validation and the quality assurance associated
10 with that, but don't talk about the men or women, and
11 we think that falls short of the goal.

12 My personal sense is that there are
13 tragedies coming, maybe not in the nuclear area. I
14 think when it's all played out the helicopter thing is
15 going to be a man-machine interface question. I think
16 the Korean Airline tragedy was a man-machine
17 interface. It goes beyond the design of the computers
18 and the design of the software that goes into the
19 computers to the fact that men are going to operate
20 them. Humans are going to operate them and if you
21 don't consider that in the first instance you are
22 going to lose some of the advantages which modern
23 capability and I&C, digital instrumentation and
24 computers will bring you.

25 CHAIRMAN SELIN: As far as the human
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1 factors research goes, I would be satisfied if it were
2 possible to answer two questions. They're not simple
3 questions. Well, they're simple questions but the
4 answers aren't simple. Number one is, what should we
5 use for the probabilities in these interfaces? And
6 the second is, in looking at and evaluating whether
7 it's designs or more likely operations, how do we take
8 into account or how do we look for things that are
9 just hard to do, you know, control rooms that are hard
10 to operate, equipment? Those two things.

11 Remember, we're not designing the
12 equipment. You know, we sometimes forget that our job
13 is either confirmatory or truly regulatory, not to
14 make up for deficiencies in research that's being done
15 on the part of the people who design, whether it's
16 low-level waste facilities or computer centers. And
17 do we have a program or is it possible at our level to
18 have a program? We're not supposed to be doing basic
19 research. We're supposed to be finding out what's
20 been achieved elsewhere and seeing how it could be
21 converted to meet our needs.

22 MR. KINTNER: First of all, I would agree.

23 Human factors research is not very
24 rewarding. I mean, it's very difficult to look into
25 that and find the answer to this kind of question. On

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1 the other hand, it seems to me also obvious that it is
2 not too much to ask, if you're going to ask for a
3 study of this whole subject by the National Academies,
4 that the human aspect of it be included. And it does
5 go beyond the designs of the control rooms, but the
6 design of the control room was a major factor in TMI-2
7 and the same kind of errors can be made in the design
8 of control rooms with modern equipment in them.

9 As a matter of fact, you may have also
10 tried to operate the simulator in France. It doesn't
11 seem to me that makes it very easy. I mean, I had a
12 harder time with it than I would at TMI. So, there
13 are these kinds of insights which nobody has
14 established yet. It's very difficult to do so, but
15 the Commission I think does need to be aware of these
16 significant aspects of modern equipment. Now does
17 that mean you're going to have to do research in an
18 area where you shouldn't be doing it? Not
19 necessarily.

20 CHAIRMAN SELIN: Well, is there research
21 going on in aviation or in other areas that could be
22 adapted to our needs or do we end up having to do more
23 basic research if we need answers about how efficient
24 or how effective can people be in computer centers?
25 I mean, I would think there's nothing all that special

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1 about a computer center to support a --

2 MR. KINTNER: Well, there's a lot of
3 research going on. In aviation, for example, I think
4 they have a whole center devoted to it. There's also
5 research going on in aviation of the kinds of
6 accidents that are occurring. There are near misses
7 that are occurring. And all those things can be,
8 without a lot of additional effort, considered.

9 What really, I think, worries us is that
10 we don't see in the way the program is now organized
11 that the implication of the human relationship in the
12 system is sufficiently infused.

13 DOCTOR BUSH: Maybe I could make a
14 comment.

15 CHAIRMAN SELIN: Please.

16 DOCTOR BUSH: I've participated now for
17 about 12, 14 years in an international program. For
18 the last six years one of the aspects of this has
19 dealt with human factors, in the plebeian use,
20 perhaps, but we talk about equipment. It has to do
21 with the reliability of the individual when it comes
22 to running a nondestructive examination, which of
23 course is a basic requirement.

24 We found in that particular one that the
25 operator over a period under stresses, this was a

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1 stressor controlled experiment, his reliability ranged
2 from ten percent to 90 percent in the same period for
3 the same operator. There were various reasons for
4 this, but it does indicate that at least when it comes
5 to operation of equipment on a repetitive basis there
6 are inherent problems that one must face up to.

7 Now this happened to be, as I say, a
8 straightforward ultrasonic examination, but I could
9 apply the same thing into a preventive maintenance
10 program. It does not give one what I'd call a high
11 level of confidence as to what the end product would
12 be.

