

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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BRIEFING ON LONG-RANGE RESEARCH PLAN

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Nuclear Regulatory Commission
Room 1130
1717 H Street, Northwest
Washington, D. C.

Tuesday, April 28, 1981

The Commission met, pursuant to notice, at 2:40 p. m.,

JOSEPH M. HENDRIE, Chairman, presiding.

BEFORE:

JOSEPH M. HENDRIE, Chairman

VICTOR GILINSKY, Commissioner

PETER A. BRADFORD, Commissioner

JOHN A. AHEARNE, Commissioner

ALSO PRESENT:

LEONARD BICKWIT, General Counsel

SAMUEL J. CHILK, Secretary

KEVIN CORNELL

ROBERT B. MINOGUE

DENNIS K. RATHBUN

RONALD M. SCROGGINS

DENWOOD ROSS

TOM MURLEY

BOB BERNERO

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POOR ORIGINAL

P R O C E E D I N G S

1
2 CHAIRMAN HENDRIE: Why don't we go ahead. We have been,
3 until this afternoon, managing to avoid the longrange research
4 program. But Bob, Dennie and I are going down to discuss the
5 matter with the Congress tomorrow, and it seemed like a good idea
6 for the Commission to -- I thought there were several aspects of
7 scheduling at this point. I must say, a significant one for me
8 was that the discussion would be very valuable in terms of sort
9 of getting partway up to speed for tomorrow's enterprise on the
10 Hill.

11 Let's see, Kevin, you are representing William J.
12 Dircks at the moment, so let me throw the ball to you, and you
13 launch this enterprise.

14 MR. CORNELL: I will defer right over to Bob.

15 CHAIRMAN HENDRIE: Good.

16 MR. MINOGUE: I will try to move right along. I have
17 got a number of points I would like to cover.

18 First, I think it would be helpful if I begin by
19 discussing what the document is and what it isn't. Certainly,
20 first of all, it is clearly a living document. It is not in any
21 way seen by any of us as defining the program over the next five
22 years. It is more a basic planning document that can provide a
23 framework in which the program can be reviewed in a broad sense
24 by the various interested parties.

25 This one, the first one out of the box, clearly has some

1 fairly significant deficiencies in the way the material is
2 organized and the way the programs are put together and
3 explained, and I would hope we would correct that in future
4 versions.

5 It is the kind of document that clearly should be
6 revised periodically, at least once a year, and I would hope we
7 could do another version in about six months that could reflect
8 some of the feedback we get from the review process on this.

9 But as I said, the main purpose of the document was not
10 in any way to substitute for or replace the normal process of
11 budget review and hard scrubbing of program, but more to lay out
12 a framework for broad program review and a basis for dialogue
13 at the management level with the user offices.

14 Before this plan the program had a tendency to be
15 developed by user need requests that tended to boil up from the
16 lower level of the staff, and that is not a bad thing at all. It
17 certainly helped identify specific problem areas where research
18 could help in immediate licensing decisions. But when you set
19 up a program that way, what tends to be missing is the overview
20 that ties all the stuff together in an organized, coherent way to
21 deal with broad problem areas, and second, the kind of input that
22 best comes from the management of the user offices, rather than
23 the individual staff members.

24 That clearly was an intent -- I am assuming that was
25 the intent of the Commission in putting that out. It certainly

1 was our intent in issuing it.

2 That was a smashing success. It is hard to exaggerate
3 the kind of response we got that was extremely good. I talked to
4 each of the program office directors when the report was sent to
5 them for comment. Key staff people gave it their direct
6 attention. We got back a lot of comments. All the offices gave
7 good comments, particularly NRR, and it was the right kind of
8 comment. It was comment that related to broad program directions
9 and areas of emphasis, and not some fifth order question.

10 All of the comments that we received from the user
11 offices have been incorporated in the program as we sent it to the
12 Commission, at least in general terms. Some of the specifics are
13 still in the process of being pulled into the program.

14 We also found that a useful document to provide a
15 basis for interface with the ACRS. We actually have gone through
16 several stages, and that work is not completed yet. The review
17 by the ACRS of the fiscal '82 program gave us some insights into
18 program direction. Many, although not all, of their comments on
19 the '82 program were folded into the long range plan, and we
20 expect to get a further round of comment from them in the context
21 of their review of the fiscal '83 budget that will be again based
22 on this long range plan.

23 The letter that they sent to the Commission on it
24 really reflects more some problems that they had with the
25 structure of the program and the way it was cross-racked. I

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1 think a significant one was that the plan is laid out in
2 accordance with decision units, and from the point of view of
3 preparing the '83 budget that is a big help to us, because we can
4 now march from this directly into the '83 budget process. But
5 the structure in the decision units to some extent is picked in
6 terms of the interface with Congress and reasonable flexibility
7 to reprogramming and things of that type, and it is sometimes not
8 all that easy to come into something like that and say, okay,
9 there are certain basic questions, what are the elements that
10 bear on this question and that question. You will find them
11 scattered through the report.

12 What we had planned to do, and because of the ---

13 CHAIRMAN HENDRIE: I must say I don't find that. I
14 know their objection, but it seems to me that before we had
15 decision units there were complaints that there was not an orderly
16 way to get program plans of the offices into the budget process
17 in a fashion which was then trackable and auditable and so on.
18 We made the move into decision units, and I think having this
19 thing laid out that way so it flows into the budgetary process
20 is on balance from our standpoint a preferable one to recasting
21 it according to scientific questions and then having great
22 cross correlation tables to figure out what your budget docu-
23 ments look like.

24 So, you can do it one way, you can do it the other,
25 and I think it is better this way.

1 MR. MINOGUE: What I had originally planned to do, and
2 we just were not able to do it, the demands on staff particularly
3 have just undergone a major reorganization, and that was a
4 terrific staff burden and a lot of confusion. My original intent
5 was to have a companion document, a longer Commission paper, this
6 was a suggestion I got in talking to Commission Gilinsky some time
7 ago, that would basically say, here are the questions this
8 program is trying to answer, relate the program elements to the
9 questions and then flow from that into proposed incorporated
10 material to incorporate in the PPPG guidance. And I hope we will
11 have that developed in the context of the '82 budget preparation,
12 but I was not able to do it in the context of this package. We
13 tried and there just wasn't enough staff time available to take
14 care of it.

15 I think that is the kind of thing they are after, and
16 really the trouble is we have got two audiences here. One is the
17 budgetary process, where I like the present structure. But the
18 other one, I intend to put this out for public comment, I would
19 like to solicit broadly the comments of the research community
20 and so on. And structured this way, I am going to have trouble
21 getting the kind of comment I would like to get.

22 So, I think there really is some incentive to try to
23 either revise the report or have a companion document structured
24 that way.

25 COMMISSIONER AHEARNE: Yes, I think there is a definite

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1 advantage, and I guess what I would say is intellectual approach,
2 as opposed to budget approach, in trying to lay out sort of the
3 basic concept.

4 MR. MINOGUE: In developing this plan, we had some
5 fairly straightforward objectives; to develop a better understand-
6 ing of safety issues, to reduce uncertainties, to contribute to
7 improvements in the licensing process, to improve the risk
8 perspectives in regulation, and to improve safety. These are the
9 fundamental objectives that we had.

10 What I plan to do today in talking about the content,
11 rather than try to go through everything in here, is to stress the
12 areas of change, areas where there is either greater or less
13 emphasis than in previous programs.

14 Many of these shifts began right after Three Mile
15 Island. Some were initiated by Levine, many by Budnitz. They
16 have been carried forward by Tom Murley. And there are not any
17 really radical shifts here. There is a certain amount of
18 continuous flow.

19 So, we are not talking about greater emphasis in the
20 program. I am really talking about the post TMI. The more
21 recent shifts I will flag as I go through.

22 The first area, and a very important one of greater
23 emphasis in the research program, is to put a lot more emphasis
24 on the question of identifying an understanding complex system
25 transients. I will come back to that after I have covered the

1 other items on the list.

2 Second, much more emphasis on fuel damage and fission
3 product behavior over a very wide range of transients and
4 accidents. This means not just in the context of melting fuel,
5 but the whole range of any transients or any accidents that
6 involve damage to the clad or damage to the fuel, release of
7 fission products, going clear through to core melt situations.
8 And further, a much more careful isotope by isotope definition
9 of how the fission products behave in that context; if they are
10 released, how they are released, in what form, how they interact
11 with the medium that they see, what mechanisms exist to transport
12 them into the containment, and how they behave in the containment.

13 This kind of understanding is essential if we are going
14 to proceed in any sensible way with the degraded core cooling
15 rulemaking. I think it is essential if we are going to use
16 risk assessment as a general tool.

17 The next major area of greater emphasis is the area of
18 human factors, of operator training and understanding the man-
19 machine interface. And particularly in this context, a better
20 understanding of the kind of decision making that is involved
21 and what humans are capable of and what you have to rely on
22 automatic control systems is a research area that I think is
23 clearly needed if we are going to really get a handle on the kind
24 of control system design, control room design, operator training
25 and qualifications.

1 The next area, and one that the ACRS has stressed very
2 strongly, is improved safety systems. In the context of some of
3 the budget hearings, we have sent up to the Commission a list of
4 some of the improved safety system work that we are doing.

5 This area raises a question of the interface with DOE,
6 which I am going to discuss later.

7 The next major area ---

8 CHAIRMAN HENDRIE: The way you have groups it is all of
9 the improved safety systems work under that specific -- you
10 know, at the program we argue with OMB each year over whether it
11 should be one or four million, or whatever. It is in that
12 category?

13 MR. MINOGUE: I believe it is separately flagged. Ron,
14 can you verify that?

15 MR. SCROGGINS: In the fiscal '82 submission it was not
16 a separate decision unit as it had been for the previous. But
17 it includes the things that were previously identified in that
18 area, which has to do with the concepts for mitigation systems,
19 improved instrumentation and all.

20 MR. MINOGUE: I think the question is, if you go into
21 the budget package, all of that stuff is basically in one area
22 in the green book, isn't it?

23 MR. SCROGGINS: No. It is in -- in the '82 submission
24 it was in the new decision unit, rack-up, that we used for fiscal
25 '82. It ceased to have its identify as a separate decision unit

1 as it had in '80 and '81.

2 CHAIRMAN HENDRIE: In a programmatic sense, is it still
3 pretty well confined in the items in the original three year
4 program layout?

