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BRIEFING ON STATUS OF EPRI DESIGN REQUIREMENTS
DOCUMENT FOR ADVANCED LIGHT WATER REACTORS

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DOCUMENT FOR ADVANCED LIGHT WATER REACTORS

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PUBLIC MEETING

Nuclear Regulatory Commission
One White Flint North
Rockville, Maryland

Tuesday, August 1, 1989

The Commission met in open session, pursuant to notice, at 10:00 ^a~~p~~.m., Kenneth M. Carr, Chairman, presiding.

COMMISSIONERS PRESENT:

KENNETH M. CARR, Chairman of the Commission
THOMAS M. ROBERTS, Commissioner
KENNETH C. ROGERS, Commissioner
JAMES R. CURTISS, Commissioner

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STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE:

SAMUEL J. CHILK, Secretary

WILLIAM C. PARLER, General Counsel

JAMES TAYLOR, Deputy Executive Director for Operations

THOMAS MURLEY, Director, NRR

THOMAS J. KENYON, Project Manager, PDSNP

CHARLES MILLER, Project Director, PDSNP

ASHOK THADANI, Assistant Director for Systems
Technology

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

10:00 a.m.

CHAIRMAN CARR: Good morning, ladies and gentlemen.

The purpose of today's meeting is for the NRC staff to brief the Commission on the status of Electric Power Research Institute, EPRI, design requirements document for advanced light water reactors. The Commission was last briefed on this subject in June of 1988.

Copies of the slide presentation are available at the entrance to the meeting room.

Do my fellow Commissioners have any opening comments?

(No response)

CHAIRMAN CARR: In that case, Mr. Taylor, you may proceed.

MR. TAYLOR: Good morning, Mr. Chairman. With me at the table are Doctor Murley and Ashok Thadani to my right, and to my left, Charlie Miller and Tom Kenyon, who is the Project Manager for this effort.

I'll now ask Doctor Murley to brief you.

DOCTOR MURLEY: Thank you, Commissioners.

Charlie Miller will describe the background

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1 and the current status of the staff's review of the
2 EPRI's ALWR requirements document. But first there
3 are some philosophical points that I would like to
4 discuss to set the stage for that. This is sort of
5 the higher level of abstraction that Commissioner
6 Rogers mentioned at last week's briefing. I'm afraid
7 I'll unavoidably cover some of the same ground that
8 Charlie Miller will cover later.

9 First, what is the ALWR requirements
10 document? We view it as a type of utility industry
11 guide for the basic design features for the next
12 generation of evolutionary plants. That's a good
13 idea. We support the concept. The utilities have
14 learned through hard operating experience what design
15 features they would like in the next plants and, by
16 getting NRC review and approval, the utility industry
17 will have an added bargaining chip with the reactor
18 designers to get the design features they would like.

19 For example, the designers could not use the
20 argument that the NRC would never agree with a certain
21 design feature if we had already reviewed and approved
22 it in the ALWR requirements document. Therefore, it
23 is a good vehicle for the utility industry to specify
24 the design features they want and to obtain NRC's
25 approval in principle before design begins.

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1 The requirements document, however, will not
2 go through certification rulemaking. Therefore, it
3 will not have the same status as a certified design
4 and it will not be legally binding on the staff. For
5 example, if a proposed design some years in the future
6 referenced the ALWR requirements document, it is
7 possible that new information or new insights by the
8 staff in the interim could cause us to propose some
9 different requirements in a certification rulemaking
10 from those in the EPRI requirements document.

11 The second question is, what licensing basis
12 is the staff using for reviewing the requirements
13 document as well as the evolutionary LWR designs?
14 First, of course, there's the current set of NRC
15 regulations, and I would particularly mention the
16 general design criteria among those.

17 Second is the set of post-TMI requirements,
18 the lessons that we learned from the TMI accident and
19 largely they're embodied in Part 50.34(f) of our
20 regulations.

21 The third set of requirements are the
22 technical resolution of all unresolved safety issues,
23 USIs, and all medium and high priority generic safety
24 issues, GSIs.

25 And the fourth general set of guidelines is

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1 that the staff is following the severe accident policy
2 statement put out by the Commission in 1985.

3 Now, this leads us to the following safety
4 philosophy and guidelines, I call them, namely that
5 future plant design should be safer than the current
6 generation of plants. They should follow the defense
7 in depth safety philosophy in the design. The plants
8 should complete a full scope PRA, probabilistic risk
9 assessment, before design -- or, as design begins and
10 the plant should meet NRC safety goals.

11 Concurrent with that, as I mentioned in last
12 week's briefing, these lead to numerical guidelines
13 that the staff has used in our review and they are
14 that the overall core melt frequency should be less
15 than 10^{-5} per reactor year; that any single individual
16 core melt sequence should be less than 10^{-6} per
17 reactor year. For example, this guides us in our
18 thinking on how to deal with ^{ATWS}~~Atlas~~ or how to deal with
19 station blackout or some of the standard sequences
20 that we are struggling with all the time.

21 Likewise, the guideline, numerical
22 guideline, that we're using is that the frequency of a
23 large release should be less than a 10^{-6} per reactor
24 year. And as you know, we have not formally defined
25 what we mean by large release. That is an issue that

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1 was -- the Commission was briefed on a few months ago.
2 EPRI has a guideline of -- essentially it's a
3 guideline of 25 whole bo -- rem, whole body dose,
4 during a 24 hour period at a half mile from the plant,
5 which they defined to be the site boundary. We're
6 working with EPRI on that guideline. There are still
7 -- there are some differences between theirs and ours,
8 but I think we can work those differences out.

9 And finally, there is another bit of safety
10 philosophy guideline, which is that for defense in
11 depth there should be a containment performance
12 criterion and I'll talk more about that later in the
13 briefing.

14 So, in conducting our reviews, particularly
15 in the area of severe accident design basis, the staff
16 is proposing resolution of individual issues within
17 that overall framework of regulations, policy
18 statements and established safety philosophy that I've
19 just discussed.

20 Many of these resolutions, however, are
21 design dependent. The containment design proposed for
22 the ABWR is fundamentally different from that proposed
23 for the advanced PWRs, for example. And, therefore,
24 it's difficult to make a generic set of requirements
25 or rules that would be much different from what we're

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1 already using.

2 The third question is, what is the
3 relationship then of the ABWR review, which we briefed
4 the Commission in June, to the ALWR review, which
5 we're discussing today? GE is supporting the ALWR
6 requirements document preparation and they are
7 addressing all of the ALWR requirements. In fact, GE
8 has added design features that go beyond what the
9 staff would have required in order to conform with
10 some of the EPRI requirements, in some cases.

11 But the ABWR review and resolution is moving
12 at a faster pace than the EPRI document. Part of the
13 reason is that about \$250 million has been spent on
14 the design and development testing in the U.S. and
15 Japan on the ABWR. There are firm plans to build two
16 ABWR plants in Japan. So that decisions are being
17 made and GE is moving ahead then with plans to firm up
18 the design and to actually build those plants.

19 GE has notified us that they're pleased with
20 the progress of the NRC staff review on the ^{ABW}~~ABRW~~. And
21 as I reported in June, the staff has reached
22 agreement, we believe, with GE on the broad resolution
23 of severe accident issues, although there are still a
24 number of detailed open issues to be resolved. We
25 don't think those are major stumbling blocks.

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1 Turning now to the ALWR requirements
2 document, the staff has prepared a draft safety
3 evaluation report on Chapter 5. And I believe the
4 Commission has just recently received a copy of that
5 draft for review.

6 You will note that there are over 40 open
7 issues in the draft SER and some of them are very
8 basic issues between the NRC staff and EPRI. I'll
9 talk about some of those in just a moment.

10 Now, in some cases, GE has side-stepped the
11 issue through a design choice like in ERDA containment
12 so that, although it's an issue between us and the
13 staff and EPRI, it is not an issue for the ABWR
14 because GE has chosen a design feature that avoids the
15 problem.

16 In other cases, they have agreed with the
17 staff's proposed resolution. One issue that comes to
18 mind is the notion of using the current Part 100
19 source term for meeting the Part 100 regulations.

20 EPRI's main concern, as I understand it, is
21 that the resolutions of issues being made on the ABWR
22 will preempt decisions on the ALWR requirements and I
23 understand that concern. We've tried to be flexible.
24 As you will see in the draft SER, we're prepared to
25 discuss alternative resolutions on several issues.

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1 So, the staff is not being rigid in using the ABWR
2 resolutions as generic requirements.

3 I think with that introduction then, I will
4 turn to Charlie who can -- Charzlie Miller who'll give
5 us more discussion of the background.

6 MR. MILLER: Thank you, Doctor Murley.

7 Good morning, Mr. Chairman, Commissioners.

8 (Slide) If I could have viewgraph 2,
9 please.

10 In order to set the stage and to put the
11 EPRI review in its proper perspective, I'd like to
12 discuss for a minute or two the history and the
13 overall schedule for the standardization project
14 reviews that we currently have in-house.

15 The standardization efforts started in some
16 earnest in the early 1980s. The earlier efforts were
17 GESSAR, Combustion Engineering System 80 and, at the
18 same time, there were some early EPRI interactions
19 with the staff to lay the groundwork for the work that
20 was going to be put into the requirements document.
21 The GESSAR and System 80 efforts were cited in the
22 Commission's severe accident policy statement and
23 there were some ground rules put in there concerning
24 what would need to be done with those in order to make
25 them forward referencable.

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1 In 1985 the Commission issued its severe
2 accident policy statement. Then, in subsequent years,
3 through 1987, the standardization policy statement and
4 the safety goal policy statement was issued by the
5 Commission. These policy statements provided
6 Commission guidance on what was expected in future
7 designs.

8 (Slide) May I have the next viewgraph,
9 please?

10 Starting in 1983, the staff started to
11 receive vendor submittals for standard plant designs.
12 The Westinghouse SP/90 was the first to submit
13 information, starting in about 1983. General Electric
14 submitted their application for design certification
15 in about 1987 and CE System 80+ formally submitted it
16 in 1989.