13 DOCTOR TODREAS: Let me just step in.

14 You may have made a very constructive
15 comment for the Committee in terms of the future.
16 This report that you refer to is worded and has the
17 thrust that it does because when we reviewed the
18 program we couldn't really find the central questions
19 that the program was designed to answer. I hope that
20 isn't too harsh, but we came away from that -- it
21 turns out three of us are on that subcommittee -- we
22 thought the reason was that there was no overall
23 framework and --

24 CHAIRMAN SELIN: The Commission has been
25 asking the same question in this area for a couple

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1 years.

2 DOCTOR TODREAS: In fact, you know, what
3 you've done by hypothesis is you've asked two very
4 specific questions. If they turn out to be the right
5 questions or reasonable base to develop the right
6 questions, then one could then go back and examine the
7 program against that. But the program now is sliced
8 in a lot of small cuts and the linkage between those
9 cuts isn't clear and some of the questions that
10 individual slices are asking just doesn't taste right
11 as far as satisfying.

12 CHAIRMAN SELIN: My part of this SRM, and
13 I played a fairly minor part of it, but my part was
14 really to get after that. When I say, if the programs
15 are carried out successfully will they answer
16 questions they have to answer, part of it is do we
17 know what questions we're trying to answer.

18 In low-level waste, I'm interested in
19 knowing what research we need to have to fill in the
20 holes so that our licensing people can license a low-
21 level waste facility, not how do you design them, et
22 cetera. A lot of work is being done on transport,
23 some of which seems to me to be sort of interesting
24 but more design oriented than regulatory oriented.

25 Are you suggesting that maybe even across

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1 the board there's a lack of the putting the couple of
2 questions that the research program is supposed to
3 answer or is this just in human factors?

4 DOCTOR TODREAS: You said "across the
5 board." I'm not suggesting that at all.

6 CHAIRMAN SELIN: I was giving you a
7 chance. You know, it's your last session. Why not?
8 Go out with a flame.

9 DOCTOR TODREAS: I hope when you read the
10 other reports and all you can see we're very focused
11 on debate about how to answer the question and the
12 technical sufficiency of it. We don't come out with
13 such broad statements as where is the over-arching
14 framework. So, no, I think it's endemic in this area
15 and it's because --

16 CHAIRMAN SELIN: This area being human
17 factors?

18 DOCTOR TODREAS: Human factors and digital
19 I&C together. And the reason is this is just
20 regenerated. The area activity was regenerated in the
21 research program, so it's not that old. We nor the
22 staff have had all that much experience in it, but
23 we're all really branded that as you move into
24 advanced reactors and actually backfits into existing
25 reactors this is the one area with a real potential to

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1 make a big positive difference or to really hurt you,
2 and so we're very sensitive about this area.

3 CHAIRMAN SELIN: I see.

4 COMMISSIONER de PLANQUE: You talked about
5 work being done for other industries in the human
6 factors area. Do you sense that our staff is
7 sufficiently well plugged into those?

8 MR. KINTNER: We have made this point in
9 several of our reports from the Subcommittee and I
10 think there's been a considerable improvement in that
11 regard. I doubt that you would pick anyone in the
12 staff and ask them or could ask them to recount to you
13 thoroughly and with adequate knowledge what's going on
14 in the world in this field. I just don't think it's
15 vital to that end, but it should be.

16 DOCTOR TODREAS: We were even taken to
17 task on that, if you read the rebuttal that you
18 referred to. In past reports, we said, "Get out and
19 do this." In January we reviewed the programs and it
20 seemed they were getting out and doing it so much that
21 that was the whole emphasis and there was not enough
22 integration and then pouring forth. So, we made that
23 comment and then people turned around and said, "Gee,
24 you told us to do this."

25 But you have to do it, but then you've got

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1 to stop, integrate it and get smart yourself. I think
2 we're at that point.

3 DOCTOR MORRISON: One might apologize a
4 little bit on the basis of the staff. They're having
5 a very difficult time, as we are even on the
6 Committee, finding an individual that can bridge that
7 whole gap or see the systems context. You get people
8 in the I&C area that are very much oriented toward
9 that or you get way over in the human factors side or
10 someone is a software engineer. We've been trying to
11 fill a gap on the Committee itself and there just
12 isn't an individual that pops out, yes, that is the
13 person. Unfortunately, when you get to three persons,
14 then you've lost the systems integration capabilities.
15 I can't fully blame the staff for not being able to do
16 it either.

17 COMMISSIONER ROGERS: In the staff's
18 response to one of your letters, and it had to do --
19 well, it was on some of your comments, the staff
20 indicated its cautious approach to the question of
21 being out in front of the industry on a matter and
22 cited the legislative history of the Energy
23 Reorganization Act of 1974 and so on, and finally
24 wound up by saying RES, that is our research area,
25 cannot lead the industry toward a particular strategic

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1 vision or integrating initiative without acting
2 inconsistently with this legislative intent concerning
3 its mission scope.