5 MR. SCROGGINS: Yes.

6 MR. MINOGUE: I would say there is more emphasis on
7 improved instrumentation. The answer is yes, with the idea of
8 improvements in instrumentation, and this year it would seem more
9 in the semi scale LOFT type work. There has been a lot of
10 emphasis in those programs to look at measurement techniques.
11 You kind of develop them in the context of trying to instrument
12 your experiments, but what you are also getting out of that as a
13 byproduct is evaluating some concepts of measuring system
14 conditions that would be pertinent to the power plants. But the
15 rest of the things on the list pretty much is the standard list.
16 I would say, by and large the ACRS has not been terribly happy
17 with the level of attention to this or the pace of the program,
18 particularly Dave Okrent.

19 The next broad area of greater emphasis relates to the
20 pressure boundary integrity and component operability as the
21 plants age. This relates to the problems of the many corrosion
22 phenomena that are not well understood, problems of severe
23 limitations in current in-service inspection techniques, and
24 problems related to the qualification testing of systems and
25 components under the conditions that they see both in in service

1 conditions and aging phenomena and external environments.

2 This is not an area where the total amount of money that
3 we have here has shifted so much as the emphasis of the program.
4 There is much more stress now on identifying and understanding
5 what the problems are and developing inspection techniques and
6 examination techniques and acceptability criteria, rather than
7 trying to put quite so much emphasis on some of the basic
8 phenonology.

9 So, I have listed it as an area of greater emphasis
10 even though the dollars are about the same.

11 Waste management, of course, is a major area with two
12 components which have rather different characteristics. The
13 high level waste issue depends to a very great extent on the
14 meaning that is given to the site characterization process. And
15 to the extent that a very high level of assurance is seen as
16 being required at that stage, the program expands very rapidly,
17 because basically you are in an area where you are trying to
18 develop very sophisticated geophysical techniques and other
19 exploratory techniques to define structural geology and
20 hydrology that really strain the state of the art.

21 That is an area where some changes in emphasis among
22 the barriers to release to the public, more emphasis on the
23 waste form, more emphasis on engineered features, less emphasis
24 on geology, or shift in emphasis on the level of assurance that
25 is sought in the site characterization process could have a big

1 impact on the program.

2 So, what we have put in the long range plan
3 fundamentally would track the current NMSS/Martin view which
4 reflects Commission assessment. But this is an area that could
5 contract quite rapidly or expand quite rapidly if the nature of
6 the task changes.

7 The other waste area is the low level waste problem,
8 which is more technical in nature in the sense that it is sort of
9 a fixed problem. It does involve interfaces and concerns about
10 work that may be done in the context of dealing with other
11 chemical and toxic wastes. But right now there is not that much
12 of that type stuff being done by other agencies.

13 COMMISSIONER AHEARNE: Bob, you mentioned the SECY
14 paper on the waste management research. The program is designed
15 to take maximum advantage of the DOE engineering and site
16 exploration research programs. I guess that, then, carries with
17 it some assumption that there will be potentially a re-examination
18 if DOE goes through a re-examination of its program?

19 MR. MINOGUE: That is really what I was just trying to
20 convey. We are shooting at a target on the wing here. We have
21 come up with a program that matches a particular approach and a
22 certain level of effort by DOE. If that changes much, and it
23 wouldn't take much of a change, it could result in some
24 significant changes in the program in this area. It is an
25 oddity here that we are in a frontier technology area, much more

1 than they are in some of the others, and an area that the oil
2 companies have just worked to death. All the easy techniques
3 have long since been developed by people that are out there
4 trying to find oil.

5 The next major area is related to risk assessment
6 techniques. Of course, this is primarily aimed at providing a
7 better focus of the regulatory process on safety issues.

8 We really have three distinct roles reflected in the
9 plan here. One is the development of techniques that would be
10 used by the licensing people to make risk judgments. Another is
11 the development and use of techniques to make -- the development
12 of techniques to provide a basis for rulemaking judgments or for
13 research priorities, and then, of course, the application of
14 those techniques in our their new assignment as rulemaking and
15 the older assignment of assigning priorities.

16 Again, this is an area that the ACRS, I think,
17 generally would like to see us go further. I think there is a
18 fundamental difference of opinion in the sense that I don't think
19 we feel that the state of the art is ready to make the kinds of
20 decisions that some of the ACRS members would like to see made
21 now. But, of course, as the data base -- I think we all agree
22 on where we want to head as the data base is improved and as the
23 techniques are improved. That would be eventually a major
24 decision-making tool.

25 COMMISSIONER AHEARNE: To what extent is that kind of

1 allocation approach used for the research program?

2 MR. MINOGUE: Right now, I would say relatively little.
3 Bob Bernero has made some applications, but I think the
4 fundamental problem is that the data base is limited and the
5 techniques are limited, and it is not a major factor. The
6 biggest prioritization that already exists in this document,
7 of course, will go on at a much heavier level as the fiscal '83
8 budget is developed is more the conventional tradeoffs and
9 judgments that the managements have to deal with the problems and
10 recognizing budget realities.

11 COMMISSIONER GILINSKY: What is it the ACRS wants you
12 to do?

13 MR. MINOGUE: Well, some members are more vocal on this
14 than others. I really would put it in terms of Dave Okrent, if
15 I may, because he is the strongest advocate of this.

16 COMMISSIONER GILINSKY: What does he want you to do?

17 MR. MINOGUE: Fundamentally, to use risk assessment as
18 the method of deciding where the research priorities should be
19 throughout the whole range of our activities. And fundamentally,
20 what we are saying is, to be able to do that across activities is
21 a long, long way off, because the acceptability of risks varies,
22 or the public perception of risks which reflects the political
23 acceptability varies a great deal.

24 Let me use as an example the comparison between the
25 practice of nuclear medicine, where people readily accept this

1 rather widespread dispersal of material, and some of the reactor
2 safety questions. Within specific areas of the program, I think
3 there is more agreement. So if you are looking, say, at
4 deciding between one set of tests or another that are trying to
5 look at different accident scenarios, now you can really begin to
6 apply this kind of technology, and we do do that, deciding where
7 to put the emphasis in some of the experimental programs.

8 COMMISSIONER GILINSKY: Well, presumably we do apply
9 it in the sense that it is your judgment, you are just not
10 calculating it. Other people have done this for years and years
11 and years.

12 COMMISSIONER AHEARNE: I think part of the problem has
13 been, at least from some of the ACRS members, that when they
14 apply their intuition to the research program, they come out with
15 a different set of priorities than they see in the research
16 program, and their argument is that we aren't applying any kind
17 of probabilistic assessment to where the dollars ought to be
18 going because they say that if we did, then we would get a
19 shifting of the dollars.

20 MR. MURLEY: Could I augment the comments here, because
21 there was a study of this about two years ago. And it happened
22 just before Three Mile Island. One of Tony Buhl's guys, Ray
23 DiSalvo, went through our whole safety research program and used
24 the techniques out of WASH 1400, the high risk scenarios, and
25 from that he ranked the research program according to its

1 contribution to risk. And unfortunately it got caught up in the
2 hurly-burly of TMI and it is probably just gathering dust
3 somewhere now. But I think you could find it and dig it out.

4 But I would say that if -- we did use that, as a matter
5 of fact, to augment our judgments with regard to reducing the
6 large LOCA research, increasing the emphasis on small LOCAs and
7 human factors. But there is a trap in that, and let me bring
8 that out, because it came out in the PPPG last year also.

9 That is, if you prioritize the program according to
10 the risk analysis that you have done, you are limited by errors
11 that can be in that risk assessment. I will give you one
12 example. DiSalvo's estimate came out and showed that the
13 contribution of our heavy section steel program and our pressure
14 vessel program was negligible, and on that basis we should have
15 dropped it. The point is that that was based on an assessment
16 that the vessel failure probability was ten to the minus seven
17 per reactor year. And some of us kind of questioned, gee, do we
18 know everything there is to know about pressure vessels, and we
19 are glad we kept it going.

20 So, there are those traps there, and I would urge that
21 it only be used as a guide, and not as a rigorous kind of rule.

22 MR. MINOGUE: I was aware of this previous study, and
23 I think that HSST program is a good example. If a risk
24 assessment comes out with an answer that is consistent with the
25 engineering judgment, the pooled expertise of a lot of

1 knowledgeable people, then it gives you some extra confidence.

2 COMMISSIONER GILINSKY: It is like any complicated
3 reactor, the regular program.

4 MR. MINOGUE: Yes. I recollect well the conclusion on
5 the HSST program, which I think probably of all the programs that
6 the research office has run over the years has made the greatest
7 single contribution to safety, because it has been the basis on
8 which the boiler code provisions have been developed, and that is
9 what makes the pressure vessel failure probability so low. And
10 it is that kind of thing that makes me nervous about trying to
11 apply this in a sweeping way, because some of the conclusions are
12 just contrary to common sense.

13 COMMISSIONER GILINSKY: Actually, could I ask Tom a
14 question?

15 One of the conclusions of WASH 1400, as I understand it,
16 is that one ought to pay more attention to small breaks.

17 MR. MURLEY: Yes.

18 COMMISSIONER GILINSKY: And yet that didn't get factored
19 into our program for a long time, even though we had people who
20 were actively involved in developing that document on the staff.
21 What is the reason for that?

22 MR. MURLEY: Well, as I recede further and further
23 from the immediate -- no, I was right in the middle of it. I
24 think the reason was we felt we had this commitment that stemmed
25 out of the ECCS hearings, and the people -- well, it was

1 Herb Kouts and Sol Levine and people like that who were in
2 charge of the office at the time, and they felt it was a real
3 failing of the agency that we did not have this research
4 information when we went into that hearing, and it was
5 embarrassing.

6 So, they made a commitment, and it is a commitment of
7 the old AEC that we will go out and get those research data to
8 confirm the margin. So, it got to be an article of faith with
9 us on the staff that we will go out and get it, and I think we
10 are probably a little over zealous, particularly in the big
11 facilities area, that we are going to do it.

12 COMMISSIONER GILINSKY: Well, we got locked into
13 fairly substantial programs, too. But at the same time, and I
14 don't bring it up in any other vein other than just to try to help
15 us think about the future, I don't remember any suggestion that,
16 you know, as soon as we get through with this we are going to go
17 on with small breaks. It was just that we had this program, we
18 had made a commitment to the American Physical Society or whoever,
19 the ACRS, Dave Okrent probably, and we were marching on.

20 CHAIRMAN HENDRIE: And I think the commitment was
21 thought of very heavily in terms of a commitment to staff
22 reviewers and engineers whose judgment about ECCS performance was
23 in part based on the following kind of thing; all, it looks
24 reasonable and I think it is going to come out that way, and I am
25 willing to go ahead and say yes, it is okay, but part of the

1 reason I am willing to do that is, I can see this research coming
2 along and I know that it isn't going to be very long before there
3 will be confirmation or, if something doesn't come through quite
4 the way I think it is going to work out; we will be able to do
5 something about it, you know, in the fairly near term, the next
6 few years.