17 With regard to the EPRI requirements
18 document, the earlier efforts culminated in December
19 1986 into NUREG-1197. I have a copy here in front of
20 me. It pretty much laid the foundation for the ALWR
21 requirements document review. This resulted from
22 earlier interactions that the staff had with EPRI.

23 All of these efforts and the policy
24 statements culminated in April 1989 when the
25 Commission promulgated 10 CFR Part 52, which was the

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1 standardization rule.

2 (Slide) Go to the next slide, please.

3 I'd like to discuss a little bit now the
4 overall schedules that we are using for the current
5 plants that are in-house and some that we anticipate
6 receiving in the future and how the EPRI effort fits
7 into all of that.

8 Between 1990 and 1992, the staff anticipates
9 that the evolutionary plant final design approvals
10 will be issued. These are the GE ABWR, the CE System
11 80+ and the Westinghouse SP/90, if Westinghouse
12 decides to pursue design certification.

13 (Slide) Next slide, please.

14 In the following years, the 1991-1993 time
15 frame, the staff expects to complete design
16 certification for these three reviews. These will re
17 -- these will result in the rulemaking activities.

18 (Slide) May I have the next slide, please?

19 The next stage of reviews and the next class
20 of plant that the staff expects to review are the so-
21 called passive light water reactor designs. The--
22 these are smaller designs than those of the
23 evolutionary variety. In the 1993-1995 times frame,
24 it's estimated that we will be conducting and
25 finishing our reviews on these activities and

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1 providing final design approvals.

2 (Slide) May I have the next slide, please?

3 These will culminate in the 1995-1997 time
4 frame to passive design certification activities.

5 Now, we also have some other designs that we
6 are anticipating the review of where review schedules
7 have not been determined and these are designs of the
8 variety of the CANDU, the modular high temperature
9 gas-cooled reactor, the liquid metal reactors and we
10 got indications recently that the -- the Swedes are
11 interested in pursuing design certification of PIUS in
12 the United States.

13 (Slide) May I have the next slide, please?

14 I'd like to say a few words to amplify
15 Doctor Murley's remarks on Commission guidance.

16 There are three main points that I'd like to
17 point out from the severe accident policy statement.

18 First, the policy statement established for
19 the staff a mechanism to resolve severe accident
20 issues. We kind of viewed it as a guide to regulatory
21 decision making for severe accident issues.

22 Secondly, at that time the Commission felt
23 that severe accident questions could be resolved in
24 the course of the on-going reviews.

25 And thirdly, Commission policy stated that

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1 they expected future designs to achieve a higher level
2 of standard -- of severe accident safety than current
3 designs.

4 (Slide) Next slide, please.

5 In addition, as Doctor Murley pointed out,
6 there were -- there were four criteria pointed out in
7 a policy statement, the severe accident policy
8 statement, that future plants should address, these
9 being the Commission's regulations, compliance with
10 the TMI issues identified in 50.34(f), addressing the
11 unresolved and generic safety issues, and performing a
12 PRA to provide insight for vulnerabilities.

13 NUREG-1070 was the supporting document which
14 was used to amplify the guidance presented in the
15 policy statement.

16 The Commission stated that they believed
17 that if these criteria were met, that one had
18 demonstrated acceptability of the designs for severe
19 accidents.

20 (Slide) Next slide, please.

21 And as I previously mentioned, Part 52
22 codified this thinking into a standardization rule.

23 As the -- at the Commission's request, we
24 have informed the Commission of our recent review
25 activities and these were provided to the Commission

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1 in SECYS-89-013 and SECYS-89-153, which were some of
2 the design basis staff positions and 89-153 addressed
3 the resolutions of severe accident issues for the
4 ABWR.

5 (Slide) Next slide, please.

6 This slide just states in -- in a come what
7 -- compact form some of the discussion that Doctor
8 Murley had just made concerning the purpose of the
9 requirements document and I'll read it real quickly.

10 "To specify a design criteria that, if
11 properly translated into a design in accordance with
12 the Commission's regulations, it should result in a
13 nuclear power plant that will have the attributes that
14 will ensure that there is no undue risk to public
15 health or safety or to the environment."

16 And the staff is reviewing this requirements
17 document to ensure that it meets its stated purpose.

18 (Slide) Next slide, please.

19 I'd like to get into a little bit about the
20 submittals schedule and where we are in the review.

21 COMMISSIONER ROGERS: Just before you go off
22 that, you -- you paraphrased that -- that --

23 MR. MILLER: Yes, I did.

24 COMMISSIONER ROGERS: -- and stated it just
25 a little bit differently in that you didn't explicitly

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1 say, "required by regulation." Was that a conscious
2 decision or --

3 MR. MILLER: No, it was not a conscious
4 decision. The "required by regulations" is -- is

5 COMMISSIONER ROGERS: I think that is a
6 sticky point.

7 MR. MILLER: Yes, it is.

8 COMMISSIONER ROGERS: I mean it's a key
9 point, but it's a sticky point. It's not just that we
10 believe that they'll have these properties, but they
11 will have the attributes required by regulation.

12 MR. MILLER: Commissioner Rogers, earlier in
13 the statement, it stated that if properly translated
14 into design in accordance with the regulations. I
15 paraphrased it because I thought that the later
16 statement turned out to be redundant.

17 COMMISSIONER ROGERS: Okay.

18 MR. MILLER: (Slide) May I have the next
19 slide, please?

20 The EPRI requirements document itself has
21 kind of evolved into initially being a two-volume
22 document to plans for it being a three-volume
23 document. Currently, the staff has received, in
24 modular form, what was initially intended to be an
25 executive summary and 13 chapters containing the

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1 design criteria for evolutionary plants.

2 EPRI has informed us that they plan on
3 expanding the scope of the requirements document and
4 the format to three volumes, where the first volume is
5 planned to be an executive summary and top tier
6 requirements that would apply to both evolutionary
7 plants and to passive plants, passive light water
8 reactor plants.

9 Then, the second volume would be the 13-
10 chapter volume on evolutionary plants and there would
11 be a similar, as I understand it, 13-chapter volume
12 for passive plants, which has yet to be submitted.

13 (Slide) May I have the next slide, please?

14 Currently the staff has received, as I
15 mentioned, the information that was initially in the
16 executive summary and 12 of the 13 chapters on the
17 evolutionary plants. It's EPRI's intention to resolve
18 the issues with the staff and then provide updated
19 information in what's called a roll-up document.

20 (Slide) May I have viewgraph 14, please?

21 I'll get in -- in a minute, I'll get into a
22 little bit more of -- of the schedules and where we
23 are in the activities, but first I'd like to make a
24 couple remarks concerning our review approach.

25 We feel that the requirements document and

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1 the design certification process complement each
2 other. The requirements document itself would provide
3 design criteria. The design certification itself
4 demonstrates the acceptability of these design -- design
5 criteria through rulemaking.

6 (Slide) May I have the next slide, please?

7 The next slide is a schematic that kind of
8 shows where the EPRI requirements document fits into
9 the total scheme of things and quickly going through
10 it, you know, the utilities and -- and the vendors are
11 feeding information into the EPRI requirements
12 document, as is the NRC through their -- through their
13 input, through the review process. This information
14 is -- is then intended to be fed to the certification
15 applicant to use as guidance to prepare its documents
16 for the design certification process.

17 You should also note on the right the dotted
18 line. Currently, there -- there are efforts where the
19 requirements document is not -- it is not being
20 followed, for example, the Westinghouse RESAR SP/90
21 effort.

22 COMMISSIONER CURTISS: Let me ask a question
23 before you go off that --

24 MR. MILLER: Okay.

25 COMMISSIONER CURTISS: -- that chart.

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1 The upper left-hand box, "NRC INPUT," Doctor
2 Murley alluded to that earlier and described the
3 licensing basis the Commission is using in reviewing
4 the design requirements document of EPRI. Where you
5 have issues that come up -- and I gather they're
6 called optimization issues in the review process--
7 where the designers and the Commission are of the view
8 that the regulations are too stringent or, conversely,
9 where the Commission may be or the staff may be of the
10 view that the requirements in the current regulations
11 don't go far enough.

12 A couple in the Chapter 5 issue, mid-loop
13 operation and diverse SCRAM, is good examples of that,
14 where we may want to go beyond what the current
15 requirements in the regulations provide for.

16 How do you handle those issues and how do
17 those get put on the table and resolved in the context
18 of what you have here on this chart?

19 MR. MILLER: Okay. If I could beg your
20 indulgence, Commissioner, Doctor Murley is going to go
21 into some of the big issues at the end of the
22 presentation and I think at that point in time I hope
23 it will become clear.

24 COMMISSIONER CURTISS: Thanks.

25 MR. MILLER: (Slide) Okay. If I could have

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1 the next slide, please.

2 The status of the review is currently thus.
3 We've issued draft safety evaluations on the executive
4 summary in the first four chapters. The staff has
5 prepared, as Doctor Murley has mentioned, and the
6 Commission has the Chapter 5 draft safety evaluation
7 for your review. It's the staff intent to issue that
8 evaluation to EPRI so that we can begin to -- the
9 dialogue and resolve the open issues. The staff is in
10 the process of reviewing the remaining chapters.

11 (Slide) If I could have the next -- two
12 slides back, slide 18, please, I think you'll see a
13 schematic there showing where we are in the review
14 schedule. It's the color chart that you have in your
15 package. I have an extra set of viewgraphs here that
16 I think has a color version of the chart for anyone
17 who doesn't have one in front of them.

18 Okay. If I could discuss this chart a
19 little bit, this chart shows in -- in -- in bar chart
20 form how the review process has proceeded over the
21 last several years. The left-hand side of the blue
22 section, the dark blue section, in each of the
23 chapters indicates when the NRC received these
24 individual modules for review. The blue chart -- the
25 dark blue part, proceeds through the period where the

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1 staff did their initial review and provided to EPRI
2 requests for additional information.

3 The time periods shown in green indicate the
4 time periods EPRI took those requests for additional
5 information and worked responses and submitted them
6 back to the staff.