4 Well, it seems to me that that's both true
5 and false. We do it all the time, unconsciously.
6 Regulation itself leads the industry. Why is it that
7 the nuclear power plant industry is so retarded with
8 respect to the introduction of digital I&C systems.
9 It's not because they didn't know about them, it's
10 because as a regulatory body we just didn't know how
11 to deal with those things. So, we did lead the
12 industry, we led it backwards, not forwards, but we
13 led it.

14 So, I think that one has to recognize that
15 yes, caution should be duly exercised here, but I
16 think that what you're saying, this necessity of
17 clearly recognizing how the integration of the human
18 being into the loop that includes the digital -- I
19 don't see that happening in our industry. The
20 industries you've talked about, yes, they're dealing
21 with it. I don't see it happening in the nuclear
22 power plant industry as such. There may be little
23 shoots of it, little green shoots popping up, but it
24 hasn't gotten very far or gone very far yet. I think
25 that our concerns with safety here in this area,

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1 proper concerns of safety, in fact, can exercise
2 leadership and force a strategic vision. I think
3 what's lacking has been a strategic vision in this
4 activity, in the design and execution of nuclear power
5 plants.

6 There's a great deal of caution on the
7 part of our licensees as well as the vendor as to what
8 the NRC is going to accept. We had a devil of a time
9 coming to the conclusion that we would allow somebody
10 to unplug an analog device and put a digital one in
11 that was tried and true and tested and had a little
12 tiny bit of software in it because it had a software
13 reliability question that was really quite different
14 from the software reliability questions when you have
15 a massive hundred thousand lines of code situation.

16 So, somehow it does seem to me that in our
17 own way we can, in fact, force a strategic vision
18 where we really think that that's lacking in the
19 industry and it's needed for safety. I wonder if you
20 want to comment on that. You got the letter, right?
21 It went back to you on April 28th.

22 MR. KINTNER: I think you said what we
23 believe, at least what I believe and I think the
24 Subcommittee believes is exactly right, that there is
25 this restriction by law on you and what you can do.

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1 But this is an area which is not going to be fixed by
2 the industry without further understanding and
3 application of regulatory influence as you said. I
4 say again that in the first generation of reactors the
5 instrumentation and control was sort of independent
6 from everything else. They put this meter up here,
7 this meter up here and this meter here and so forth
8 and an operator is supposed to be able to know where
9 to look when the accident occurs. If he doesn't, you
10 have a Three Mile Island.

11 So, you're caught between the legal
12 requirements and what I think is a broader requirement
13 on the Commission to ensure that these factors are
14 considered and incorporated up front. I don't see the
15 industry doing it either. They're making beautiful
16 control rooms, very pretty and very colorful, the
17 questions of implication from the human point of view
18 are not included in the way they should be.

19 DOCTOR TODREAS: I just wanted to comment
20 and remind us all. You're reading a response from a
21 research organization to a research review committee's
22 observation. The hierarchy in this area is it starts
23 with the applicant designer, then it goes to the
24 regulation function, then it comes down to the
25 research function. We're basically reacting at the

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1 bottom, trying to decide is research in this area done
2 correctly. The only way you can do it is if you know
3 what the questions are. The only way you can have the
4 questions is if you have the framework. So, we are
5 reacting to the lack of framework being constructed
6 higher up on the hierarchy.

7 Therefore, I say that that response in the
8 letter is correct at the level in the hierarchy that
9 it's written and represents. But the overall response
10 that you're saying is right and wrong, it belies the
11 fact that somehow in the whole stream of things in
12 this industry and the regulatory function, we've got
13 to get it fixed.

14 COMMISSIONER ROGERS: Well, yes, I think
15 that's right. But what your remarks were all
16 predicated on on a certain perception of where RES is
17 in the hierarchy. You've just said it's the bottom.
18 I don't really think that's necessarily the case. I
19 think that the role of RES, and I'm saying that part
20 of our organization -- that's why I call it RES and
21 not research, it is a part, a statutory part of this
22 Agency -- can have a more proactive role. It need not
23 only be a totally reactive situation. It must, in
24 fact, deliver to the users but it also has to deliver
25 to the whole needs of the Commission as well.

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1 I'd ask you whether you're really
2 convinced that that's the only possibility for RES in
3 this organization. I don't think it is.