7 Furthermore, there wasn't a great deal of pressure
8 from the licensing offices to rush back into the research program
9 and reorient large LOCA research to transients and small LOCAs.
10 You know, we continued to wave hands over the proposition.

11 MR. MURLEY: Small breaks were always in the plan, but
12 again, before Three Mile Island, we thought we had it bounded,
13 that the large break analyses and experiments bounded the small
14 breaks, and so they were a second order of problem.

15 COMMISSIONER AHEARNE: DiSalvo's analysis that you are
16 quoting there didn't lead to a conclusion on the small break-
17 large break?

18 MR. MURLEY: As I recall, he did say that we ought to
19 put more emphasis on the small break, yes. So, just before Three
20 Mile Island, we were starting to factor this into our thinking,
21 and then, of course, that accident crystallized that.

22 COMMISSIONER GILINSKY: Is that the essential point,
23 the notion that we had bounded the problem?

24 MR. MURLEY: Yes.

25 MR. MINOGUE: I would like to interject a comment from

1 a little different perspective. We are talking about the
2 Appendix K mortgage here, and I agree with what has been said.
3 But the whole regulatory process, going back a long time, has been
4 based on the assumptions that you use particular models, you
5 assess particular accidents, and that they properly characterized
6 and, in a sense, bounded the problem. And that has been kind of
7 fundamental.

8 But the fact that other accidents might have more
9 significance in some real world sense goes back, I know, at least
10 as far as Mr. Schlesinger's chairmanship, because that was
11 something that when he took over as chairman of the AEC he
12 commented on as being, gee, you guys are putting so much
13 emphasis on limiting case accident and there may be lesser
14 accidents that should be of greater concern.

15 I think the fundamental problem is, and I am really
16 going to parrot what Tom has said, that the research office
17 perceived that they had an obligation to pay the Appendix K
18 mortgage, that a very complex methodology had been set up and was
19 being used by the staff that required some confirmation of
20 margins by a research program, and that was the main thrust.

21 COMMISSIONER GILINSKY: I understand that, but still
22 there wasn't the suggestion or the recommendation that we have
23 got to look at this other class of accidents, even though one of
24 the central safety studies already evaluated said that, you know,
25 that is precisely what you ought to be doing.

1 MR. MINOGUE: Yes. There was little urge to strike out--
2 it is the program I am really talking about here, to go back and
3 do it right -- that is, to do the kind of thing that the
4 Commission is undertaking in the degraded core cooling rule-
5 making means that you have got to sit down and define in some
6 very detailed way a very wide range of system transients. It is
7 an absolute prerequisite, because you need that, and this is one
8 of the points I was going to make in my presentation, you need that
9 as a basis for doing the risk analysis, you need it as a basis to
10 understand how the systems operate, to do the control room
11 design. You need it to plan the research that you do on
12 fission product release and fuel behavior. You need it to
13 establish the design basis for improved safety features, and it is
14 a big program.

15 I think part of the problem here was that there was a
16 reluctance -- this goes back a long way, it goes back to when I
17 was a safety research coordinator for the AEC regulatory staff --
18 there was a real reluctance to depart from this basically very
19 simple approach, although Appendix K is not all that simple. This
20 is on a par with the TID 14844 ion analysis. It was a simple
21 approach that was generally seen as properly and adequately
22 characterizing the risks, and if you applied that you had a
23 licensing process that could move forward and make decisions.
24 Whereas the feeling was that if you went back and tried to really
25 re-examine the basic nature and course of accidents and transients

1 and how things behaved, it would be a very costly program, and it
2 is. You know, we have laid out such a program, and it is not
3 cheap.

4 COMMISSIONER GILINSKY: At the risk of boring everybody
5 by continuing this, the thing that surprised me was that you had,
6 I don't know, I guess a dozen of the key authors of WASH 1400,
7 and one of the principal conclusions of that report was, you really
8 ought to be looking -- well, not ought to be looking, but a
9 certain class of accidents is probably more important than these
10 cataclysmic breaks, and yet that doesn't seem to have what people
11 think that we really ought to be doing.

12 I guess one reason for bringing it up is that we were
13 so sure we were right before, it just suggested that we think
14 carefully.

15 MR. MINOGUE: I would be glad to yield to Mr. Bernero
16 in a second, but part of the problem here was that the staff
17 reception of WASH 1400 was mixed from the beginning because of
18 concerns about the executive summary, concerns about the data
19 base, and there was a very real reluctance to charge off into the
20 unknown based on the conclusions of the report, just from the
21 reactions of staff on the limitations of the report and some
22 somewhat mixed signals we got from various commissioners as to
23 what their attitude was toward the report.

24 COMMISSIONER GILINSKY: I came late, but even so, I
25 don't think it goes to this point.

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1 MR. MINOGUE: No. When the report was first issued
 2 there were a number of people in the regulatory staff who were
 3 really concerned about the limitations of the data base and
 4 somewhat skeptical of the conclusions because of that. That was a
 5 fairly widely held view.

6 MR. BERNERO: If I could make some comments, the report
 7 that Ray DiSalvo did when he was part of the then called
 8 probabilistic analysis staff is indeed in the hands of the ACRS.
 9 It was discussed with them at some length.

10 If you read that report, it does use the insight
 11 provided by WASH 1400, warts and all, to say, oh, here is high
 12 priority work, here is medium priority work, and here is low
 13 priority work.

14 Consequently, since it reflects the biases of WASH 1400,
 15 it is blind in many areas, like heavy section steel questions.

16 There is also a problem when you go into it. WASH 1400
 17 says the principal threat to safety lies in areas like transients
 18 and small breaks that will get the plant into trouble, but what
 19 is the subject of the research that you need. Is it the
 20 probability of pipes breaking, is it the probability of transients
 21 occurring, or is it the phenomena of the plants under those
 22 conditions?

23 And I think if you look carefully at the research
 24 program, perhaps not as quickly as it might have been, you will
 25 find footprints, you will find traces of things like a severe

1 accident sequence analysis, that I want to be sure of exactly
2 what the plant does during a station blackout, so let's throw a
3 bunch of engineers at it and try to analyze step by step with the
4 best codes available when the steam generator boils dry, when the
5 relief valves have lifted, when everything that is going to
6 happen happens.

7 So, you will find traces of that sort of stuff, but you
8 won't find a useful report card that someone goes through the
9 decision unit and sub element structure and gives a figure of
10 merit for risk assessment. That would really be a sophomoric
11 use of it.

12 Just take the LOFT program. I participated in that
13 LOFT special review group. There is still a whole body of people
14 that feel a need for more large break analysis. There is another
15 body of people that says you can kill two or three birds with one
16 stone, you can do man-machine interface stuff and small break
17 analysis in the same facility.

18 It really doesn't lend itself to some rigorous figure
19 of merit probabilistic risk analysis. It is a very complex
20 judgment there. Is that a good place to do man-machine? Man-
21 machine interfaces is important work, but is LOFT the right place
22 to do it? Probabilistic risk analysis doesn't help you to make
23 those decisions. The small break analysis, is that the right
24 place to get the effects that are crucial, pumps on, pumps off,
25 separate effects, is the break on the top of the pipe, the bottom

1 of the pipe, all that kind of question.

2 COMMISSIONER GILINSKY: I don't want to hold Bob up.
3 Of course, Denny had something to say, but I do want to say that
4 in retrospect I am surprised that WASH 1400 didn't have -- given
5 that a lot of the authors were right in that office -- didn't
6 have more of an effect on the research program.

7 MR. RATHBUN: I think there were some effects that may
8 not be as well acknowledged. If research had studied the small
9 break in Appendix K space, it wouldn't have learned anything. It
10 learned that small breaks are benign. It would have applied
11 single failures, but that is all. If it had been trying to solve
12 an Appendix K small break, then nothing would have been learned.

13 About that time, that is the '74 to '79 time span,
14 there were a lot of changes, I think, that you can attribute to
15 WASH 1400. The protection policy on the uncontained LOCA, the
16 MV, about that time the auxiliary feedwater standard review panel
17 was upgraded to make it a safety system.

18 The weaknesses of small break LOCA with loss of power,
19 which is one of the dominant sequences, I think, we contributing
20 to upgrading the diesel generator reliability work. I think it
21 is somewhat belatedly leading to the DC power study, which was
22 recently published.

23 So, I think there have been a lot of changes, some of
24 which you can attribute to research studies to help reduce some
25 core melt sequences, but it is really not thermal hydrolic LOCA

1 research, but they are definitely related research and they
2 definitely reduce core melt likelihood.

3 MR. MINOGUE: But it still boils down to a relatively
4 limited application, and generally within some specific problem
5 area, not across areas.

6 One point that Mr. Bernero made that I would like to
7 identify before I go on that is important. Much of this work
8 is aimed at identifying phenomenology, and other chunks of the
9 work aimed at identifying probabilities, and that is a thread that
10 runs throughout the program. Much of the testing work
11 fundamentally is trying to determine how things behave under
12 certain conditions. The risk assessment work will help us
13 define some of the probabilities of those conditions, and we will
14 put it all together at the tail end. That is really one of the
15 things I had in mind when I talked about the lack of a data base.

16 One of the problems I have with some of the risk
17 assessment work is I think some of the phenomenology that is
18 assumed is not well founded.

19 Let me talk about the areas where the emphasis has been
20 decreased in this program.

21 The first we have discussed at some length, the
22 Appendix K mortgage is basically paid. There are some residual
23 large break areas to be worked on, but fundamentally that is an
24 area of much less emphasis.

25 Safeguards research, we have wound down the material

1 control and accounting work in this program quite significantly.
2 This, of course, if there were a breeder program, that would have
3 to come back in again.

4 The LOFT issue we have discussed with the Commission as
5 a separate question. Fundamentally, we are putting a lot less
6 emphasis on the large integral facilities like LOFT, and a subset
7 of that which I will touch on later is where big multipurpose
8 facilities are involved, efforts to define approaches with which
9 we can pool our interests basically with industry or with DOE
10 to get work of that type done on somebody else's facility.

11 Open ended code development, this is an area that the
12 ACRS, I think, was very happy to see. Much of the emphasis in
13 past years has been to develop more and more complex codes to
14 describe some of the phenomenon with more and more complex models.
15 It has really come the time to begin to put the emphasis on
16 applications of these models and applications of these codes.
17 The faster running versions are using them as the basis for
18 research planning and for licensing work. That there is a real
19 consensus on, so there is a real turndown in the code
20 development whose fundamental objective in each year is to better
21 the model that was done the previous year.