7 The time periods shown in red indicate the
8 time periods for which the staff received those
9 responses and prepared safety evaluations.

10 I guess I want to point out that those--
11 those areas that are shown in the dark colors
12 basically show history, things that have happened.
13 Those that are shown in the light colors, more on the
14 right side of the page, are -- represent estimated
15 dates for how we see the review proceeding in our best
16 estimate from here forward. I thought that could give
17 the Commission, you know, a better indication of where
18 we are in the process and how we plan on proceeding
19 from here.

20 Once we've issued the draft safety
21 evaluation for all the chapters, we then have to work
22 to get the issue resolution and that -- that will be
23 going on simultaneously with the review of the
24 subsequent chapters; but when all done and the
25 resolution has been reached, EPRI will prepare what

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1 they call a roll-up document which gives the -- a
2 final version of the EPRI requirements document that
3 is in agreement between NRC and EPRI.

4 COMMISSIONER CURTISS: Do we have a target
5 date for that or is it too early to tell when that
6 would come?

7 MR. MILLER: Originally, Commissioner, we
8 had planned for the fact that it may take about a year
9 from the time that we had a draft safety evaluation in
10 complete form until the time that we had a final roll-
11 up document. I think we may be able to make some
12 expedient recovery on that, given the fact of the
13 nature of the way that the review is done, since we've
14 been dialoging on a lot of these issues in detail. It
15 will again be a challenge for both NRC and EPRI to try
16 to cut that time down.

17 COMMISSIONER CURTISS: It looks like Chapter
18 10 is the basing item here.

19 MR. MILLER: Chapter 10 has not yet been
20 received by the staff.

21 COMMISSIONER CURTISS: All right. So, when
22 we receive that and with the schedule that you've got
23 here, do you have a feel for when -- when the roll-up
24 document would be complete from the date listed here
25 for completion of Chapter 10?

1 MR. MILLER: I would say in approximately
2 ten or 12 months from the completion or the admission
3 of draft documents, when everything has been issued.

4 COMMISSIONER CURTISS: Okay.

5 COMMISSIONER ROGERS: Could you just
6 describe what -- what this -- how this chart relates
7 to some of these questions? I mean we've got this
8 list of 40 -- 40 questions --

9 MR. MILLER: That's correct.

10 COMMISSIONER ROGERS: -- or areas of
11 disagreement that need to be resolved. Now, how do I
12 -- how do I fit those into this chart and if I look at
13 Chapter 5? For example, the blue bar is supposed to
14 be the period -- I -- according to what you've said,
15 the period under which requests for additional
16 information were being -- were flowing out of NRC.

17 MR. MILLER: That's correct.

18 COMMISSIONER ROGERS: And the green bar is
19 when the responses are coming back to us from EPRI.
20 And the red is then presumably when we're preparing
21 our draft safety evaluation. Well, now, how do those
22 40 unanswered problems -- how do they fit into this--

23 MR. MILLER: Okay.

24 COMMISSIONER ROGERS: -- this scheme? I--
25 it doesn't -- they seem to be in conflict here.

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1 MR. MILLER: The 40 -- the 40 unanswered
2 problems would be identified in the red bar in -- in
3 the draft safety evaluations. The draft safety
4 evaluations would call out what items remain open.

5 DOCTOR MURLEY: I should point out there was

6 --

7 COMMISSIONER ROGERS: But then you're going
8 to have another green bar someplace.

9 DOCTOR MURLEY: T there was a dialogue all
10 during that period, I think.

11 MR. MILLER: Yes.

12 DOCTOR MURLEY: It is important to mention
13 that, that we're not just sitting back here drafting
14 up a draft SER, that -- that there was an attempt to
15 try to reach resolution on a lot of these issues. And
16 now, I think the point has come that we've decided to
17 -- and they want us to -- publish the draft so we can
18 get -- get it out. We -- it -- it -- it amounts to us
19 kind of taking a formal position when we publish it--

20

21 COMMISSIONER ROGERS: Will the draft have
22 unresolved issues in it?

23 MR. MILLER: Yes.

24 DOCTOR MURLEY: Yes.

25 COMMISSIONER ROGERS: It will?

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1 MR. MILLER: Yes. Yes.

2 COMMISSIONER ROGERS: I see. So -- well
3 then, I don't quite understand what this whole thing
4 means then.

5 MR. MILLER: Okay.

6 COMMISSIONER CURTISS: What you're really
7 asking is how long does it take to resolve the open
8 issues before we have a final product?

9 MR. TAYLOR: That's what he's asking.

10 COMMISSIONER CURTISS: That's kind of my
11 question too.

12 MR. TAYLOR: Or until you reach agreement.

13 COMMISSIONER ROGERS: Yes, because this
14 doesn't describe the entire process.

15 MR. MILLER: No, it does not. I -- I I
16 mentioned earlier that this describes the near-term
17 process until such a time that we have issued a
18 complete draft document so that all the open issues
19 are on the table.

20 COMMISSIONER ROGERS: Okay. So that draft
21 document would and could contain a number of open
22 issues?

23 MR. MILLER: Yes, it could.

24 COMMISSIONER ROGERS: I see. All right.
25 Okay.

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1 CHAIRMAN CARR: How many open issues are in
2 Chapters 1 through 4?

3 MR. MILLER: Okay. The project manager, I
4 think, can answer that question.

5 MR. KENYON: For the total of the four,
6 there's probably 36 open issues. So, there's a large
7 number in the beginning. In the first chapter there
8 was 18. I think that was simply because that was
9 their first attempt and that -- at producing the
10 requirements document. They produced the first
11 chapter and it was our first attempt at trying to go
12 through because it is a unique -- unique document. So
13 a total -- there's about 36 to 40 open issues in all
14 -- in all the four --

15 CHAIRMAN CARR: Are they coming down? I
16 mean are we working those issues so that they've re--
17 re -- reduced them in number since -- since the end
18 of the red bar?

19 MR. KENYON: Let me answer this sort of in
20 light of Commissioner Rogers' question too. The
21 intent now is -- now that -- once they receive the
22 draft SER, EPRI and the staff will continue to
23 dialogue to reach resolution on some of these issues.
24 We've received a couple of submittals already on
25 Chapter 1 in an attempt to resolve some of these

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1 issues.

2 At -- at the point where they put together
3 their roll-up document and prepare it for submittal,
4 the intent is that that roll-up document will contain
5 the resolutions of -- of these issues, at which time
6 they will submit it to the staff and the staff will go
7 through the roll-up document for its final review and
8 -- and make it the final determination onto the
9 acceptability.

10 CHAIRMAN CARR: Well, I'm concerned that
11 Chapter 1 has been around since the end of '87 and
12 we've still got X number of issues in it that aren't
13 finished.

14 MR. MILLER: Okay. I -- I -- I think I can
15 address that, Mr. Chairman. It may be -- help to do
16 that if we could look at -- if we could look at
17 viewgraph 17.

18 (Slide) Okay. In that viewgraph, we stated
19 that the review of the requirements document is
20 somewhat unique. It doesn't necessarily follow reg.
21 guide 1.7 or SRP format. The reg. guide 1.70
22 basically laid out the format which an applicant would
23 submit a final safety analysis report and that's--
24 that's a format that the staff has traditionally used
25 to pro -- to perform a review. And some of the--

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1 some of the issues were difficult to resolve and I
2 think we'll get into some of those in -- in just a few
3 minutes.

4 But I think, to answer your question
5 directly, what we have found is that issues are
6 brought forth in the earlier chapters, for example,
7 Chapter 1, Chapter 2, Chapter 3, Chapter 5; but more
8 detailed discussions of some of those issues take
9 place in subsequent chapters. So, we -- some of those
10 issues remained open because the staff had -- had seen
11 the information introduced to them, but they had not
12 had sufficient information to be able to draw
13 conclusions.

14 Completing the review of the subsequent,
15 later chapters may resolve many of those open issues,
16 but they needed to be identified and remain open
17 basically because at that time we did not have the
18 information in hand. As we review it, we may be able
19 to close some of those earlier issues.

20 So, they -- they couldn't -- you know, they
21 couldn't be closed until such a time that we received
22 the information. The chapters reference each other
23 back and forth and more detailed information
24 examples, would be station blackout or something like
25 that. The detailed discussion of it may be later--

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1 later in the report.

2 COMMISSIONER CURTISS: When we issue a draft
3 SER, it sounds like open issues may be explained by
4 one of two things. First, we haven't gotten the
5 necessary information from EPRI --

6 MR. MILLER: That's correct.

7 COMMISSIONER CURTISS: -- to close out the
8 issue or, second, in the case of the earlier chapters,
9 the resolution of the issue may depend -- depend upon
10 an approach taken in subsequent chapters.

11 MR. MILLER: That's correct.

12 COMMISSIONER CURTISS: Well I want to --

13 CHAIRMAN CARR: Or three, we may just
14 disagree with them.

15 SEVERAL: We may just disagree with them.

16 MR. MILLER: We may just disagree with them.

17 COMMISSIONER CURTISS: That's the point I
18 was going to come back to. Are there any issues,
19 particularly in Chapter 5, where EPRI has provided us
20 all the information, say, on hydrogen. They've laid
21 out their case and it's just a question of hammering
22 out a resolution of that issue.

23 DOCTOR MURLEY: We'll talk about in just a
24 second.

25 COMMISSIONER CURTISS: Okay. We'll come to

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1 that.

2 DOCTOR MURLEY: We'll get to some specifics
3 where we disagree and you'll see why and how and so
4 forth.

5 COMMISSIONER CURTISS: All right. Thank
6 you.

7 MR. MILLER: The conclusion --

8 COMMISSIONER ROGERS: Just -- just on this
9 open issue thing.

10 MR. MILLER: Yes, sir.

11 COMMISSIONER ROGERS: Of the -- how many
12 chapters do we have, 12 out of the 13 now, did you
13 say?

14 COMMISSIONER CURTISS: Yes.

15 MR. MILLER: Yes.

16 COMMISSIONER ROGERS: What -- what -- what's
17 missing off that list? This --

18 MR. MILLER: Chapter 10.

19 COMMISSIONER ROGERS: Ten, 10 is missing.
20 And how many open issues are there in Chapters 6
21 through 13 now?

22 MR. MILLER: Well, we're in the process
23 of -- we've issued requests for additional
24 information. And upon -- you know, we're still
25 receiving, in some cases, the responses to those. To

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1 give you the total number, we'll have to have looked
2 at all the response when we prepare our safety
3 evaluation.