4 DOCTOR TODREAS: No. That's a big
5 introduction to the user needs issue --

6 DOCTOR MORRISON: Yes, I was just going to
7 raise that. We're thinking along the same lines.

8 DOCTOR TODREAS: -- which we've talked
9 about quite a bit.

10 DOCTOR MORRISON: I would raise it in a
11 very general sense to begin with. I think maybe what
12 we're seeing is the symptoms of the change in the
13 program over a six year period of time, which was, I
14 would say, very much bottoms-up driven to begin with
15 and now it's user needs driven and it's on the
16 spectrum of almost 100 percent user needs driven. I
17 will say that the RES has been very responsive to user
18 needs and certainly have ticked off a lot of the needs
19 that have been tabled to them.

20 I think the question that the Committee is
21 really thrashing about and realizes that there's not
22 enough flexibility either in the budgeting or the
23 staffing or the programmatic planning to accommodate,
24 and we use the term "exploratory research," which may
25 not be the right kind of label to put on it, but at

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1 least an ability to explore areas that don't
2 necessarily have a clearly identified need now, still
3 are within the realm of what needs to be done with
4 regard to nuclear reactor regulation, but some issues
5 that you can spend some time and effort doing it.

6 It has two components to it, the amount of
7 money to be set aside, and I think that's a management
8 decision, whatever percentage of the total budget
9 ought to be put in there. That's something that
10 management has to be comfortable with. It looks like
11 it's too low now. We were looking at a paper
12 yesterday that says maybe 25 percent is the number.
13 That may be too high. So, it's probably somewhere
14 between zero and 25 percent. But of equal importance
15 in my mind is to be able to put a fence around that
16 and say, "Yes, I've committed this for a long enough
17 period of time that I'll see the research reach some
18 conclusion on it and not start it this year and pull
19 it back next year," because that will sort of destroy
20 the overall purpose in having it.

21 This could be an area where some research
22 might be quite useful in the exploratory area and
23 the --

24 COMMISSIONER ROGERS: Well, in fact, I
25 think that's exactly what we did with human factors.

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1 I think we had a fairly aggressive human factors
2 program about ten years ago or so and then it just all
3 of a sudden took a nose dive, went down to practically
4 nothing and now we're trying to put it back together
5 again in a way that seems to be a little more focused
6 and relevant to other things.

7 But I think what it comes back down to is
8 the necessity of really trying to understand what your
9 purpose is behind a research area that you support and
10 when it is inadequately thought through, then it is
11 apt to start to grow just because everything likes to
12 grow and then suddenly get cut off, rather than being
13 able to maintain a reasonable level of effort with
14 some usual fluctuations, but not excessive
15 fluctuations, until it's very clear that it's done its
16 job and perhaps it's time to close it out. That's a
17 difficult decision, but those kinds of decisions have
18 to be made as well. But I don't think the human
19 factors has ever gotten to that. It's been sort of
20 started up with enthusiasm, grown and then cut off
21 because it wasn't really relevant and now it's
22 starting up again. So, we're kind of into a saw-tooth
23 function here on this that --

24 CHAIRMAN SELIN: Positive void
25 coefficients.

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1 DOCTOR MORRISON: Or from the more
2 research standpoint that perhaps what we're asking for
3 here in this over arching strategy is a premise under
4 which one is doing the research. As long as you have
5 a premise that you're going on, at least you see a
6 direction.

7 CHAIRMAN SELIN: Without quibbling about
8 it, there's a problem with this phrase "exploratory
9 research," at least in my mind. I believe that a
10 certain amount of the research should be done not
11 because there are users who have asked for it. The
12 function of the research management is to foresee
13 problems and make sure work has been done, as well as
14 respond to perceived problems. But it shouldn't be
15 exploratory work. It should be work that we're
16 doing -- I mean hopefully there's exploratory work
17 going on elsewhere that we can adapt. It's trying to
18 build up a stock of knowledge so that we have informed
19 people or codes or products when we need them.

20 But in most cases, I would hope it would
21 really be applied work. We're not doing basic thermal
22 hydraulics, we're trying to figure out how to take the
23 basic work and do the codes that fit the
24 configurations and the situations, the small subset
25 that arise in reactors.

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1 DOCTOR MORRISON: Yes. I think all
2 agencies have the problem of what label do you put on
3 that. We're working quite a bit with the
4 Environmental Protection Agency and they use the term
5 "fundamental" as to distinguish that from basic.

6 COMMISSIONER de PLANQUE: Aren't we really
7 talking now --

8 COMMISSIONER ROGERS: That helps a lot.

9 COMMISSIONER de PLANQUE: Aren't we really
10 talking now is that Neil's hierarchy is what you're
11 saying exists about 100 percent of the time now and
12 you want some percentage of the cases where it goes in
13 the other direction?