22 Fuel behavior under normal operating transients is
23 another area that we have really turned down quite a bit. That
24 is, again, something that the ACRS, I think, was very pleased to
25 see.

1 And last, the point that Tom Murley touched on, the
2 emphasis in the program on confirming margins in the existing
3 regulations has been substantially reduced.

4 I say, if I can sort of sum all of this up, probably
5 the biggest single thing that we are trying to do in the next
6 few years is to develop a solid base of understanding on
7 phenomena and on probabilities to provide a basis for a complete
8 re-examination of the degraded core cooling rulemaking, a
9 complete re-examination of the way severe accidents are treated
10 in the regulatory process, and a major driving force behind this
11 program in the next few years is precisely that.

12 Something that is not in the plan, if I can go on to the
13 next area ---

14 CHAIRMAN HENDRIE: Before you come away from this
15 summary, help me out on safeguards research. I dimly remember
16 because once in a while it gets mentioned down on the Hill or
17 somebody writes me a letter, I dimly remember something in an
18 authorization bill or in an appropriation bill about six people
19 to do something with material accounting.

20 MR. CORNELL: That was in NMSS.

21 CHAIRMAN HENDRIE: And none of that is rubbed off here?

22 MR. MINOGUE: No. I discussed this specifically with
23 Davis personally.

24 COMMISSIONER AHEARNE: That was an amendment to have
25 certain people allocated to NMSS.

1 MR. MINOGUE: Yes. What we are really saying here is
2 that with the current industry that deals with material that may
3 be diverted, there does not appear to be a need for a large
4 research program to deal with material control and accounting.
5 If you have got a fullblown plutonium industry handled strictly
6 in the private sector, then we have got a different story and we
7 have to reinstate all that work.

8 It shows up in some of the budget material that we
9 sent to the various hearings in answer to questions. In the
10 breeder program, you will note there is a continuing item about
11 more safeguards work. Well, that is what we are cutting out
12 here. It is just basically putting it back in again.

13 Two things that are missing from this plan are the
14 breeder and the HTGRs. I would like to discuss each of them at
15 least briefly.

16 I committed to the ACRS that we would develop a
17 supplement for these. The problems are rather different, in the
18 sense that the big problem with the breeder is to figure out
19 exactly what level of program and dealing with what issues is
20 required, and you really can only do that in the context of
21 looking at the schedule of licensing and the context in which the
22 submission may be made.

23 So, we have developed a whole set of figures that range
24 from -- all of which assume that the NEPA type questions are not
25 at issue, that they are essentially resolved by separate action.

1 COMMISSIONER AHEARNE: Could you explain that a little
2 bit more, the NEPA type actions will be resolved by a separate
3 action?

4 MR. MINOGUE: Yes. There really are three basic -- in
5 the very early stages of trying to pull something together in the
6 context of the backup for the budget hearings, we worked with NRR
7 on this. One licensing mode would treat the CRBR as a normal
8 commercial activity, fully licensed in accordance with the normal
9 process, including alternate site review, the whole implementation
10 of NEPA, the need for the project. Everything like that would be
11 litigated through the full process.

12 Another alternative would dispose of the NEPA issues,
13 alternate site selection, need for the project, et cetera, but
14 would carry out a safety review that would go through the normal
15 full hearing process.

16 And the third alternate would be one comparable to the
17 way FFTF and other development projects have been handled, where
18 there would be a safety review made by the staff, but it would in
19 a sense be advisory. It wouldn't end up with the fullblown
20 hearing process.

21 COMMISSIONER AHEARNE: When you refer to the NEPA would
22 not be involved or handled otherwise, you were then speaking
23 only of the CRBR?

24 MR. MINOGUE: Yes. The assumption is that the NEPA
25 type issues would be disposed of, not through the licensing

1 process.

2 COMMISSIONER AHEARNE: That I understand. I thought you
3 were speaking across the board.

4 MR. MINOGUE: No, I am sorry. - Just the one project.

5 The real issue here, of course, it is a development project, and
6 in the past development projects have all been handled as special.
7 No pretense is made that they are fullblown commercial projects,
8 and of course much of the normal process assumes it is a fullblown
9 commercial.

10 In any event, in looking at the kind of work required
11 and we are developing a supplement to this document, but
12 basically ---

13 COMMISSIONER AHEARNE: Would that go as an additional
14 amount that you have?

15 MR. MINOGUE: Yes. There is no money in this program.
16 The general range of what we are coming up with for the most
17 likely track would be about 20 million incremental per year.
18 This is a very complex composite. About six and a half million
19 of the present light water reactor program is directly
20 attributable, some of the work on fuel behavior, and aerosol
21 behavior. There is some that is applicable to both projects.
22 We have continued that work as a light water project completely
23 legitimately, and the fact that it is there we never made a
24 secret.

25 So, when you flip it back the other way and say, well,

1 we now have a breeder program again, that work is still there and
2 you don't have to pay for it again.

3 Beyond that, depending on how one lays it out,
4 possibly another eight million or so of work that would be
5 related to accident phenomenology, and then risk assessment as it
6 might be applied to breeder work, and safeguards are two other
7 major areas.

8 The total figures that we have been handing out as
9 attachments to testimony run around 20 million or 21 million
10 extra. This is pretty iffy stuff, though. I want to emphasize
11 that. This bothered the ACRS when I talked to them, that there
12 are -- what we need to do in the way of research to support the
13 licensing process, given that a lot of this work has already been
14 done, depends a lot on the pace of it, how it comes to us, how
15 much of our effort would have to be aimed at pulling together
16 phenomenology into forms that the licensing people could use
17 directly, how much new work we would have to do.

18 COMMISSIONER AHEARNE: A lot depends on which way DOE
19 and Congress go.

20 MR. MINOGUE: Yes. How much they may modify the
21 design. It is really pretty imponderable. So, I really can't be
22 that specific about it. But hopefully over the next few months
23 this will resolve enough that we can at least lay out some
24 clear alternatives. We are going to need them, I think, because
25 the question of whether we have to swallow this money to

1 accomplish other programs or not is quite real.

2 HTGR I wanted to discuss briefly. I talked to
3 Chairman Hendrie a few weeks ago, and based on that decision I
4 have had some very brief discussions with DOE. I plan more
5 extensive discussions. I have met with both the utility group,
6 the Gas Cooled Reactor Associates, I think, is their title, and
7 with General Natomic. I am rather clear now on the direction of
8 commercialization that they plan.

9 The areas of research need are fairly straightforward.
10 They relate to fuel behavior. This would be really confirmatory
11 work because General Natomic has done a lot of work in this area.
12 Work on the high temperature code cases, high temperature
13 material questions, fission product behavior would really be a
14 matter of modifying the light water program to take some of this
15 into account. The behavior of concrete under various adverse
16 conditions. Again, that could be related to the work that is
17 being done on concrete containments.

18 Issues related to applications of risk assessments to
19 HTGR issues, and that is something that is mentioned in the
20 Udall committee bill as preapplication review, and that contains
21 both risk assessment and standards type work related to general
22 design criteria.

23 COMMISSIONER AHEARNE: You conclude there is still life
24 in that conglomerate of utilities?

25 MR. MINOGUE: Yes. Of course, the charge that

1 Chairman Hendrie gave me was to really -- and we have taken some
2 early steps toward this -- to lay out a program in a range from,
3 say, two million to three and a half million a year that would be
4 both structured to deal with real issues, solid work that would
5 not predetermine directions of commercialization, but would
6 conform to it, and that would maintain a cadre of skills. You
7 know, you would almost pick the projects to make sure you covered
8 a wide range and kept people involved that might be specialists
9 in other areas.

10 So that if we did get a license application, that you
11 wouldn't be just caught completely flatfooted. If you read
12 through the wording of the Udall bill, there is a lot of wording
13 in there and a very good list of things that need to be done. So,
14 there is some pretty fair congressional support on this.

15 The viability of the program is difficult to assess.
16 There clearly is a significant utility commitment of a large
17 group of the utilities, many of whom are very, you know,
18 responsible organizations, big organizations with big engineering
19 staffs. It seemed rather clear to me in talking to the GCRA
20 group that they would not proceed without some substantial
21 government support. They talked in terms of a pilot program with
22 a utility which owned the plant, to pay the normal commercial
23 price, and the government would pay the rest.

24 I guess I have a feeling that if something doesn't
25 happen in the next year or so that that will be the end of the

1 line. I certainly had felt that they were somewhat concerned
2 that way, but they seemed fairly optimistic. There does seem to
3 be some -- you know, without making a predetermined judgment on
4 something that hasn't been built, there are a lot of inherent
5 safety features to HTGRs that are pretty darn significant. They
6 also have some advantages in terms of combined applications of
7 electrical generation and processes that are quite significant.

8 I guess what I would say, the direction of
9 commercialization that they were discussing was not really
10 competitive with the large central station LWR. It was a rather
11 different application, a somewhat smaller plant that would be
12 built on the context of some cogeneration type approach.

13 What we plan to do on that is to try to -- and I am
14 much more clear we can do that on the schedule -- to have
15 something like this pulled together by the end of June or even
16 earlier that would tie into the '83 submission. I am assuming
17 we have to swallow that in the program.

18 One of the viewgraphs that you had shows how the
19 dollars look on this program going into the out years. I can
20 summarize it briefly, because I don't think that is the main
21 purpose of it.

22 In developing the program, we were able to scrub the
23 '83 program down to actually somewhat less than, about seven
24 million less than the figure that was sent to OMB as a possible
25 '83 submission. The EDO guidance is somewhat less than that yet,

1 but it is still in the same range. I think it is something like
2 five million less.

3 So, we have got a program here that in the near years,
4 '83, even with LOFT continuing as we discussed with the
5 Commission, is basically consistent with the EDO guidance. It
6 would obviously need a hard scrub as part of the normal review
7 process, but we are in the right range.

8 The big question mark is what happens if we have to
9 swallow the breeder. That clearly is in the 20 million or so
10 range, and I don't see much way that comes down much, and that is
11 a big chunk of money, and I think it would give us some very
12 difficult real prioritization decisions if we have to swallow
13 that, and I am not optimistic that we wouldn't have to swallow it.

14 So, although it may look superficially like we are
15 right in the right ballpark, the program at this point is still
16 flat, and is probably still flat because we are swallowing the
17 breeder and will need some scrubbing still. But that is okay.

18 I think this is broad program directions. It is nice
19 if you overshoot a bit and in the budget process you hammer out
20 what you really need.