4 COMMISSIONER ROGERS: Okay, you don't --

5 MR. MILLER: We don't have -- we don't have
6 an itemized number at this point.

7 MR. TAYLOR: We're not in the same position
8 we are in Chapter 5.

9 COMMISSIONER ROGERS: Okay.

10 MR. TAYLOR: That will come together as you
11 -- as we --

12 MR. MILLER: As we finish the review, yes.

13 COMMISSIONER ROGERS: All right.

14 DOCTOR MURLEY: I think the length of the--
15 of the process that you see in Chapter 5 reflects a
16 couple of factors. One is these are tough issues and
17 we have no single regulation that covers them all,
18 severe accident issues.

19 The second aspect I think it reflects is the
20 fact that EPRI is pushing the staff on some of these
21 issues. And let me list three. We'll, I guess, move
22 onto the next chart, but I'll pick three issues to
23 talk about where there's a difference between us.

24 One is the source term. EPRI would like to
25 use new data from research results and from the TMI

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1 accident to modify current source term requirements.
2 Now, there's three categories under the source term I
3 would list. One is where there have been some staff
4 positions already been modified. That is, we agree
5 with EPRI. An example would be giving credit for
6 fission product scrubbing in a suppression pool of BWR
7 containment. We agree with that.

8 The second category would be where some
9 staff positions can be changed by changing reg.
10 guides. This will require our normal NRC back-fit
11 procedures to go through. One example here would be
12 the timing of fission product release to containment.
13 We'll require changes to reg. guides 1.3 and 1.4. We
14 may or may not agree exactly with EPRI's numbers on
15 the timing of releases, but we do think some changes
16 can be made. That's one example and that will come in
17 the future.

18 A third category under source term are those
19 changes that will require either a rule change or an
20 exemption to the rule. And here the major area is the
21 fission product release fractions that are in TID-14-
22 844, which is a document that's referenced in Part
23 100. This will not be a simple change to make.

24 Therefore, I would say the staff agrees with
25 some of the EPRI views in this broad area of source

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1 term modifications, but not all. And we recognize
2 that we owe the Commission a fuller explanation of
3 this and we are preparing a paper that will describe
4 this in detail.

5 CHAIRMAN CARR: But with the fact that
6 you've got to change those publications or make a rule
7 is not the problem. The problem is technical, I
8 assume. It's simple to -- if the -- if the data is
9 there to change the -- the regulations, it's not that
10 hard. What are you telling me?

11 DOCTOR MURLEY: Well, let us suppose, for
12 example, that we had complete agreement on the
13 technical aspects of how to change the source term,
14 which we don't, but suppose we did. It would still
15 show up as an open item until we were -- until we had
16 the rule changed. We still have to go through the
17 process in that case.

18 COMMISSIONER CURTISS: Well let me -- let me
19 contrast that --

20 CHAIRMAN CARR: But the ball's in our court,
21 not their court.

22 DOCTOR MURLEY: Yes. If -- if there were
23 agreement --

24 CHAIRMAN CARR: The only reason it's open is
25 because we haven't got our work done.

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1 DOCTOR MURLEY: Yes, but, we -- we haven't
2 reached agreement, by the way --

3 CHAIRMAN CARR: Oh, no. What I'm trying to
4 figure out --

5 DOCTOR MURLEY: -- on this rule change.

6 CHAIRMAN CARR: I mean, you said the three
7 kinds of things that we're in disagreement means we
8 have to change a rule or we have to change a -- the
9 reg. guide and that's not the reason we're in
10 disagreement. What you're saying is the current rules
11 don't allow what they're doing. But if what they're
12 doing is right, then we ought to change the rule
13 instead of just say it doesn't meet the rule.

14 MR. MILLER: Yes.

15 DOCTOR MURLEY: And we don't agree with them
16 in all cases.

17 COMMISSIONER CURTISS: Yes, there are
18 instances in the -- as I read the staff's review,
19 there are instances where we have agreed as a
20 technical matter on approaches that differ from what
21 the regulations require. And -- and that technical
22 resolution, it seems to me -- appears to me, is
23 reflected in what we're putting out. Operating the
24 basis earthquake is a good example of that. We no
25 longer think it ought to be connected to the SSE as we

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1 always have and as the regulations require, and we are
2 prepared, I take it, because of the technical
3 agreement on that issue, to resolve that issue and set
4 forth the resolution, even though it might be one that
5 requires a subsequent change in the rules in the
6 document that we're putting out.

7 DOCTOR MURLEY: That's correct.

8 COMMISSIONER CURTISS: The Chairman's point
9 is --

10 DOCTOR MURLEY: Yes.

11 COMMISSIONER CURTISS: -- that it's not just
12 a procedural impediment that we have here. I take it
13 it's an underlying technical disagreement. When we
14 resolve the technical disagreement, if we reach a
15 consensus, then, depending upon the nature of the
16 issue, we'd have to do --

17 DOCTOR MURLEY: Yes.

18 COMMISSIONER CURTISS: -- one of these three
19 things is what you're saying.

20 DOCTOR MURLEY: Yes. I probably shouldn't
21 have stressed so much the procedural impediment
22 because if we were -- once we had technical agreement,
23 let's say, to change a requirement that's in a current
24 rule, we could proceed on through certification
25 rulemaking with that change. And assuming that it--

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1 that it would emerge from that rulemaking, it would be
2 changed.

3 Now, you'd asked an earlier question about
4 some examples and I want to ask Ashok Thadani to give
5 an example where we are relaxing a current requirement
6 and where we're going beyond a current requirement, so
7 he can give you an idea --

8 MR. THADANI: Okay. Let me -- let me give
9 you an example first of where we might be relaxing our
10 current requirements. It's -- an example would be
11 anticipated transience without SCRAM rule, which would
12 require for boiling water reactors that they have
13 automatic actuation of standby liquid control system.
14 In the ABWR, General Electric has proposed not having
15 automatic standby liquid control system.

16 Similarly, the protection system or the rod
17 drive system they have for the ABWR has a diverse
18 insertion system which compensates for not having
19 automatic standby liquid control system and there's
20 enough basis, safety rationale, to say why it might be
21 appropriate not to require automatic standby liquid
22 control system, even though the rule explicit--
23 explicitly requires automatic actuation of standby
24 liquid control system.

25 That's sort of a safety rationale, so to

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1 speak, for why it's okay and we can go forward with
2 that kind of a change from the regulation.

3 Similarly, there -- let me give you an
4 example of where we're going beyond what our current
5 requirements are. An issue of some importance that
6 has come up in the last two years has been the mid-
7 loop operation issue we've discussed with you in the
8 past. It's when you lower the inventory of the
9 primary system in the pressurized water reactor.
10 Several events have occurred where we have lost our HR
11 pumps.

12 DOCTOR MURLEY: This is while a reactor is
13 shut down.

14 MR. THADANI: Normal decay heat removal
15 system. And we developed requirements for
16 instrumentation and the changes to technical
17 specification to make sure certain systems would be
18 available should an event like that were to occur.

19 The concern here, of course, basic concern,
20 is that two of the three barriers are -- may not be
21 available. The primary cooling system may be open,
22 the containment, and the containment may be open. So,
23 the only -- only protection is the fuel barrier.

24 What we would like to do for these future
25 designs is to try to find ways to prevent a situation

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1 like this from developing. And in that regard, on
2 SP/90, Westinghouse has proposed ways whereby they
3 have increased substantially the margin that would be
4 normally available to the operators in terms of
5 controlling the level during this mid-loop operation.
6 They have increased that margin from about two inches
7 to well over 12 inches, as I understand. And we
8 believe that would give plenty of margin in time and
9 the operators would likely not get into this
10 situation. And they have provided other features also
11 to prevent these situations from developing.

12 So, for the ALWR, we're going forward and
13 saying these are good ideas, good concepts, even
14 though they are beyond what we're requiring in the
15 current plants and we're recommending that these types
16 of features be considered for the ALWR designs.

17 So that's sort of an example of how we're
18 going forward beyond what we're required on operating
19 reactors.

20 DOCTOR MURLEY: Let me pick up on a second
21 example where we disagree with EPRI. It's an
22 important one. It's on the hydrogen generation during
23 an accident. EPRI believes that 75 percent zirconium
24 water reaction should be the design basis for
25 containment. The staff believes that a 100 percent

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1 zirconium water reaction should be the design basis.

2 We've had several dialogues with them. It
3 may turn out that EPRI can, given time, demonstrate
4 their case conclusively. But I've found no one in the
5 staff, either in NRR research or anywhere else, that
6 believes they have demonstrated their case yet. And I
7 should add, the staff feels very strongly on this
8 issue.

9 So this discussion may go on for months
10 before we reach resolution. In the meantime, as I
11 mentioned earlier, GE has resolved the issue for the
12 ABWR by inerting containment. But for EPRI, it is a
13 significant open issue and we'll -- we'll continue, of
14 course, the discussion. We're open to being
15 convinced, but we are not convinced at this stage.

16 A third major --

17 CHAIRMAN CARR: Well, is that one of those
18 questions that research can resolve?

19 DOCTOR MURLEY: Well given time, I think
20 yes.

21 CHAIRMAN CARR: And if not, why not and why
22 haven't we?

23 DOCTOR MURLEY: I guess I'd like to perhaps
24 turn to Research and maybe Eric or Themis Speis would
25 like to --

1 MR. BECKJORD: Eric Beckjord. I think that
2 one of the questions involved here, first of all the
3 zirconium reaction that we're talking about is the
4 active length of the fuel. It's the clad along the
5 active length. The 100 percent in the case of the
6 ABWR is intended to include the possibility of a
7 melting core and a melting through the vessel and
8 there's margin there for the effective core concrete
9 reaction and the gas that would evolve from that.