14 DOCTOR MORRISON: That's correct.

15 MR. KINTNER: And the words that you used
16 in your memorandum, it seemed to me, bear directly on
17 this subject, "provision of technical introspective
18 capacity," which means to me it is not undirected,
19 it's not exploratory. It does have a purpose within
20 the mission, but nevertheless provides a technical
21 base to allow people to think about things in a new
22 way.

23 DOCTOR TODREAS: Introspective directed
24 research.

25 MR. KINTNER: Maybe that's the title.

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1 CHAIRMAN SELIN: Forrest?

2 COMMISSIONER REMICK: First, just a
3 comment meant in humor, not to be critical. But in a
4 former life, another advisory committee that I served
5 on, on this question of is the question properly
6 formulated, the committee used to say, "If you don't
7 what the question is, how will you know when you have
8 the answer?" It's so true. If you really don't know
9 what you're headed for, you'll never know if you get
10 there.

11 Many of the questions that I had have been
12 addressed. But one that I have, in your November
13 letter you indicated that there appear to be some kind
14 of a restriction on communication with DOE on the
15 advanced light water reactor program. In reading the
16 staff's response, I get the impression that there was
17 perhaps a misunderstanding. Can I conclude that that
18 issue is basically resolved?

19 MR. KINTNER: Neil?

20 DOCTOR TODREAS: We have to exchange a
21 little bit more. We have talked about trying to get
22 data through the naval reactors activity. In our
23 Committee letter, which I prepared, I don't remember
24 this --

25 COMMISSIONER REMICK: I see. I did not
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1 associate with naval reactors, but perhaps it was
2 intended. I thought it had to do with --

3 DOCTOR TODREAS: Steam generators.

4 COMMISSIONER REMICK: Is that what it was?

5 I see.

6 DOCTOR TODREAS: Wasn't it steam
7 generator --

8 MR. KINTNER: It was also an ALWR
9 question.

10 COMMISSIONER REMICK: It was specifically
11 ALWR, yes.

12 MR. KINTNER: And I think that's been very
13 much improved.

14 COMMISSIONER REMICK: It has? Good.
15 Okay. Good.

16 One area that I found particular
17 interesting was your comment on the RELAP 5 code
18 development program. I thought you had a lot of good
19 comments there because it is an area that I've had
20 some concern, and right or wrong. One of the reasons
21 I was hoping that a group like yours would look into
22 was a question of had we become somewhat complacent
23 with our codes or had we declared victory too soon.

24 I was very pleased with the staff's April
25 28th response to you on that issue because I thought

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1 it was a very candid self-assessment by the staff of
2 the situation and proposals on what we should do. In
3 fact, I think that's what the Commission had in mind.
4 Certainly as one Commissioner, I had in mind in that
5 particular area that the staff would do a very
6 thorough, candid self-appraisal of that situation.
7 But it is an area that, once again, I would hope that
8 the Committee would keep in touch with because it's
9 one that's going to take time and continued emphasis.
10 So, I would hope that the Committee would continue to
11 watch over that.

12 I don't know if you wish to make a comment
13 or not. It was really not a question.

14 DOCTOR MORRISON: Well, let me ask Herb
15 Isbin, who is Chairman of that Subcommittee, whether
16 he has a comment to make on it.

17 Herb?

18 DOCTOR ISBIN: What we were really
19 referring to is the advanced light water reactors.

20 DOCTOR MORRISON: All right. Neil then,
21 do you have a comment on it?

22 DOCTOR TODREAS: We were fortunate enough
23 or maybe it was prethought out that we had the
24 director at that meeting, which was not held in
25 Washington. So, it didn't require waiting for a

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1 report. One could attend the meeting, listen to the
2 meeting and the reason things moved off so fast is
3 because it was moved from the interchange, not from
4 waiting for an exchange of the reports.

5 COMMISSIONER REMICK: I see. I thought it
6 was an excellent response from the staff.

7 Also, I would like to say I sincerely am
8 very pleased with the work of the Committee. I think
9 you've been doing some very fine work. Even sometimes
10 you're probably right. But really, I think you've
11 been doing an outstanding job and I'd like to take the
12 opportunity to say that I would like to give credit to
13 also Eric Beckjord and his associates for recommending
14 people of this stature that are on the Committee and
15 are joining the Committee because it's obvious you've
16 not been selected to be a yes group. I think you've
17 been a real credit to the NRC and your recommendations
18 are right on target many times and extremely valuable
19 to the Commission and to the staff. So, I sincerely
20 thank you.