21 If I may, I would like to go on and talk about the DOE
22 issue.

23 The legislation that was passed last year, and it
24 covers a number of things, but one of the items in it calls on
25 the Secretary of Energy to pull together a research and

1 development program that is related to a long list of problems
2 that relate to severe accident phenomena. It is the same thing
3 we have been discussing here. It is a very good list, as a
4 matter of fact.

5 This legislation can be read to call for a re-
6 examination and an expansion of the DOE role, re-examination of
7 the interface between that and NRC.

8 I have had a number of discussions with DOE staff, the
9 assistant secretary for nuclear energy position is not filled,
10 and I would not represent this as being something we can be sure
11 would be, let's say, confirmed or ratified by a new assistant
12 secretary coming in, but with staff we have got a pretty clear
13 line of agreement, first, that the DOE role is rather different
14 than ours. They are concerned with broader questions than just
15 safety questions. They are concerned with operational
16 reliability and availability of power generation capacity.

17 I think we both see that they might pull together or
18 encompass a bigger program of which our work might well be part,
19 emphasizing areas of severe fuel damage, which the legislation
20 calls for, commercialization of improved instrumentation,
21 commercialization of safety systems, operations, human factors
22 and operator training, more though as they are related to plant
23 reliability.

24 We seem to have agreement on that. The thing that is
25 a little fuzzy at this point, earlier we talked about the ACRS

1 wish that we would do more work on improved safety systems, and
2 in fact the budget isn't going up in that area and that is
3 probably because my view is that our goal here, long term, should
4 be to work three way, through and with DOE and with the industry,
5 to try to find mechanisms whereby the concepts that flow out of
6 our program, and nobody is arguing that we shouldn't do a lot of
7 work on improved safety system concepts, get pulled into a
8 commercialization mode either through DOE or by the industry.
9 And it is difficult to get anything really going on that very
10 solid with DOE not a viable partner.

11 More clearcut, and we have had some success here, is
12 to the IDCOR, the group that the industry has set up to do work
13 on the degraded core cooling issues plans an expenditure of, I
14 believe it was 15 million over the next several years. Much of
15 that would be analytical work. It would deal with and address
16 many of the same issues that I have touched on very briefly here.
17 It would seem almost tragic if we couldn't find some way to be
18 aware of each other's programs and to establish some kind of a
19 coordination framework so that we don't duplicate each other's
20 work. That doesn't suggest that we are going to go to bed with
21 them, but at least that we have coordinated programs.

22 A possible vehicle for that coordination would be
23 under the umbrella of DOE and, in fact, they did sponsor a
24 meeting recently between the researchers in the two areas -- it
25 was not a program planning meeting so much as an exchange of

1 information on what was going on.

2 What we would plan to do in the near future is to carry
3 that one step further, again ideally under a DOE umbrella, to what
4 would amount to a combined planning effort, like the Maryland
5 State Income Tax Return, combined but separate, or combined
6 return filing separately, that kind of stuff.

7 I really feel pretty confident that we can build a
8 framework here where we can work very effectively and get some
9 benefit from these programs and reduce the costs of our programs.

10 When you are talking about quantifying phenomenology
11 and really determining the characteristics of systems under
12 various conditions, I am not optimistic that this is going to
13 lead to agreement on the final rulemaking, and I am not sure this
14 is a desirable goal. I think we take the data base and we each
15 go away and we do our own thing, and we draw our own conclusions,
16 but to work together. This kind of work should be neutral. You
17 know, if the program is correctly done and nobody fudges the data,
18 it is fundamentally work that can be neutral. And I feel that if
19 we don't do something like this, we are not going to have enough
20 money to do all the work that is needed on the time scale that is
21 needed to come to grips with some of these degraded cooling
22 issues.

23 A comparable thing I wanted to bring to your attention
24 is the question of the interface with industry. This one is
25 really simple. There are two kinds of industries in safety

1 research. One, we have no part in, and we should stay out of it,
2 and that is work that is directly done to support an application,
3 and we are not going to help them do that. That is a given.

4 But in the other area, there are a number of cases where
5 they have interests, partly their interest in defining safety
6 problems, partly they have an interest in defining operational
7 characteristics, high on-line availability -- I am talking now
8 of manufacturers and utility industry alike.

9 There are a number of things that they are after that
10 require experimental data that can be obtained on the same type of
11 facility that we would use to obtain information that we are
12 after.

13 Using the GE-TLTA agreement as a model, what we plan to
14 do is to try to -- and again ideally working this in some way
15 through and with DOE -- to set up a situation where work that
16 requires big complex facilities -- I am thinking now of things
17 like semi scale, not LOFT -- can be done by common use of a
18 facility where all the parties help share the expense.

19 If we don't do something like that, I think we are just
20 dead, because the capital investment in these facilities is so
21 high and the operating costs are so high, and the kind of
22 results that we need are sufficiently limited and narrow in
23 scope that we will just paint ourselves into another LOFT
24 situation where a very good facility is simply more costly to us
25 because we carry the whole cost than the results are worth to us.

1 COMMISSIONER AHEARNE: I would hope we would, in
2 developing that kind of an approach, use, as you say, the example
3 where with boiling waters we tend to split the cost, whereas with
4 PWRs we tend to assume all of the costs or almost all of them.

5 COMMISSIONER BRADFORD: What is the rationale for that?
6 I was going to ask you the same question at some point. It seems
7 a good moment. Is there a history as to why we do one way
8 and one the other?

9 MR. MINOGUE: Yes. I think the tendency in the past
10 has been to be more liberal or less concerned about financial
11 problems, and there has been more of a willingness to do work
12 that I am now saying we try to fund on a joint basis.

13 COMMISSIONER BRADFORD: Right. But what I am saying is,
14 why do we do the PWRs one way ---

15 CHAIRMAN HENDRIE: Primarily because LOFT got started
16 as a PWR.

17 MR. MURLEY: I guess I have never understood that
18 comment as it came back from the Commission. In fact, we do
19 share costs with Westinghouse.

20 COMMISSIONER AHEARNE: I went through the research
21 program, I went through the shared costs arrangements with PWRs
22 and with BWRs, and the percentage on BWRs is that the industry
23 picks up a much higher percentage than the PWRs pick up.

24 MR. MINOGUE: It said that none of it was picked up,
25 and that just was not true.

1 COMMISSIONER AHEARNE: No. All I am saying is, when I
2 went through your research program last fall or early spring this
3 year, and I just went down with the information I was given that
4 came up from the office, and I went down the percentage sharings.
5 Everyplace that it was indicated there was a percentage sharing,
6 I looked at the percentage sharing of BWRs and the percentage
7 sharing of PWRs, and the BWR percentage sharing is a lot higher
8 on the part of industry than it is on PWRs, at least given the
9 information that was supplied to us.

10 MR. MURLEY: Well, let me make a comment on that. There
11 is one example, the Flecht program at Westinghouse has been going
12 for years, that Westinghouse and EPRI have contributed to, much
13 more than we have. And second, it doesn't show up in this
14 research program, but there was an old agreement I think between
15 Herb Kouts and EPRI that we would pick up one program, the ECC
16 bypass program, and Combusion and EPRI would pick up a pump
17 behavior program.

18 So, in fact, there was a multi-million dollar pump
19 program at Combusion that really, if you look at it, was a
20 quid pro quo because we were doing another program. But that
21 was a sharing that we decided we needed.

22 COMMISSIONER BRADFORD: When you get into a sharing
23 that is done that way, then you eliminate what I have always
24 understood to be one of the justifications, which was when you
25 share on any given project then you are entitled to a say in its

1 direction and a clearer shot at the information. When you start
2 picking and sort of trading back and forth, we take 100 percent of
3 one program and they take 100 percent of another, then you lose
4 that benefit.

5 MR. MURLEY: And I would say that turned out to be a
6 problem on the pump program. EPRI would not let us look at the
7 data until they were quite satisfied, and it took us a while to get
8 at it.

9 MR. MINOGUE: Actually, the history on these agreements
10 literally goes back to Shauer and Poseski, and they were shared
11 agreements then that involved Westinghouse.

12 In balance, what Mr. Ahearne says is quite true. I
13 mean, the numbers speak for themselves. And I think one problem
14 is that without in any way faulting my predecessors, there has
15 been a lot of ad hockery in the whole thing. There has been no
16 organized systematic approach. Sometimes it was you do this one
17 and I will do that one; sometimes it was I will give you some
18 money and please sweep some crumbs to me when the thing is done,
19 and it has been a real mix. And there is not much point in
20 trying to go back and re-examine or relive history.

21 I would hope that we have agreements that both provide
22 a fair sharing, and that ought to in some way relate to the
23 degree of interest. It wouldn't necessarily be the same for
24 every project. And second, that the sharing should be on a
25 basis that we are full co-participants.

1 GE was quite willing to agree with this when I talked
2 with Mr. Stone, that we could participate actively, and that means
3 people on the spot doing it, you know, through a contractor, not
4 through EG&G for example, where we actively participate in the
5 detailed planning of the tasks, where we participate in the
6 making of decisions on operational capabilities, on instrumenta-
7 tion, on control capabilities, we agree on what data is going to
8 be measured, we agree on how it is going to be interpreted and
9 analyzed, and we have got people participating in all of that.

10 What I found when I first began this job, I went around
11 and met with the various labs, and I got a consistent pattern of
12 complaints -- the same thing that Mr. Murley just commented on --
13 of people saying, I got to the people with whom we have these
14 joint programs and I don't get all the information I want. And
15 my first reaction was, well, they are holding back. But as I
16 thought about it further and asked more questions, the problem
17 was that much of the work and detail was not being done to meet
18 our needs, the analyses weren't exactly what we needed, the
19 measurements weren't exactly what was required, and this
20 reflected in not an active enough role in the conduct of the
21 program.

22 We have to provide this kind of safeguard, but the
23 fundamental approach, it seems to me, is that we just have to
24 share the cost of this kind of facility.

25 The other thing I wanted to touch on in regard to

1 industry relates to EPRI. Sam Bassett had some preliminary
2 discussions with them. There has been a delay there also. John
3 Taylor was just only very recently appointed to head their
4 program, and I am going to meet with him Friday, and hopefully we
5 can cut comparable deals.

6 I think it would be fair to say that the interface that
7 Sam had with the staff, there is a lot more willingness. So,
8 there is real willingness on the part of EPRI to deal with the
9 problems with either common arrangements with us, or to provide
10 us some voice in the planning of programs that they fund and so
11 there is room there, again, for some real negotiation and some
12 real agreement. And in general I think that my impression is
13 that the climate is right for this. There are problems of
14 overruns and so on, and I haven't been directly involved in that
15 yet, but apparently the staff is fairly optimistic that
16 Westinghouse will come to grips with some of these issues. But
17 it is the wave of the future.