10 And so, that's -- that's the thinking. And
11 -- it's -- that's a difficult issue to resolve because
12 it goes beyond the question of what is happening in
13 the core.

14 DOCTOR MURLEY: In other words, one can get
15 hydrogen generation not just from the zirconium water
16 reaction in the core, but after it melts, there -- the
17 debris interaction with the concrete --

18 CHAIRMAN CARR: So it's more than 75 percent
19 zirconium water. They may be right on the 75 percent
20 zirconium water if what you're worried about is
21 zirconium concrete or something.

22 DOCTOR MURLEY: What we're worried about is
23 total hydrogen generation.

24 CHAIRMAN CARR: Yes and they're only talking
25 about zirconium water for 75 percent. Are they? I

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1 don't know. I mean you're -- that's what you said.

2 DOCTOR MURLEY: It's a very difficult -- I'm
3 reminded -- what is it, 60 percent in TMI?

4 MR. SPEIS: May I say something?

5 DOCTOR MURLEY: Yes. Themis Speis.

6 MR. SPEIS: Themis Speis from the Research
7 staff. The TMI accident led to around 50 percent or
8 so of hydrogen generated. This was an accident that
9 was contained in vessel.

10 And Mr. Chairman, you are right that the
11 EPRI proposal is for 75 percent. But the accident
12 itself is a design basis for in vessel retention. And
13 we're talking about going beyond that and we're using
14 the 100 percent as a surrogate for the other reactions
15 that can take place ex-vessel or you can augment the
16 hydrogen. So, we differ there in the design basis,
17 basically. So, it's more than the issue of the
18 hydrogen itself.

19 DOCTOR MURLEY: The third major area of
20 disagreement is containment performance goal. Here
21 you'll recall for the ABWR, the staff and GE agreed on
22 a containment conditional failure probability of ten
23 percent. That is, given the onset of core damage
24 accident, the chances that the contain -- the accident
25 would proceed to uncontrolled leakage due to

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1 containment failure we said should be less than one in
2 ten. And GE agreed with that as a goal.

3 EPRI does not like that goal because they
4 feel it can lead to design tradeoffs that would be
5 detrimental to accident prevention for the sake of
6 accident mitigation. So we're prepared to be flexible
7 on this matter. And in the draft SER you'll note that
8 we've asked EPRI to propose an alternate deterministic
9 containment goal as opposed to this probablistic goal
10 that would provide comparable containment performance.
11 We think it can be done. It requires some thought and
12 some work on their part. In fact, we would be
13 prepared to offer GE the same flexibility on the ten
14 percent goal, if they would prefer a comparable
15 deterministic goal. They have not indicated that, by
16 the way.

17 COMMISSIONER CURTISS: Let me ask you a
18 question on that. When the safety goal implementation
19 plan came before the Commission, at that time ACRS was
20 recommending a containment performance objective and
21 the staff, in analyzing that question, rejected the
22 concept of a conditional containment performance
23 objective on the grounds that what we ought to focus
24 on in future designs or safety goal context is a -- is
25 an integrated approach to meeting the large release

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1 guideline.

2 That is to say if it can be done through
3 emphasis on preventing severe accidents rather than
4 mitigation, we really don't care how they get to 10^{-6} ,
5 the large release guideline. It's the integrated
6 emphasis that we want.

7 The staff went beyond that and said that--
8 that -- that separate out the containment performance
9 objective, whether it's done deterministically, the
10 conditional goal or probablistically through
11 containment has to survive 48 hours or five days or
12 whatever it is, may in fact inhibit designers efforts
13 to drive down the probability of core melt.

14 It looks to me in this version of Chapter 5
15 as if we've come full circle on that and are now
16 talking about a containment performance objective
17 being separated out from the 10^{-6} large release
18 guideline. Is there any thinking that went into that?

19 DOCTOR MURLEY: Its -- It does represent an
20 evolution in our thinking to some extent,
21 Commissioner. There's no way to know whether a
22 containment performance goal is going to be useful
23 until you get into it and just -- just try to do it.
24 And GE is struggling with it now. They seem to be
25 finding it acceptable and useful.

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1 The reason for it, of course, is that that
2 is the way to emphasize defense in depth. You can do
3 all the -- make all the design features you want to
4 try to cut down the likelihood of a core melt accident
5 or a severe accident, but when it's all said and done,
6 I don't know how you can deal with the question of
7 human errors. And the fact that there may be some
8 combination of human errors or just plain dumb
9 operations that you haven't thought of is the reason
10 why we emphasize defense in depth.

11 And in order to do that, in order to give
12 the designer something to shoot at, we've given them
13 two choices. One is a probabilistic target of
14 conditional containment failure probability. If they
15 don't like that, if it does cause them trade-offs they
16 don't like, then we're prepared to go with something
17 like a deterministic goal which would be the
18 containment holds together for 48 hours after the
19 onset of an accident, which we think is a comparable
20 goal.

21 COMMISSIONER CURTISS: Let me ask one other
22 question. Adopting that approach to defense in depth
23 and let's say we -- that the safety goal
24 implementation plan or the approach taken here
25 includes at 10^{-1} performance objective for containment

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1 or a 48 hour requirement. Are we essentially saying
2 with that approach that for the advanced non-LWRs that
3 the defense in depth philosophy would lead us to say
4 that you need a containment or does that necessarily
5 follow?

6 DOCTOR MURLEY: No, I think you -- I think
7 you -- we have to think of it a little differently
8 because in the non-LWRs, as I understand it -- I
9 should say I have not been deeply involved in the
10 design review, but there they view the -- for example,
11 in HTGR, the fuel barrier serves a containment
12 function. So, we have to change our thinking. I
13 guess I would not necessarily say that what we're
14 doing here would flow over into the other reactor
15 types.

16 COMMISSIONER CURTISS: I gather their
17 argument is that the design of the advanced non-LWRs
18 is such that you would never get to a situation where
19 you need containment.

20 DOCTOR MURLEY: Yes, that's right.

21 COMMISSIONER CURTISS: The question I have
22 is doesn't that principle apply with equal force here
23 if somebody comes in with the design for a passive or
24 an evolutionary LWR and says, "Our large release
25 target that we've met is 10^{-7} "? Isn't that the same

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1 philosophy, the same principle applied in this
2 context? Would that lead you to say that you want a
3 containment in both cases or just here?

4 DOCTOR MURLEY: Well, I tell you where the
5 nexus is, I think, and that is how much do you believe
6 that you've ruled out human error and -- in the design
7 because that's -- that's where I think anyone
8 proposing not to worry about a containment feature, I
9 think, has a large hurdle in facing the human error
10 question, human error issue. Tom?

11 MR. THADANI: If I may add to that, a couple
12 of other areas of concern. When you're getting down
13 to these frequencies, one in a million and lower,
14 certain questions would come up certainly of
15 incompleteness in terms of analysis, issues we deal
16 with. And I mentioned mid-loop earlier as an example
17 of where we've developed some requirements. As far as
18 I know, no PRA has ever included a situation like
19 that, mid-loop, in its analysis. And our estimate of
20 the frequency of that kind of a scenario was on the
21 order of four times 10^{-5} per reactor year.

22 It seems to me we do have to be cautious and
23 careful about things like that developing that we've
24 not considered. That would be another argument,
25 common cause failures would be another --

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1 DOCTOR MURLEY: In other words, here was an
2 accident sequence that has been overlooked through all
3 these years of PRA analysis and yet operating
4 experience showed it was not negligible in terms of
5 risk.

6 COMMISSIONER CURTISS: I guess I raised that
7 question because it does seem to me to be a
8 fundamentally different approach than the staff argued
9 for in the safety goal implementation plan. And here,
10 if I understood what was said at the last meeting I
11 think on integration, it's the 10⁻¹ that drives you to
12 the vent feature of the plant, or at least in the GE
13 context, those two were connected.

14 DOCTOR MURLEY: Yes.

15 COMMISSIONER CURTISS: So, in establishing a
16 conditional containment failure probability, there are
17 design consequences that flow from that and vent
18 appears to be one of them.

19 DOCTOR MURLEY: Yes. I was going to mention
20 this --

21 COMMISSIONER CURTISS: Like -- excuse me.
22 EPRI's point on that is that what we really ought to
23 focus on, if I understand their argument, is making
24 the containment strong enough to survive the accident
25 without having to worry about a vent.

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1 DOCTOR MURLEY: Yes.

2 CHAIRMAN CARR: The point you made about
3 operating experience shows that this is an accident we
4 ought to take into consideration. It can work both
5 ways. Operating experience has shown us there are a
6 lot of accidents we're taking into consideration that
7 haven't happened yet.

8 DOCTOR MURLEY: Yes. March --

9 CHAIRMAN CARR: Do you give equal weight to
10 those?

11 DOCTOR MURLEY: Yes, yes. And I think we
12 are -- there are some areas where we're relaxing
13 current requirements and will -- I think we owe you a
14 discussion and a paper on those.

15 CHAIRMAN CARR: I guess the word "relaxed"
16 bothers me. I would like to think that your changing
17 the requirements to be more realistic instead of
18 taking out some of the safety margin we've put in
19 because we didn't know what we were doing.

20 DOCTOR MURLEY: That's right. We're
21 eliminating the need for unnecessary safety margin.

22 CHAIRMAN CARR: That's a better way of
23 saying it.

24 MR. TAYLOR: You're right, Mr. Chairman.

25 CHAIRMAN CARR: Relaxing the requirements

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1 kind of grates against my --

2 MR. TAYLOR: Yes. That has a meaning that I
3 think --

4 DOCTOR MURLEY: Commissioner Curtiss
5 mentioned the issue of the vent. That is a subsidiary
6 issue under this containment performance goal. The GE
7 ABWR proposed a vent for over pressure protection of
8 their containment and we agree that it is an
9 acceptable design feature. But the staff is not
10 requiring a vent in the ALWR requirements document if
11 EPRI can propose a containment performance goal that
12 adequately protects against over pressure failure
13 without a vent. So, we are not being rigid on that
14 matter.