21 DOCTOR MORRISON: We appreciate very much
22 your compliment.

23 CHAIRMAN SELIN: Commissioner de Planque?

24 COMMISSIONER de PLANQUE: I think
25 Commissioner Remick put that very well, so I won't

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1 reiterate it.

2 I have a couple of questions back on the
3 area of staff. You talked about staff competence,
4 about possibly identifying the super stars and setting
5 up programs and mentoring systems. I think
6 Commissioner Rogers talked about the necessity of
7 setting up the right kind of environment so that the
8 care and feeding and nurturing of research people goes
9 along properly.

10 Did you have any other particular
11 practical suggestions in this arena that you might
12 like to bring forward?

13 DOCTOR MORRISON: I certainly don't have
14 any beyond what Neil has already talked about.

15 Ed?

16 MR. KINTNER: No. It's just a question
17 again of recognizing and having it understood
18 throughout the Agency that research data, the results
19 of research are the bedrock fundamentals from which
20 all else builds. Eventually even the political
21 aspects are going to give way to technical fact.
22 That's why we believe this is so important and that
23 special steps should be taken, even against the
24 prejudices of other parts of the organization, to
25 assure that they are able to get good people, train

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1 good people, get the input at the bottom the way we
2 have suggested, all the typical personnel steps which
3 one takes when he wants to strengthen a specific
4 organization.

5 DOCTOR MORRISON: That's actually, in my
6 mind, probably a two or a three dimensioned problem
7 that you're dealing with. One is to make sure that
8 there's the technical competence there. I think over
9 the years at least that I've been a part of the
10 Committee, we've seen a good transfer of individuals
11 from the regulatory side to the research side, which
12 then kind of amplifies that technical competence or at
13 least makes it acquainted with the user aspects of it
14 which I think is a good second dimension to have, and
15 talked about earlier then the whole business of being
16 able to be an effective program manager certainly
17 applies in being able to get the research done.
18 That's sort of a different set of skills. One would
19 like the individual, obviously, to walk on water in
20 all three of those, but it's sometimes more biased one
21 direction than another. Any program that could be
22 done to effectively see that happen within the Agency
23 in a deliberate manner rather than just on an ad hoc
24 basis would be useful.

25 COMMISSIONER de PLANQUE: Okay.

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1 DOCTOR TODREAS: At the risk of making a
2 suggestion I won't be here to follow up on, I'll say
3 that the Committee hasn't really picked up the essence
4 of your question and gone through a complete
5 discussion of more specifics. We've been after the
6 framework to really see if the Agency and you as
7 Commissioners would buy this. In fact, we thought
8 maybe some of these specifics we're pushing a little
9 too far, too fast before we knew the reaction. But I
10 would say if you wanted more suggestions, I'm sure
11 you'd get them.

12 COMMISSIONER de PLANQUE: Okay. One more
13 in the same general area. You talked about the
14 pipeline. Those of you who are connected with
15 universities, what's the state of health of the
16 pipeline?

17 DOCTOR TODREAS: What's the state of the
18 health of the pipefitters who are maintaining the
19 pipeline?

20 COMMISSIONER de PLANQUE: Well, that too.
21 We tried our best.

22 DOCTOR TODREAS: Well, you know, obviously
23 there's a shadow cast on the structure. Nuclear
24 Engineering departments are under a great deal of
25 stress from administrators who want to merge or cancel

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1 departments. But there are a number of departments,
2 probably 20 or so, that I think have resilience, have
3 strength in them. The thing that sustains me quite a
4 bit is if you look at -- if you read the vision of
5 students when they have to write this essay on their
6 applications as to why they're interested in entering
7 a nuclear engineering department -- and by the way, in
8 our department in terms of U.S. people, U.S. citizens
9 wanting to go into fission reactor engineering, the
10 strength is still there. But what's really
11 interesting is the statesman-like long-range
12 principled view that these students express relative
13 to energy and a resilience ultimately back on fission
14 energy.

15 The real problem is that ultimately. It
16 may take so long to come back that we'll suffer a lag.
17 But I think there's resilience there for five to ten
18 years. But beyond that, I think there's a real
19 problem.

20 COMMISSIONER de PLANQUE: Okay. Thank you
21 very much.

22 CHAIRMAN SELIN: I appreciate very much
23 these discussions. As far as the top down, it's not
24 just human factors, there are other parts, the waste
25 parts in particular where it would be useful in

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1 discussing the research programs to try to come back
2 to what other couple questions we're trying to answer
3 than probably some other areas also. So, I wouldn't
4 just pick out the human factors folks. They have a
5 more complex job, I think, because they don't have
6 such a solid body of hard outside research to go to.