18 It basically is an effort to avoid getting into another
19 LOFT situation, and I think it is important to bring it out in
20 this discussion to make sure that the Commission recognizes that
21 this is the direction we are going.

22 I feel really confident that we can handle the
23 safeguards problem here, which is quite real.

24 Another alternative that I discussed with GE and
25 found them quite agreeable would be almost like renting dedicated

1 time. This would work whether DOE might be the owner of the
2 facility or somebody else, where in addition to shared programs,
3 we had common interest and pooled expenses, that the various
4 parties might do experiments on their own, basically on a time
5 sharing basis where they did the tests and they walked away with
6 the results. It was their results, whether this would be us or
7 industry. The GE people were quite responsive to that also.

8 A comparable problem that I would like to touch on
9 briefly is the international program. In some ways that is not
10 so simple, because a lot of that program was set up in the context
11 of trying to deal with some of the large break issues or without
12 some of these perspectives on shifting emphasis and putting more
13 emphasis on operational transients, and it is a little harder to
14 come to grips with that.

15 I think by and large the biggest program is the ASEP
16 program, and the general reaction I get is that people are
17 reasonably satisfied that the Japanese work is solidly
18 applicable. There is somewhat more concern in terms of the
19 German program, which is not nearly as far along and not nearly
20 as much money has been spent regarding whether it really is the
21 kind of program that needs to be done on such a large level,
22 given the shift in emphasis from large break LOCAs.

23 So, this is an area also that we are trying to deal
24 with to find ways. To give a feel for the magnitude of this,
25 the total dollar value of foreign research work that is

1 applicable in some way to regulatory issues that we are dealing
2 with is something like 65 or 70 million dollars. It is quite
3 substantial. And by and large in the past it is a good approach.
4 I think Mr. Murley deserves a lot of credit for this.

5 We have been able to play a very large role in the
6 planning of that program at a relatively small expense, and a
7 lot of the price of participation has been the kind of thing that
8 helps you dominate the program, like developing instrumentation
9 or doing analyses that in effect predetermine the test. So, even
10 where we have put money into it, it has been the kind of in kind
11 participation that is a lot more effective in giving you a voice
12 in the program than just sending somebody a check and saying
13 please send in the results when they are available.

14 That basically covers the main points that I wanted to
15 discuss with you gentlemen.

16 COMMISSIONER AHEARNE: Could I ask a couple of questions
17 more on how you intend -- I assume you intend to, as you say it is
18 a living document, so that you would not view this as a one time
19 operation, is that correct?

20 MR. MINOGUE: Yes, sir, that is correct.

21 COMMISSIONER AHEARNE: Is it too early to say what, if
22 any, changes you would make in the approach you have here?

23 MR. MINOGUE: Yes. I think that the problem of the
24 structuring of the report we discussed earlier, and we may do
25 that by essentially doing two cross racks. Many of the NRR

1 comments we have incorporated in principle here. I think working
2 out some of the details, what we talked the other day to
3 Commissioner Bradford about the fire protection work would be an
4 example. There is a lot of detail that really needs to be
5 resolved.

6 I would say they are solidly on board in terms of,
7 basic approaches and broad programs, but there are a lot of fine
8 structures that need to be worked out.

9 Second, I really would like very much to run this
10 through an outside peer review process. We intend to publish it
11 for comment, and I hope we get a lot of comment from the research
12 community.

13 COMMISSIONER AHEARNE: I gather the nuclear safety
14 oversight committee is going to do that also for you?

15 MR. MINOGUE: Yes. They plan on June 4th and 5th
16 meetings to deal with the program, and I am told it is not just a
17 rerun of the ACRS review that we just had, that they are going to
18 look at it from a different perspective.

19 I think, though, I would like to and plan to solicit
20 comment more broadly. Hopefully, the various doers of the
21 program, the various national labs, and I am hoping -- I may be
22 disappointed -- will take it on themselves to come back and give
23 us some very solid feedback on this program.

24 COMMISSIONER AHEARNE: I think that is a good idea, so
25 I would support doing that. But I would guess that if you do

1 that, you want to be very careful in drafting whatever the notice
2 is that goes with it to give the person or the group that are now
3 looking at it a good understanding of what you know it isn't and
4 what areas and in what way you would like them to look at it.
5 Because otherwise, just seeing a long range research plan, it
6 could well be viewed as, well, here is your five year program and
7 all these pieces fit together and everything.

8 I guess I would say that I was very happy to see it.
9 I thought that as an initial effort it was excellent and that it
10 pulled together in sort of one place a lot of the information
11 which I know in the past I have tried to get hold of or look at,
12 and for a first time through I think that all of you who worked
13 on it ought to be commended. It is excellent.

14 MR. MINOGUE: I appreciate that, and I also would like
15 to acknowledge that the first major draft of this was done under
16 Mr. Murley and I had the benefit of one good head start on it.

17 There is one comment I would like to make to your
18 comment on the five year plan. The ACRS looks at the curves, and
19 you see a tailoff, and some of that, of course, is the tail of
20 the dragon and just is things that you don't foresee. But I
21 must say, I really do think the program will be really tailing
22 off. I think there are some major issues that involve a lot of
23 experimentation, which is high cost stuff, that are related to
24 accidents and transients and fuel damage, and as that work is
25 done, the program would be quite reduced. So, I think their

1 view is that the program, anything, should be going up with
2 time, and that the tailoff is all tail of the dragon, and I don't
3 really think that. I think that a lot of that tailoff is real,
4 and you can see it on the curves that you have got in front of
5 you.

6 CHAIRMAN HENDRIE: Very good. Other comments? Peter?
7 John?

8 I second John's comments about the piece of work. You
9 will notice you have got from the secretary a vote sheet. The
10 recommendation here we might note is not that this document is to
11 be gilded and regarded as the Bible, but rather simply that the
12 Commission recognize and approve this thing as a basis for
13 research program planning activities. And we understand that it
14 does not imply approval of specific budget details, and it
15 doesn't replace the normal budget review process.

16 So, when you get around to your vote sheets, why, be
17 aware that you are not being asked to bless every dollar line
18 word, and in that context I certainly am going to approve the
19 recommendation.

20 Other comments?

21 (No response.)

22 Thank you very much.

23 (Whereupon, at 3:55 p. m., the meeting was adjourned.)

24 + + +

25

NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the
NUCLEAR REGULATORY COMMISSION

in the matter of: Briefing on Long-Range Research Plan

Date of Proceeding: Tuesday, April 28, 1981

Docket Number: _____

Place of Proceeding: Room 1130, 1717 H St., Washington, D. C.

were held as herein appears, and that this is the original transcript thereof for the file of the Commission.

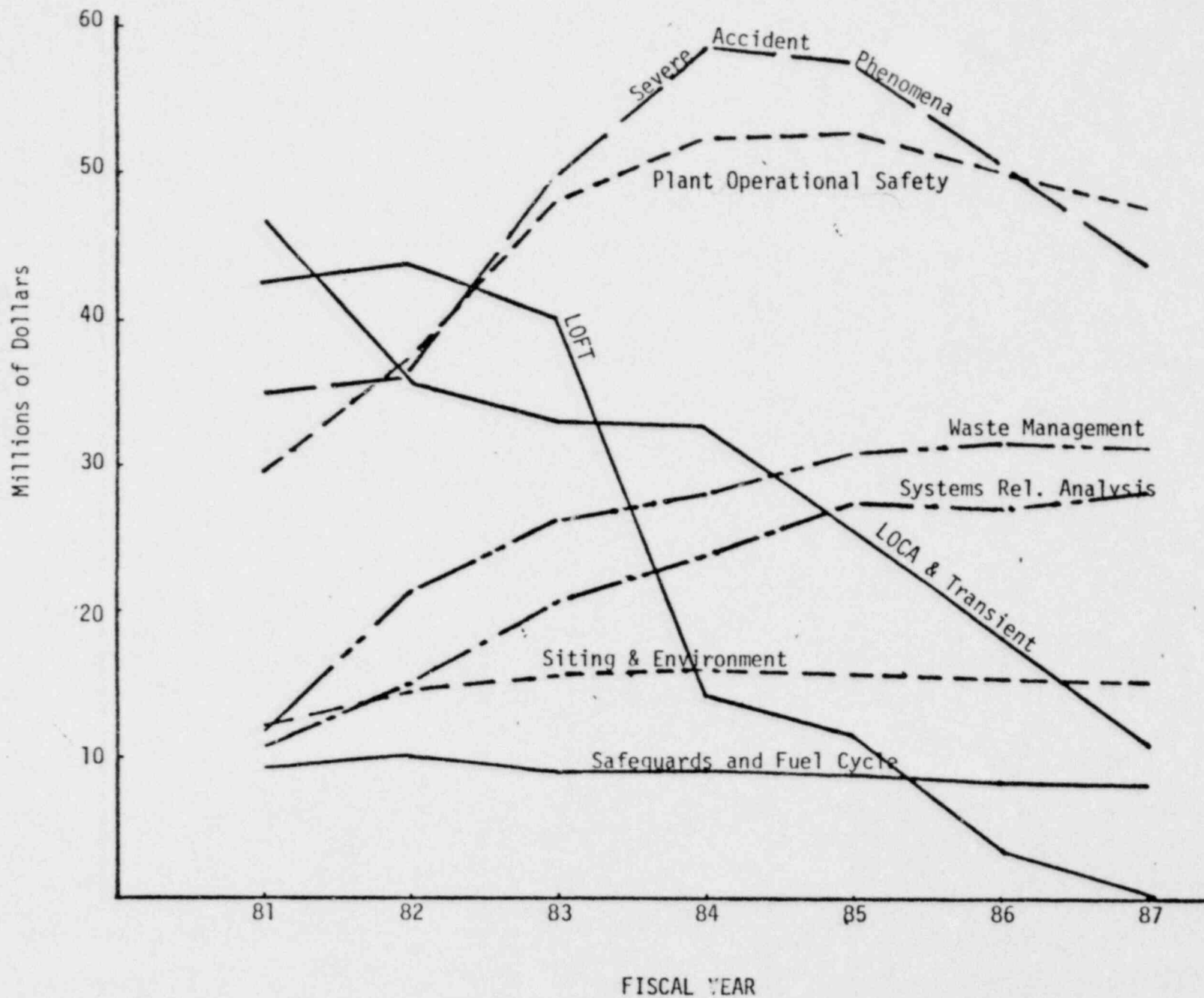
Marilynn M. Nations

Official Reporter (Typed)