15 CHAIRMAN CARR: While we're on this subject,
16 are there areas in these open issue items that you
17 need -- that staff needs a policy decision from the
18 Commission on?

19 DOCTOR MURLEY: Yes, I think it's a little
20 early to say that now because I think the next step
21 for us is to issue our draft SER to EPRI and let them
22 see in writing what the staff's views are. If we
23 cannot reach an agreement within a reasonable time, I
24 would say within a matter of a few months, then I
25 would propose that we would come back to the

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1 Commission for a resolution and decision rather than
2 drag things out for quite a long time. But at this
3 stage, it's probably a little premature because maybe
4 EPRI might propose some compromises or some unique
5 solutions that would get around these issues.

6 CHAIRMAN CARR: I guess I'm a little worried
7 whether either of them are willing to go to the mat
8 with you and bring it to the Commission.

9 MR. TAYLOR: We're going to bring it to the
10 Commission.

11 CHAIRMAN CARR: I know, but I'm concerned
12 about how they would view that size of an argument
13 with respect to the rest of the work they do. So, I
14 guess I would ask you to be liberal in bringing those
15 to the Commission. If it looks like there are policy
16 issues that we ought to get into, we'd like to get
17 into them earliest.

18 MR. TAYLOR: Yes.

19 COMMISSIONER CURTISS: I guess I have a
20 variation of that question. There are a number of
21 them during the course of the last half a dozen or so
22 briefings on the subjects that we've covered here and
23 they've been very useful for me. There are a number
24 of issues that have come up that seem to me to involve
25 significant policy questions. The process of what

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1 you've described for establishing the licensing basis
2 sounds to me like a rather flexible one. I don't mean
3 to be too critical because I do support the design
4 requirements document. I think that's really where
5 the focus ought to be now and especially for the
6 passive plants. I think it's a useful top down
7 approach to establishing requirements.

8 Having said that, it looks to me like the--
9 the -- the licensing basis really is a function of
10 what we currently require except for instances where
11 we think that current regulations are too stringent,
12 given more recent events where we want to reduce the
13 conservatism or want to be more realistic. We call
14 those optimization issues. And instances, ^{where} we've
15 talked about some of them, mid-loop is a good example,
16 the diverse SCRAM system for Atlas is a good example,
17 where the current approach that we got either in the
18 regulations or generic letters or reg. guides or
19 whatever is being supplemented in what we're doing.

20 That process, in turn, has led to what looks
21 to me like three or four principal issues where the GE
22 approach and the EPRI approach may differ, let's say,
23 may not be in conflict. GE may be going beyond what
24 EPRI has in mind. But on hydrogen, source term and
25 containment performance and the venting issue, those

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1 look to be significant policy questions that at some
2 point we're going to have to come to grips with.

3 The question that I guess I have is on those
4 issues, first those three in particular, whose court
5 is the ball in? Are we waiting for -- I gather on
6 hydrogen, we're waiting for EPRI to submit whatever
7 additional information they have because they haven't
8 convinced us to date on the 100 percent interaction
9 issue.

10 Source term and containment, it's not clear
11 to me. We've got two approaches now on the
12 containment -- on the performance objective for
13 containment, one in the safety goal implementation
14 plan and another reflected here. Are we waiting for
15 additional information from EPRI on containment and
16 source term or is the ball in our court on that? And,
17 if so, is there a policy question that we ought to
18 take a look at there?

19 DOCTOR MURLEY: On the source term, the way
20 I would characterize it is -- is we've -- there's the
21 three categories. One is areas that we agree in and
22 have already changed our -- our standard review plan,
23 for example. Second are areas that we generally agree
24 with them and we need to revise our regulatory guides
25 according to our procedures. The third and the

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1 toughest one is the fission product release fractions
2 that are embodied in current regulations. And there,
3 I would say that -- that -- well, I think it's too
4 early to say. We owe you a paper as a result of a
5 recent staff requirements memorandum and I don't think
6 the staff has sat down and discussed it to be able to
7 answer that question.

8 Personally, I think it is possible that we
9 can change our regulations on fission product
10 releases, but it's going to be a lengthy process.
11 You'll recall we tried this a few years ago. We got
12 the American Physical Society involved to help us and
13 the result of all that was that the science was not
14 ready yet for a consensus on fission product release
15 fraction. And it could very well be that when we're
16 all said and done, when you want to envelope all the
17 sequences that you have to envelope for release
18 fraction, you'll wind up with a release fraction
19 that's very close to TID-14-844.

20 I guess I would, rather than go beyond that
21 today, think about it a little more. We need to talk
22 with our colleagues in research and --

23 COMMISSIONER CURTISS: A lot's coming before
24 us and going on. We talked in the GE context about a
25 vent system that has two rupture disks and two open

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1 valves, an engineered containment failure mechanism
2 which is different than the vent that we've used in
3 the past, the pre-vent philosophy. We've got here an
4 approach in Chapter 5 that says that vent can be an
5 alternative to decay heat removal systems. And it
6 looks to me like there's a policy evolving on the
7 question of vent that is evolving in the context of a
8 larger question, is containment performance objective
9 of 10^{-1} something that's leading to that and do we
10 want to cull out containment performance as a separate
11 matter and establish an objective for that? That, it
12 seems to me, we've got two different approaches.

13 So, the vent issue is being discussed in the
14 case of GE plant, I think resolved. But at the same
15 time on the question of whether you cull out a
16 containment performance objective, I'm not sure -- I'm
17 not sure that decision has actually been made yet. In
18 all fairness to the staff, they did say we ought to be
19 going on the safety goal implementation plan and
20 resolve that at the last meeting. I think that would
21 resolve it, but it's not clear to me now that it would
22 resolve it in a manner consistent now with Chapter 5.

23 DOCTOR MURLEY: You recall the ACRS has also
24 been tasked by the Commission to look at this
25 question. And it could very well be that that is a

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1 major policy issue whether we have a separate
2 containment performance goal. We're proceeding on the
3 basis that there should be one to kind of implement
4 the defense in depth safety philosophy. But it's --

5 COMMISSIONER CURTISS: My understanding is
6 the safety goal implementation plan says there
7 shouldn't be one and that's pending before the
8 Commission. As I say, if we voted today on the safety
9 goal implementation plan just as the staff has
10 recommended, it would not contain a containment
11 performance criterion.

12 CHAIRMAN CARR: Let's proceed.

13 DOCTOR MURLEY: (Slide) Move to the final
14 viewgraph, number 21. That concludes the major aspect
15 of the briefing. The staff proposes to continue to
16 review the ALWR requirements document and standard
17 plant designs to ensure consistent regulatory
18 treatment for eventual design certification. And
19 policy matters will continue to be brought to the
20 attention of the Commission.

21 That concludes our briefing.

22 CHAIRMAN CARR: Questions, Commissioner
23 Roberts?

24 COMMISSIONER ROBERTS: I don't have any
25 questions at this point, but I got the draft SER

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1 yesterday and I do have a number of questions and I
2 will submit them in writing.

3 CHAIRMAN CARR: Commissioner Rogers?

4 COMMISSIONER ROGERS: Well, of course, we've
5 all -- we all have had that problem that there's a lot
6 here and we haven't really had that much time to look
7 at it in detail. But just some general matters.

8 In your review to date, have you encountered
9 any difficulties in determining how to apply the
10 guidance in the policy statements on severe accident
11 standardization and safety goals that now we've asked
12 to be integrated? And have you had any difficulties
13 in applying those to the EPRI products?

14 DOCTOR MURLEY: Well, we've kind of had to
15 integrate all the policy statements and all the
16 regulations into this umbrella that I mentioned. I
17 don't recall that we've had any fundamental problems.

18 Have we, Charlie?

19 MR. MILLER: No.

20 DOCTOR MURLEY: So, it's working. We don't
21 see any inconsistencies.

22 COMMISSIONER ROGERS: How about gaps that
23 you've had to bridge over?

24 DOCTOR MURLEY: Yes, there have been some
25 gaps, one that Commissioner Curtiss mentioned on the

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1 containment performance criterion. We've -- we've
2 moved ahead with one there. In one sense, I suppose
3 that is an inconsistency. I hadn't really thought
4 about it, but the safety goal implementation is a
5 policy of the Commission. It doesn't speak to that
6 right now, but that is a kind of an inconsistency.

7 Are there any other gaps that we've had to
8 make up, can you think of?

9 MR. THADANI: No, I don't think so. I think
10 that was the one on containment, although the safety
11 goal implementation plan I thought also talked about
12 the severe release in terms of defense in depth and
13 not wanting to basically put all eggs in one bag, so
14 to speak. So, I think the implementation plan at
15 least alluded to this element.

16 DOCTOR MURLEY: Yes. The source term is not
17 a gap because we do have an existing regulation on how
18 to deal with source terms for citing purposes in Part
19 100. We've decided, in the absence of an updated
20 rule, to go ahead with the one we have. But we were
21 planning to allow the designers and EPRI to use more
22 realistic source terms, if they could justify them for
23 their design, to show that they meet the large release
24 guideline. Now, we haven't seen what more realistic
25 source terms would be for their designs, so I don't

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1 know whether it's any different from TI -- from TID-
2 14-844, for example. But that's a bit of a gap that
3 we've had to fill because we don't have a new rule.

4 COMMISSIONER ROGERS: Well, I think if you
5 could try to keep track of those things and go back
6 and take a look at the process and separate those out
7 for us just to take a look at because I think it will
8 help us to understand how successful the integration
9 of these statements actually is in practical terms.
10 You're applying them now to specific proposals and
11 that will test them. That's -- that's, you know,
12 another test of their completeness and consistency.

13 So, I would ask you to try to track that
14 sort of thing as it develops in your reviews. Pull
15 them out and then make a list of them that we can look
16 at because I think it would be helpful to us to
17 understand how the thing is working and whether
18 there's another policy lurking in the thicket there
19 someplace that we ought to concern ourselves with.