7 I would say a few words to the people in
8 Research. You know, you've said the right things, but
9 it makes it sound like program matters, something you
10 do on Wednesday mornings from 8:00 to 10:00. We've
11 been putting enormous pressure on our research people
12 to do a very good job of managing the program, even to
13 the financial side of things and not just to making
14 sure that the statements are workable, well structured
15 and the work is there. It's a very difficult job that
16 we're asking them to do.

17 We have noted that the labs, all of which
18 work for the Department of Energy, have a factor of
19 two or greater in what they charge for essentially
20 equivalent services in different cases and we expect
21 people to take this into account when they're letting
22 contracts. So, it's a lot beyond what you normally
23 think of as just a contract monitor into trying to get
24 the work.

25 Nevertheless, we have a research program

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1 which, in spite of all the support it gets in this
2 room, is not terribly popular on the Hill or with the
3 people who have to pay for it and we don't have a
4 simple answer that says, "What would happen if it were
5 20 percent more or 20 percent less? What would the
6 impact be, even the long run, on regulation?" Part of
7 answering the question is to get to the point and say,
8 "Well, what would happen if we weren't doing the work
9 to answer this question or answer that question?"

10 I'm a little uncomfortable asking a
11 technical advisory committee to do so much top down
12 work, but I personally find your answers very helpful
13 and to continue on what question are you answering,
14 why are you doing it yourself, isn't there material
15 outside that you can adapt instead of doing, and when
16 will you know when you're done? Those are three
17 terrific questions to put into each and every group
18 that you work with, but bearing in mind -- you know,
19 I'm trying to tell these guys to run their programs a
20 little more efficiently. Commissioner Rogers says
21 you've got to more of an expert in what you're doing,
22 et cetera. You know, we're all directors of research
23 on this Commission and so we all have great interests.
24 It's really tough to be in the research area at NRC.

25 So, with a certain amount of sympathy but

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1 nevertheless the fact is that this is the hardest part
2 of the program to defend. The one with the payoff
3 that's the longest are in some ways the most
4 duplicative. There's really nothing we do in Research
5 that we don't do to some degree in the two program
6 offices or in some degree in AEOD. It's a really
7 tough job they have and we need your help, they need
8 your help on these topics.

9 DOCTOR MORRISON: Well, I would like to
10 say that I think our new chairman of the Committee is
11 very capable of asking those same kinds of questions.
12 In fact, he posed a number of those to us before we
13 started this last meeting.

14 So, Ed, let me toss it to you to carry on.

15 MR. KINTNER: Well, I think before I do,
16 would you say a few words, Spence?

17 DOCTOR BUSH: Okay. Last chance to
18 express by biases.

19 I've been around quite awhile working on
20 the AEC/NRC, close to 40 years now. That includes a
21 few stints on ACRS, three on this one and quite a few
22 special assignments. My views haven't changed an
23 awful lot, I would indicate, in some of the broad
24 issues that were addressed by Dave and Neil. I'll get
25 down to some specific ones that I've been close to,

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1 some of them for 30 years.

2 My interest has always been in preventing
3 and minimizing the severe accidents. I've looked at
4 this, what you can do. So, that's where my long-term
5 interests lie.

6 A few items, and I'll draw an ultimate
7 conclusion on this. Passive components, of course,
8 have interested me ever since the '60s. The reactor
9 pressure vessel is near and dear to my heart. Piping,
10 steam generators, NDE so hopefully you can close the
11 loop and not have these kind of problems. For the
12 last 15 years I've been looking at seismic in the
13 context of how much can it do particularly to piping
14 systems or how much won't it do. That's a more
15 important part of it. Of course, you've had a very
16 high program, the Commission has, in aging.

17 My interest is less in active components.
18 The one I am interested in I consider a major problem
19 is valves. I guess I would sum up, and this is a
20 personal opinion but I don't think it differs too much
21 from that opinion of the Committee, is that you will
22 need to retain expertise at some appropriate level,
23 which I can't predict. The three areas that I would
24 place in the top hierarchy would be the pressure
25 vessel. Even though we've done work since 1966, there

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1 are still loose ends there. The second one, not too
2 surprisingly, is the steam generator, which I think is
3 going to haunt us for some time to come. Finally, the
4 third one that worries me more than all the others
5 from the point of view of its potential impact on
6 accidents, are valves. So, I guess my swan song would
7 be that those are the areas that I believe that you
8 will have to retain the expertise both within the
9 Commission and with your contractors, at least in the
10 foreseeable.