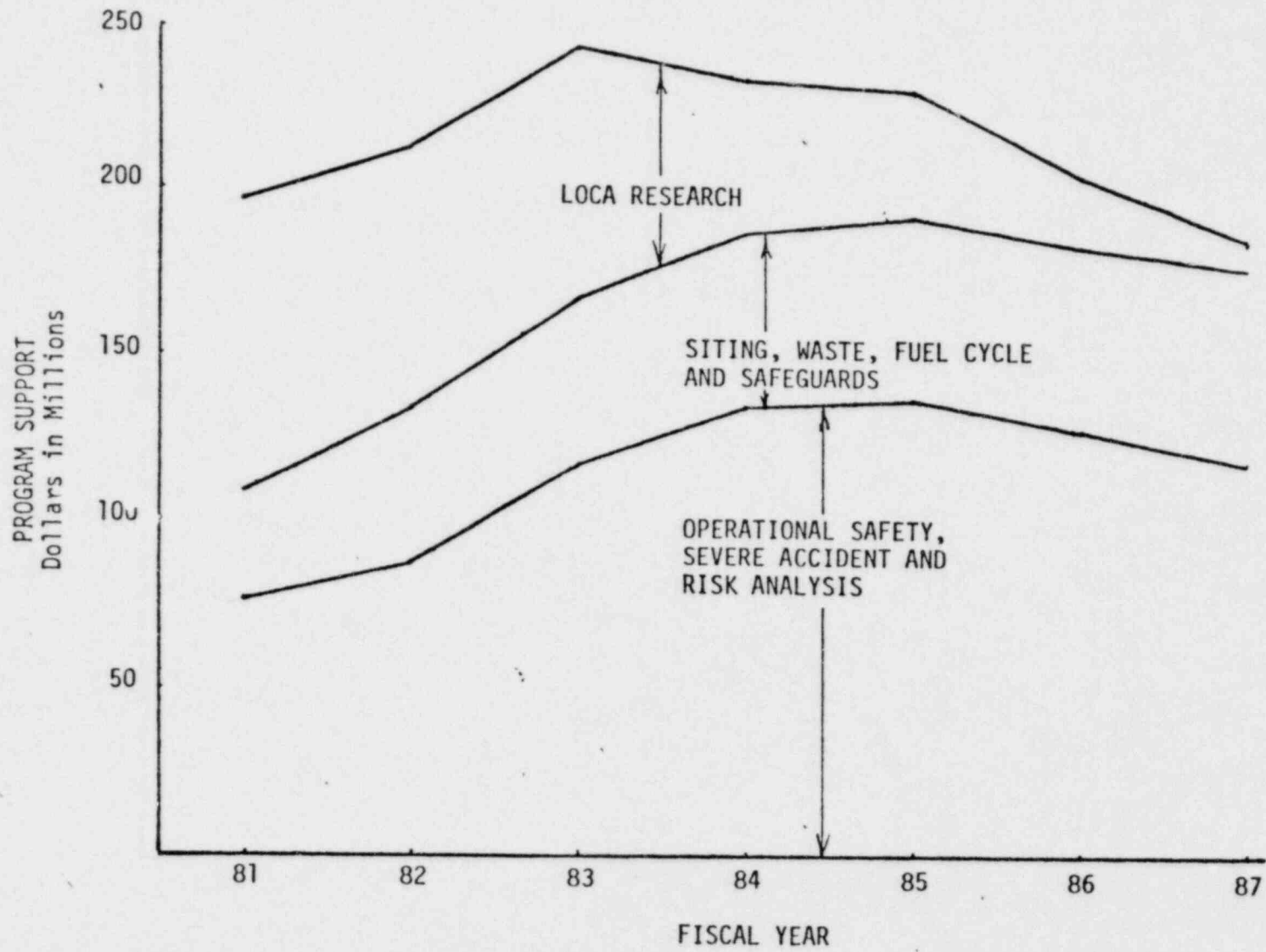
Marilynn M. Nations

Official Reporter (Signature)

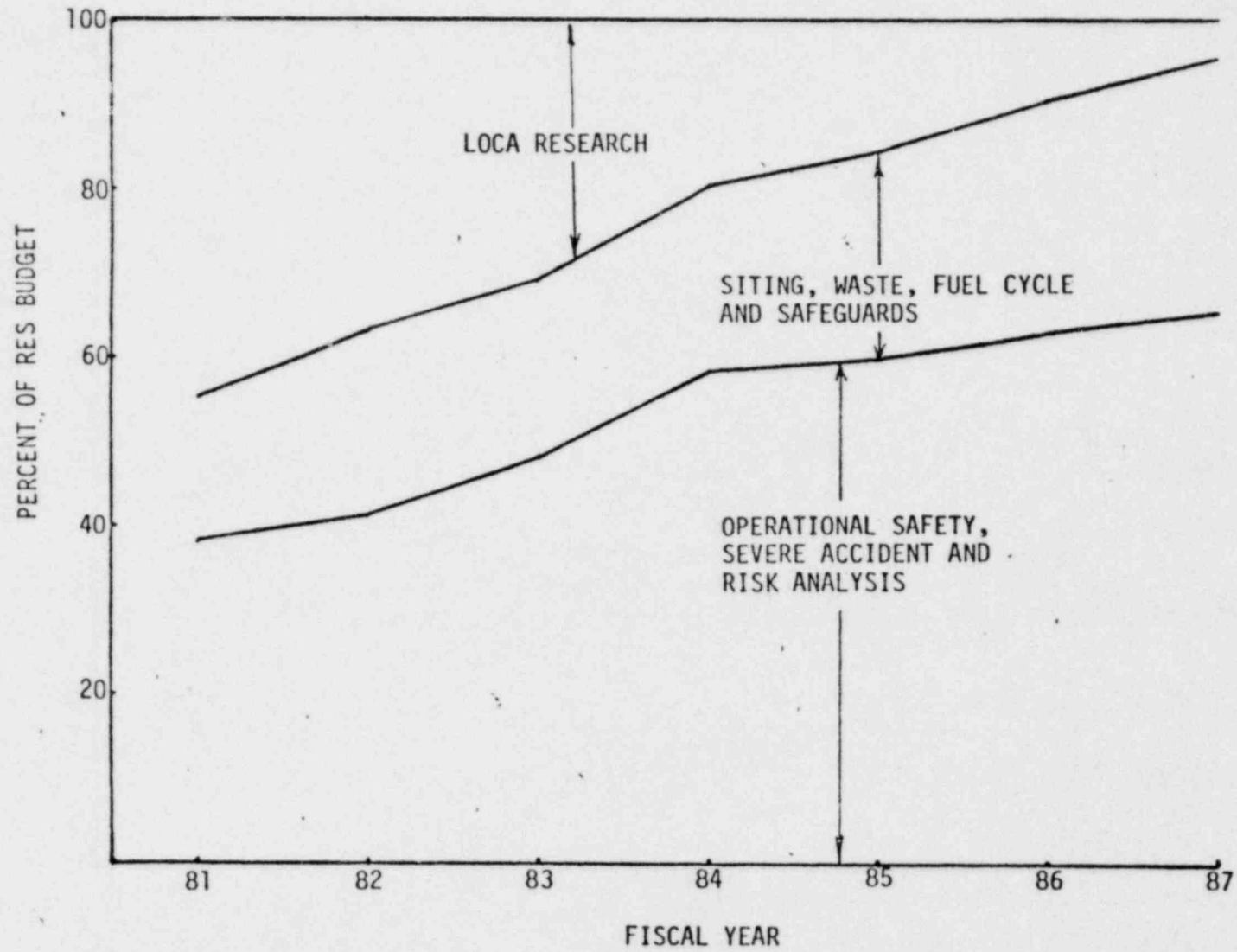
LONG RANGE RESEARCH PLAN BUDGET PROJECTIONS°



LONG RANGE RESEARCH PLAN BUDGET
BY MAJOR GROUPINGS



LONG RANGE RESEARCH PLAN
PERCENT OF BUDGET BY MAJOR GROUPINGS



NUCLEAR REGULATORY RESEARCH
LONG RANGE RESEARCH PLAN - NUREG-0740
(DOLLARS IN MILLIONS)

<u>DECISION UNIT</u>	<u>FY82</u>	<u>FY83</u>	<u>FY84</u>	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>
(PERSONNEL)	(170)	(174)	(174)	(173)	(167)	(158)
LOCA & TRANSIENT	\$ 35.4	\$ 32.9	\$ 32.6	\$ 25.6	\$ 17.7	\$ 10.6
LOFT	44.0	40.6	14.1	11.6	3.8	0
PLANT OPER. SAFETY	37.0	47.9	52.0	52.3	49.7	47.2
SEVERE ACCIDENT PHEN. & MITIGATION	35.8	49.4	58.8	57.9	50.4	43.9
SITING & ENVIRONMENTAL	14.4	15.6	15.9	15.5	15.3	15.1
WASTE MANAGEMENT	21.5	26.6	28.0	30.7	31.5	31.1
SAFEGUARDS & FUEL CYCLE SAFETY	10.2	9.1	9.1	8.8	8.4	8.3
SYSTEMS & RELIABILITY ANALYSIS	14.9	20.4	23.9	27.2	27.8	28.1
TOTAL PROG. SUPPORT	<u>\$213.2</u>	<u>\$242.5</u>	<u>\$234.4</u>	<u>\$229.6</u>	<u>\$204.6</u>	<u>\$184.3</u>
EQUIPMENT	7.4	8.2	7.9	7.7	6.7	5.8
TOTAL RES	<u>\$220.6</u>	<u>\$250.7</u>	<u>\$242.3</u>	<u>\$237.3</u>	<u>\$211.3</u>	<u>\$190.1</u>

NUCLEAR REGULATORY RESEARCH
LONG RANGE RESEARCH PLAN - NUREG-0740
(DOLLARS IN MILLIONS)

<u>LOCA & TRANSIENT RESEARCH</u>	<u>FY82</u>	<u>FY83</u>	<u>FY84</u>	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>
(PERSONNEL)	(20)	(19)	(18)	(17)	(15)	(11)
SEMISCALE	\$ 7.5	\$ 7.5	\$ 7.6	\$ 7.6	\$ 3.9	\$ 2.0
SEP. EFFECTS EXP. & MODEL DEV.	6.7	6.6	6.1	5.1	4.7	3.7
3-D PROGRAM	6.0	6.5	7.0	4.3	3.2	1.5
CODE IMPROVEMENT & MAINT.	3.8	3.1	2.5	2.0	1.3	1.3
CODE ASSESSMENT & APPL.	6.4	7.3	7.5	5.1	3.6	2.1
FUEL BEHAVIOR UNDER OPER. TRANSIENTS	5.0	1.9	1.9	1.5	1.0	0
TOTAL PROG. SUPPORT	<u>\$35.4</u>	<u>\$32.9</u>	<u>\$32.6</u>	<u>\$25.6</u>	<u>\$17.7</u>	<u>\$10.6</u>
EQUIPMENT	1.1	1.0	1.0	0.9	0.5	0.3