20 It's really a question, I think, for
21 Research. How long does the staff think would be
22 required to resolve generic severe accident questions
23 that are addressed in Chapter 5? You know that -- you
24 know to some extent, Mr. Beckjord has already said
25 that one of those is a tough one if you track it all

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1 the way from a research basis, this whole issue of the
2 percentage cladding. What other ones are there and
3 what is -- what's the task that's laid out for
4 Research to resolve these -- these matters? How does
5 it -- how does it look in time?

6 DOCTOR MURLEY: The two that I would mention
7 that I think are going to be toughest to resolve are
8 the hydrogen generation issue and the source term
9 issue. I guess I'd turn to Research and ask -- we
10 realize we do owe you a paper on that and we'll be
11 working on it.

12 Do you have any comments on how long it
13 might take?

14 MR. SPEIS: We'll address it in the SRM.

15 DOCTOR MURLEY: Yes, I think today we
16 probably don't have a good answer for you,
17 Commissioner, but we do know within a month or two we
18 owe you a paper on that.

19 COMMISSIONER ROGERS: Well, I wonder if
20 looking at those times realistically, whether we might
21 then have to make a decision that we have to stay with
22 what we have.

23 MR. TAYLOR: That may be.

24 COMMISSIONER ROGERS: Particularly with
25 respect to 14-844 --

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1 MR. TAYLOR: That may be.

2 COMMISSIONER ROGERS: -- that it may be that
3 that's all there is and that's all there's going to be
4 for the foreseeable future on some of these things and
5 that while research can go on and try to, you know,
6 clarify or bring to some resolution any questions,
7 that for the purposes of this project, that TID-14-844
8 may just have to stand. You know, I'm not saying what
9 the answer is, but I think that's something we may
10 have to face.

11 CHAIRMAN CARR: My concern -- is there a
12 better technical basis for that than there is for
13 anything else? That just happens to be something
14 everybody agreed on.

15 DOCTOR MURLEY: Only in the sense that it's
16 a conservative bounding and we do that frequently in
17 engineering judgment.

18 MR. TAYLOR: It's the same thing as the 100
19 percent reaction and it's a conservative basis until
20 better knowledge makes us reduce that fraction. And I
21 think that we will be back on these types of things to
22 the Commission. When -- If there's enough knowledge
23 or enough support for the arguments, we'll try to
24 understand those and be back with the Commission to
25 explain why we might change our position. Is that a

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1 good way of saying it?

2 DOCTOR MURLEY: Yes.

3 MR. TAYLOR: Definitely this requirements
4 document will be the basis to flush those up to the
5 Commission. Where we can't and we don't have
6 sufficient basis, we will recommend not altering it.
7 So, that's the dialogue that will be going on and I
8 think he's outlined some of the very key arguments, or
9 at least the basis of what's being argued.

10 COMMISSIONER ROGERS: Yes. Well, I guess we
11 have to have a clear mechanism for coming to
12 resolution on making at least a decision so that we
13 can proceed ahead.

14 MR. TAYLOR: Yes, sir. Right.

15 COMMISSIONER ROGERS: The -- if you come to
16 some changes that you're willing to accept in Chapter
17 5 as a result of looking at Chapter 5 for the advanced
18 -- for the requirements document, how likely are those
19 going to be to lead to initiatives of current
20 licensees of existing operating plants to have their
21 amendments -- to have amendments to their licenses to
22 incorporate those changes?

23 DOCTOR MURLEY: That's an extremely good
24 question and we don't have an answer to it. But it
25 could very well be that some of the issues -- for

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1 example, in this source term area where we're going to
2 modify staff positions in reg. guides on taking credit
3 for various scrubbing and suppression pools and things
4 like that, it could mean that current licensees may
5 want to take advantage of that and -- I don't know if
6 relax is the right word, but change their criterion on
7 leakage rate, for example, isolation valve leakage.

8 COMMISSIONER ROGERS: Now, would we have the
9 resources to deal with a flood of those if they
10 started coming in?

11 DOCTOR MURLEY: Yes, I think so because once
12 we've gone through the technical issue ourselves once
13 and established a staff position, it's generally not a
14 great difficulty to review an individual plant design.
15 So, we could do it as part of a --

16 COMMISSIONER ROGERS: You don't see that as
17 possibly opening up a whole new chapter of work for
18 you that --

19 DOCTOR MURLEY: It would involve more work,
20 but I don't see it as an overriding burden, no.

21 MR. TAYLOR: It would be an issue by issue
22 basis. People would say, "That's worthwhile."

23 COMMISSIONER ROGERS: I was just thinking
24 from a budgetary point of view and budgetary planning.

25 MR. MILLER: Commissioner Rogers, if I may,

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1 I would caution everyone not to think in blanket terms
2 of that if we -- if we were to offer these new
3 technical approaches that we would want to go back and
4 universally allow operating plants to necessarily use
5 them because I think what you have to look at is
6 everything in the total context of what's offered in
7 these advanced designs in order to be able to try to
8 make the conclusion that they're safer. And a lot of
9 -- a lot of the features that may be included in the
10 future designs will not be included in existing
11 reactors.

12 So, to piecemeal take things and say that
13 we're going to relax them, I'd caution against doing
14 that at this point in time.

15 COMMISSIONER ROGERS: Well, I'm very glad
16 you brought that up because that was really what I was
17 going to come to, that point that somehow we have to
18 decide how we're going to deal with that kind of a
19 question. That -- if we can't break this whole thing
20 up into a lot of different pieces and then you can
21 take some and not others, that we're looking at a
22 whole collection of requirements that together
23 establish a kind of reactor environment in which the
24 design must take place and that one then can't go back
25 and pull out a piece of that and say, "Well, we can

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1 satisfy that one even though we don't have the other
2 features that are important in the staff's decision in
3 the first place to allow that change in our point of
4 view."

5 But I think we better be clear on that and
6 think a little bit through on it, which things are
7 linked together in a certain sense so that when
8 somebody -- if someone chooses to come in with a
9 request, that we have clearly identified the other
10 features in the overall requirements that allowed us
11 to make that change in the first place.

12 COMMISSIONER CURTISS: Just out of curiosity
13 on that point, you talked about the instantaneous
14 release assumption. Is the -- is that issue one that
15 depends upon all the other changes that are being
16 made, or could you, if the instantaneous release
17 assumption were modified for the existing plants, take
18 a different approach on how quickly the MSIVs have to
19 close? Is that a discreet issue or would it be tied
20 up with some of the other -- it seems to me in that
21 area we've had a lot of problems with maintenance and
22 the operation of the valves and in part because they
23 have to slam shut in about five or ten seconds.

24 And there's some issues that may be of
25 particular interest for the existing plants that I

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1 think Commissioner Roger's focus is exactly right, we
2 need to take a look at the integrated approach, what
3 issues depend upon what other issues. I guess I'd be
4 curious about that one in particular, given the
5 problems that we've had.

6 MR. THADANI: Well, it seems to me there's
7 some issues that are more amenable to treating them on
8 the individual basis. Timing of release could be one
9 of those. And in fact, offhand, I can't see why not.
10 Today we assume on the -- I think it's 15 seconds on
11 the initiation of an event to release. And that
12 clearly is conservative and extremely unrealistic.
13 EPRI's proposal is to go to one hour. There is
14 presumably some period between 15 seconds and one hour
15 that I expect we'll agree to.

16 And that timing really ought to be fairly
17 independent to a very large extent of plant to plant
18 design differences, so to speak. And that kind of a
19 change could clearly immediately impact a number of
20 issues, closure of valve, timing and so on. That has
21 been a bit of a problem for operating reactors.

22 COMMISSIONER ROGERS: That would have to be
23 looked at thought, wouldn't it --

24 MR. THADANI: Yes.

25 COMMISSIONER ROGERS: -- on a plant by plant

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1 basis before --

2 MR. THADANI: Yes. And I think there's some
3 areas where it may be more difficult to do and deal
4 with a flood of amendment requests than on some other
5 areas perhaps.

6 DOCTOR MURLEY: You're opening up a whole
7 new school of thought, which I think we'd have to
8 weigh -- we'd have look.

9 COMMISSIONER ROGERS: Well, it might be that
10 if you could get your thoughts together on that, then
11 it might at least be useful guidance to someone who's
12 contemplating -- might contemplate something, but in
13 -- but when they realize what they'd really have to do
14 to justify it, might decide that --

15 MR. TAYLOR: Decide it's not worth it.

16 COMMISSIONER ROGERS: -- it's not worth
17 pursuing it.

18 What do you see, Doctor Murley, as the
19 practical value that is coming about from our
20 maintaining a dual or a parallel system of review
21 here, the EPRI requirements document and the specific
22 vendor evolutionary advanced light water applications?
23 I mean we're carrying on two things in parallel here,
24 particularly the GE reactor and then the EPRI document
25 which does include boiling water reactors in it.

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1 What is the value to us in carrying out
2 these two things simultaneously and we're seeing some
3 problems apparently here that have to be resolved
4 within the vendor community itself, vendor and
5 customer community itself on -- on some issues. But
6 what -- what -- what's the benefit to us in doing this
7 in parallel?

8 DOCTOR MURLEY: I'd say there's probably
9 three that come to mind, three benefits. One is we
10 are getting the benefit from the people who have
11 actually operated a generation of these plants for 20
12 years and they're seeing the design weaknesses and
13 where they need to be fixed and that's very important,
14 I think.

15 Two examples there come to mind where they
16 have required more than we probably would have. One
17 is they've required a fossil-fired generator for
18 electrical power. I believe, haven't they? We would
19 not have necessarily required that. We would have
20 required other things. And A second is I believe
21 they've required the ability to be able to flood the
22 vessel cavity on their own.

23 So, having the input from the utilities is,
24 I think, very important.

25 Second, it is forcing some issues to be

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1 dealt with now rather than -- than later. The fact
2 that the ABWR, for example, is able to side-step an
3 issue like hydrogen doesn't make it go away. It's
4 just there for the next PWR that comes in. So, it is
5 forcing us to come to decisions.