11 COMMISSIONER REMICK: Spence, you remind
12 me of something. When Doctor Morrison listed several
13 areas in which it was important for the NRC to have
14 the expertise because we can't look to others and the
15 heavy section steel technology was one I was going to
16 suggest. At least it's one that I always add to that
17 list. So, I very much agree with what you're saying.
18 It's one of those things that if we didn't do it, I'm
19 not sure where we would look for others to do it when
20 we need those answers as we've had to have a couple
21 times in recent years.

22 MR. KINTNER: Let me just say a few words
23 in closing. One of them is that it should be obvious
24 that it's a matter of some pride to follow in the
25 footsteps of these two gentlemen who have brought in

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1 six years, it's obvious to me who have been here two
2 years, that this Committee has had some influence.
3 It's also obvious that one of the reasons we can say
4 what we have said about the Research Program is
5 because the Commission itself has put the pressure on,
6 as you say, to do these things well.

7 The Committee is made up of a very broad
8 spectrum of technical competence. Just to repeat, the
9 competence is being brought into the Committee. Let
10 me give a little more introduction to each one of
11 these new members.

12 Doctor Charles Mayo is Professor of
13 Nuclear Engineering, Director of Nuclear Reactor
14 Program, North Carolina State. He was for many years
15 in system and liability controls in Babcock and Wilcox
16 and then Science Applications and he has included
17 among his extensive interests reliability and failure
18 modes in a facts analysis. So, there in one gentleman
19 is a very broad kind of experience.

20 Doctor Yukawa has 31 years in General
21 Electric's Turbine Division in materials work and that
22 includes design application services, performance
23 evaluation, vessels, piping and nuclear power plant
24 components in support of the General Electric reactor
25 systems.

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1 Doctor Golay has been Professor at MIT
2 since 1986 and Assistant Professor since 1971 and he
3 has written extensively on nuclear power topics. His
4 special field is fluid mechanics and heat transfer and
5 a broad range of other nuclear subjects.

6 The last person who is joining us today is
7 not here because he is ill, Doctor Anthony Baratta
8 from Penn State, Professor, Department of Nuclear
9 Engineering at Penn State. Before that he had a long
10 period of time in naval reactors. His activities
11 include extensive research in reactor physics, reactor
12 instrumentation and significant thermal hydraulics
13 work.

14 Doctor Robert Hatcher was not here the
15 last time. He's here this time and I would like to
16 point out that he is an eminent structural geologist,
17 has done a lot of work in seismic activities. He was
18 a member and still is a member of the National Academy
19 of Sciences Board on Radioactive Waste Management,
20 which will be very useful in that field for us. He
21 was President last year of the Geological Society of
22 America. He's now a distinguished scientists and a
23 Professor at the University of Tennessee.

24 It seems to me that this has been a very
25 excellent job of the director in selecting these

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1 people to the Committee. I can only say that it's
2 been an enthusiastic group. They have, in fact,
3 worked hard at what they're doing. We will continue
4 to do that. It's going to be very difficult to fill
5 the shoes of Dave and Neil and it's going to be even
6 more difficult because of the departure of people like
7 -- what's your name again?

8 The fact that just as this sort of change
9 of shift takes place on the Committee, that we are
10 going to lose the Director of Research is, in fact,
11 troubling. This comes at a time when, as we see it,
12 there are going to be changes in the nuclear field and
13 in the requirements eventually in the participation of
14 the Nuclear Regulatory Commission and many factors
15 overseas as well as here. It's going to be a changing
16 circumstance over the next year or so and I can only
17 say that I, and I'm sure the rest of the Committee,
18 will do our very best to be helpful to you.

19 COMMISSIONER ROGERS: The Chairman, I
20 think, has had to step out. Let me just, on behalf of
21 him and my other Commissioners, thank you, Dave and
22 Neil for your wonderful service on the Committee. I
23 think it's been very, very helpful to us.

24 Ed, we look forward to working with you
25 and the new members of the Committee.

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1 We thank you all very much for everything
2 and look forward to seeing you again at an appropriate
3 time. Thank you.

4 MR. KINTNER: Thank you.

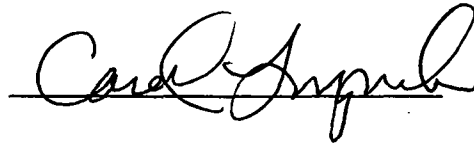
5 (Whereupon, at 2:29 p.m., the above-
6 entitled matter was concluded.)
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DATE OF MEETING: MAY 20, 1994

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is accurate and complete, to the best of my ability, and that the
transcript is a true and accurate record of the foregoing events.



Reporter's name: Peter Lynch

NEAL R. GROSS
COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVENUE, N.W.
WASHINGTON, D.C. 20005