NUCLEAR REGULATORY RESEARCH
LONG RANGE RESEARCH PLAN - NUREG-0740
(DOLLARS IN MILLIONS)

<u>LOFT</u>	<u>FY82</u>	<u>FY83</u>	<u>FY84</u>	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>
(PERSONNEL)	(7)	(7)	(5)	(4)	(2)	(0)
TEST OPER. & SUPPORT	\$26.7	\$20.1	0	0	0	0
ANALYSIS & REPORTING	9.6	8.5	2.2	0	0	0
FUEL PROC. & EXAM.	4.5	1.9	1.2	0	0	0
ANCILLARY PROJECTS*	3.2	0	0	0	0	0
PROJECT CLOSE OUT	0	5.4	1.1	0	0	0
STAND-BY ACTIVITIES	0	4.7	9.6	4.7	0	0
DECONTAMINATION	0	0	0	3.2	0	0
DECOMMISSIONING	0	0	0	3.7	3.8	0
TOTAL PROG. SUPPORT	<u>\$44.0</u>	<u>\$40.6</u>	<u>\$14.1</u>	<u>\$11.6</u>	<u>\$3.8</u>	<u>0</u>
EQUIPMENT	1.5	1.0	0	0	0	0

*/THESE PROJECTS (MAN-MACHINE, INSTR. DEV., SEP. ANALYSIS)
ARE BUDGETED UNDER APPROPRIATE DECISION UNITS IN
FY 1983 AND BEYOND.

NUCLEAR REGULATORY RESEARCH
LONG RANGE RESEARCH PLAN - NUREG-0740
(DOLLARS IN MILLIONS)

<u>PLANT OPERATIONAL SAFETY</u>	<u>FY82</u>	<u>FY83</u>	<u>FY84</u>	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>
(PERSONNEL)	(27)	(29)	(30)	(30)	(30)	(29)
MAN-MACHINE INTERFACE	\$ 4.8	\$ 7.8	\$ 8.8	\$ 8.8	\$ 7.7	\$ 7.1
I&E/PLANT SYSTEMS BEHAVIOR	6.8	9.6	11.2	10.7	9.7	8.0
MECHANICAL & STRUCTURAL SAFETY	11.4	14.0	15.0	15.8	15.6	15.6
PRIMARY SYSTEMS INTEGRITY	<u>14.0</u>	<u>16.5</u>	<u>17.0</u>	<u>17.0</u>	<u>16.7</u>	<u>16.5</u>
TOTAL PROG. SUPPORT	\$37.0	\$47.9	\$52.0	\$52.3	\$49.7	\$47.2
EQUIPMENT	1.6	2.1	2.3	2.3	2.2	2.0

NUCLEAR REGULATORY RESEARCH
LONG RANGE RESEARCH PLAN - NUREG-0740
(DOLLARS IN MILLIONS)

<u>SEVERE ACCIDENT PHENOMENA & MITIGATION RESEARCH</u>	<u>FY82</u>	<u>FY83</u>	<u>FY84</u>	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>
(PERSONNEL)	(20)	(22)	(24)	(24)	(23)	(22)
BEHAVIOR OF DAMAGED FUEL	\$10.9	\$17.6	\$17.7	\$16.6	\$15.4	\$12.9
FUEL MELT BEHAVIOR	10.0	14.7	17.1	17.7	14.1	12.3
FISSION PRODUCT RELEASE & TRANSPORT	4.3	5.4	7.9	7.5	5.8	4.4
ACCIDENT MITIGATION	3.9	5.6	8.8	8.8	7.8	7.0
PBF OPERATIONS	4.7	6.1	7.3	7.3	7.3	7.3
FAST REACTORS	0	0	0	0	0	0
GAS-COOLED REACTORS	2.0	0	0	0	0	0
TOTAL PROG. SUPPORT	<u>\$35.8</u>	<u>\$49.4</u>	<u>\$58.8</u>	<u>\$57.9</u>	<u>\$50.4</u>	<u>\$43.9</u>
EQUIPMENT	1.7	2.3	2.7	2.5	2.1	1.7

NUCLEAR REGULATORY RESEARCH
LONG RANGE RESEARCH PLAN - NUREG-0740
(DOLLARS IN MILLIONS)

<u>SITING & ENVIRON. RESEARCH</u>	<u>FY82</u>	<u>FY83</u>	<u>FY84</u>	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>
(PERSONNEL)	(13)	(13)	(13)	(13)	(13)	(13)
SITE SAFETY	\$ 6.7	\$ 7.2	\$ 7.2	\$ 7.2	\$ 7.2	\$ 7.2
EFFLUENT/ENVIRONMENT IMPACT	2.4	2.9	3.4	3.6	3.6	3.6
OCCUP. EXPOSURE & HEALTH EFF.	3.2	3.7	3.7	3.2	3.0	2.9
NEPA IMPACTS	0.7	0.8	0.9	1.0	1.0	1.0
EMERGENCY PREPAREDNESS & SITING ALT.	1.4	1.0	0.7	0.5	0.5	0.4
TOTAL PROG. SUPPORT	<u>\$14.4</u>	<u>\$15.6</u>	<u>\$15.9</u>	<u>\$15.5</u>	<u>\$15.3</u>	<u>\$15.1</u>
EQUIPMENT	0.3	0.4	0.4	0.4	0.4	0.4

NUCLEAR REGULATORY RESEARCH
LONG RANGE RESEARCH PLAN - NUREG-0740
(DOLLARS IN MILLIONS)

<u>WASTE MANAGEMENT</u>	<u>FY82</u>	<u>FY83</u>	<u>FY84</u>	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>
(PERSONNEL)	(16)	(17)	(17)	(17)	(17)	(17)
HIGH LEVEL WASTE	\$13.0	\$16.3	\$17.7	\$19.5	\$20.5	\$20.5
LOW LEVEL WASTE	5.5	5.9	5.9	5.9	5.7	5.3
URANIUM RECOVERY	3.0	4.4	4.4	5.3	5.3	5.3
TOTAL PROG. SUPPORT	<u>\$21.5</u>	<u>\$26.6</u>	<u>\$28.0</u>	<u>\$30.7</u>	<u>\$31.5</u>	<u>\$31.1</u>
EQUIPMENT	0.9	1.1	1.2	1.3	1.3	1.2

NUCLEAR REGULATORY RESEARCH
LONG RANGE RESEARCH PLAN - NUREG-0740
(DOLLARS IN MILLIONS)

<u>SAFEGUARDS & FUEL CYCLE SAFETY</u>	<u>FY82</u>	<u>FY83</u>	<u>FY84</u>	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>
(PERSONNEL)	(13)	(12)	(12)	(12)	(12)	(12)
PHYSICAL PROTECTION	\$ 2.7	\$ 1.7	\$ 1.6	\$ 1.5	\$ 1.4	\$ 1.4
MATERIAL CONTROL & ACCOUNTING	2.2	0.7	0.6	0.5	0.4	0.4
FUEL CYCLE FACILITY SAFETY	1.0	1.4	1.6	1.6	1.6	1.6
DECOMMISSIONING	1.6	1.5	1.2	1.0	0.9	0.8
TRANSPORTATION	0.8	1.1	1.3	1.5	1.5	1.5
EFFLUENT CONTROL	1.0	1.0	0.9	0.8	0.7	0.7
PRODUCT SAFETY	0.3	0.4	0.5	0.5	0.5	0.5
OCCUP. PROTECTION	0.6	1.3	1.4	1.4	1.4	1.4
TOTAL PROG. SUPPORT	<u>\$10.2</u>	<u>\$ 9.1</u>	<u>\$ 9.1</u>	<u>\$ 8.8</u>	<u>\$ 8.4</u>	<u>\$ 8.3</u>
EQUIPMENT	0.3	0.3	0.3	0.3	0.2	0.2

NUCLEAR REGULATORY RESEARCH
LONG RANGE RESEARCH PLAN - NUREG-0740
(DOLLARS IN MILLIONS)

<u>SYSTEMS & RELIABILITY ANALYSIS</u>	<u>FY82</u>	<u>FY83</u>	<u>FY84</u>	<u>FY85</u>	<u>FY86</u>	<u>FY87</u>
(PERSONNEL)	(28)	(30)	(31)	(32)	(32)	(32)
METHODOLOGY DEVELOPMENT	\$ 4.4	\$ 5.4	\$ 7.0	\$ 8.0	\$ 7.8	\$ 7.6
RELIABILITY & HUMAN ERROR DATA ANALYSIS	2.9	3.0	3.1	3.8	4.0	4.2
SYSTEMS ANALYSIS	5.9	9.3	10.4	11.7	12.5	12.9
CONSEQUENCES ANALYSIS	1.7	2.7	3.4	3.7	3.5	3.4
TOTAL PROG. SUPPORT	<u>\$14.9</u>	<u>\$20.4</u>	<u>\$23.9</u>	<u>\$27.2</u>	<u>\$27.8</u>	<u>\$28.1</u>

April 9, 1981

SECY-81-229



POLICY ISSUE
(Notation Vote)

For: The Commissioners

From: William J. Dircks, Executive Director
for Operations

Subject: LONG RANGE RESEARCH PLAN, NUREG-0740

Purpose: To submit to the Commission for its consideration and approval as a basic planning document the Long Range Research Plan (NUREG-0740) for the fiscal years 1983-1987.

Discussion: On April 22, 1980, the Commission directed the Office of Nuclear Regulatory Research (RES) to develop a long range research plan (LRRP) to better coordinate NRC research planning with the budget cycles, assist the Commission in establishing appropriate priorities and in ensuring effective utilization of NRC resources. The LRRP is a 5-year planning document that identifies issues and lays out programmatic approaches for research to be done as part of the resolution of these issues. It is not intended that approval of the LRRP preempt the budget review process or imply approval of specific project details.

The LRRP (Enclosure 1) was developed by RES considering recommendations and comments from the NRC program offices (NRR, NMSS, SD and I&E), the Office of the Executive Director for Operations, the Office of Policy Evaluation, several other NRC staff offices, and the ACRS. Impact of discussions

Contact:
R. M. Scroggins, RES
42-74301

SECY NOTE: This paper is currently scheduled for a Commission briefing at an open meeting on Wednesday, April 22, 1981.

8104220062 PDR

DUPLICATE

POOR ORIGINAL