6 I think the biggest benefit, quite frankly,
7 is going to be in the passive plants because there
8 it's a new -- not totally new concept, but a revised
9 concept. And this seems to be the type of plant that
10 EPRI and the utility industry is really interested in,
11 a much simpler, more passive, safer plant. Here
12 they're getting in on the ground floor by putting the
13 requirements very early before design has
14 substantively started. So, I see that as a big
15 benefit.

16 CHAIRMAN CARR: Is the passive plant
17 document going to build on this one? Is that your
18 view of it?

19 DOCTOR MURLEY: Well, it will build on it,
20 but in the sense there'll be -- it'll be a lot --
21 should be simpler in some regards because there are
22 fewer active safety systems.

23 CHAIRMAN CARR: But as -- as I read your
24 statement in here, you're not going to even issue our
25 agreement on this whole thing until the passive plants

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1 are in. In other words, until Chapter 3 gets -- or
2 Volume 3 or --

3 MR. MILLER: I didn't anticipate that we
4 would -- we'd do that. I would anticipate, Mr.
5 Chairman, and when we've completed our review of the
6 evolutionary plants, that we would be in a position to
7 be able to issue our findings on that.

8 CHAIRMAN CARR: Well, that's not what you
9 say you're going to do. But that's -- If we're going
10 to do that, why that's --

11 MR. TAYLOR: We'd better look at that. If
12 we haven't made that clear --

13 CHAIRMAN CARR: The way the whole thing is
14 set up, it looks like that we were going to get the
15 final chapter before we issued everything and blessed
16 it, the way I read it.

17 MR. MILLER: I think we're going to get the
18 final chapters of the volumes that are due to us on
19 the evolutionary plants. Then what EPRI will do is
20 submit a whole complete set in a third volume of
21 information in parallel -- I mean parallel to types of
22 information that was submitted for the evolutionary
23 plants, for the passive plants. We would look at as a
24 class of plant in context -- in that context.

25 CHAIRMAN CARR: You'd better look and see

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1 what you said you --

2 COMMISSIONER ROGERS: Well, just pursuing it
3 just a little bit further, this whole question of the
4 EPRI effort that we're reviewing and the vendor
5 community effort to try to move ahead, particularly
6 the GE. To what extent is the GE effort driving the
7 EPRI -- our review of the EPRI BWR portion of this?

8 DOCTOR MURLEY: Well, there is --

9 COMMISSIONER ROGERS: Or holding up the GE
10 effort. Does it make any sense to think of separating
11 the BWR part of the requirements activities from the
12 PWR part so that one can proceed along? I don't know.
13 My perception, which may be just totally incorrect
14 here, is that there seems to be a little difference
15 between GE and the rest of the vendor community in
16 their relationship of their activities to the EPRI
17 requirements document, that they are trying to move
18 more quickly and have some immediate practical
19 consequences that they're trying to address, whereas
20 the PWR community seems to be a little more ready to
21 work within the framework of the EPRI requirements
22 document.

23 Would it make any sense to consider not
24 tying those two parts of it together so tightly that
25 if -- if progress is a little slower on the PWR part

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1 that it's not necessarily impacting the BWR part?

2 DOCTOR MURLEY: Here's how I would
3 characterize that, Commissioner. We are moving ahead
4 smartly with the ABWR design. It's -- as I said, the
5 -- there are -- there's a lot of money has been put
6 into it. So that the questions aren't easier to
7 answer. A lot of thought has gone into it. And
8 there's also the practical force of the fact that this
9 plant is actually going to be started to be built, I
10 think, within a year or so in Japan. So, there's the
11 incentive to make decisions and move on. So, we are
12 doing that.

13 At the same time, we're trying to be very
14 careful that the -- our review of the ALWR
15 requirements document for BWRs is consistent with what
16 we're doing in the ABWR. Now, if there were to be,
17 let's say, a schism develop between the ABWR and ALWR,
18 then I would agree with you, it might be better to
19 just split it out. We don't see that. We think it is
20 possible to move ahead and insofar as we can keep the
21 BWR in, I think it is probably a good thing to do.
22 So, as a practical matter, we haven't found the
23 problem.

24 MR. THADANI: I might just comment on that.
25 An example would be in terms of the ABWR. Because of

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1 the design information available to General Electric,
2 they have been able to go forward and do a PRA of some
3 sort. That's very valuable early on in trying to
4 address importance of various issues, containment
5 being an example of that.

6 So, to a certain extent, that's very
7 helpful. That would be a little more difficult for
8 the requirements document.

9 COMMISSIONER ROGERS: Well, I'd hope you'd
10 keep us posted on your view on that particular
11 situation so that if there are any new developments,
12 that we're alert to them.

13 Thank you.

14 CHAIRMAN CARR: Commissioner Curtiss?

15 COMMISSIONER CURTISS: I just have a couple
16 of questions to wrap up. Back on the passive plants
17 requirements document. Do we have a feel for what
18 EPRI's schedule is in terms of getting Volume 3 in at
19 this point?

20 MR. MILLER: My understanding, Commissioner,
21 is that EPRI will start submitting those about the end
22 of this year.

23 COMMISSIONER CURTISS: And would they come
24 in in roughly the same order that Volume 2 came in?

25 MR. MILLER: I would anticipate that that

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1 would be the case, although I don't want to speak for
2 EPRI. But the schedule may be collapsed compared upon
3 what came in for the evolutionary portion because it
4 may draw upon the information, experiences and
5 thinking that went into the first document and the
6 hardships that went into --

7 COMMISSIONER CURTISS: It looks to me like,
8 from our perspective, in one respect that the review
9 of the passive requirements document ought to go more
10 quickly. We've gone through Volume 2 and we've
11 addressed -- taken a lot of the issues that might come
12 up in Volume 3 for the passive plants. But at the
13 same time, and on the other hand, I guess, the passive
14 plants do depart more significantly from our current
15 regulations.

16 MR. MILLER: I would say, Commissioner --

17 COMMISSIONER CURTISS: The question is, on
18 balance, do we expect the process for the passive
19 plants to be longer because of that or shorter because
20 we've been through it once before?

21 DOCTOR MURLEY: My guess is it's going to be
22 a little longer and here's why. In the passive
23 plants, they're relying on -- a lot on natural
24 circulation, both in water systems and in air systems
25 for cooling post accident conditions. When you do

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1 natural circulation, you're relying on elevation
2 differences for the natural driving force. We tend to
3 be conservative in our -- all of our reviews on
4 everything. It's historical. The way to be
5 conservative when you're relying on natural
6 circulation is to provide larger elevation
7 differences. When you do that, you're adding a large
8 amount to the height of buildings and to the cost of
9 the plants. And so, it's going contrary to what the
10 utilities would like to do with their passive plants.

11 Now, we haven't gotten into the details and
12 I've told EPRI on several occasions the sooner we can
13 get into these natural circulation issues, the better.
14 And I understand it's tough. But I have a hunch also
15 that part of the reason they're arguing so forcefully
16 on hydrogen is that it's going to be difficult to
17 sustain in the passive plants -- that the kind of
18 decisions that we might reach on the large
19 evolutionary plants.

20 So, for that reason, I don't have firm--
21 all I can give you is my feeling, but my feeling is
22 it's going to take longer to resolve some of these
23 issues because the design is optimized. They want it
24 to be optimized to be easy to build, to be costly, to
25 be smaller and that goes against some of the features

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1 that you need for natural circulation and hydrogen --

2 COMMISSIONER ROGERS: I think there's been a
3 general feeling, at least in some of the people I've
4 talked to, that the engineering of a passive plant is
5 a much tougher proposition from the engineering of a
6 combined active and passive system.

7 MR. MILLER: Yes.

8 COMMISSIONER ROGERS: You know, you come
9 close with your -- to as close as you want to come,
10 and then you put an engineered safety system on it,
11 that then brings you -- homes you in to where you want
12 to be and holds it there, in principal, if it doesn't
13 give some other problems. But the total design of a
14 passive plant is a much bigger challenge from an
15 engineering point of view. So, I would -- I think
16 there will be a lot of questions that will come up
17 that will have to be answered there.

18 DOCTOR MURLEY: And it takes the staff into
19 new territory too to some extent, where we don't have
20 a lot of history in reviewing natural circulation in
21 safety systems.

22 COMMISSIONER CURTISS: To go back to the
23 Chairman's question. Is it your objective to have the
24 passive plant's requirements document in place before
25 we get any applications from vendors so that we avoid

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1 what I gather may be a problem with the evolutionary
2 plants where the requirements document may be coming
3 to a point where -- certainly in the case of GE and
4 maybe CE -- two of the three plants are quite a ways
5 through the process before the requirements document
6 actually gets put on the books. Will we be able to
7 avoid that problem for the passive plants?

8 DOCTOR MURLEY: Clearly we will start on the
9 review of the ALWR requirements document for passive
10 plants before we start, I think -- at least before we
11 start detailed reviews of the passive plants. Now,
12 whether --

13 CHAIRMAN CARR: It sounds like we could give
14 you a policy decision that just says we'll finish that
15 EPRI documents review before we'll look at any passive
16 designs.

17 DOCTOR MURLEY: We could do that, yes. On
18 the other hand, sometimes --

19 CHAIRMAN CARR: It'll get us out of the
20 problem we're in now.

21 DOCTOR MURLEY: Sometimes you resolve
22 problems more quickly when you're dealing with a
23 specific design in front of you than when you're
24 dealing with a hypothetical requirement. That's been
25 the case for the ABWR requirements, for example.

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1 We've been able to move ahead quicker because we had a
2 real design to look at.

3 COMMISSIONER CURTISS: I just have one other
4 quick question. You mentioned earlier that you
5 thought that on the source term issue, when you're
6 talking about the procedural options, that to change
7 the source term would require an amendment to Part
8 100. You'd have to amend the regulations. I guess
9 I'd be curious at some point, either now or after
10 people have a chance to take a look at it, whether we
11 actually have to go through an amendment of the
12 regulations to update the TID, to use the more current
13 source term information?

14 DOCTOR MURLEY: We would look to General
15 Counsel.

16 MR. PARLER: I could take care of the
17 problem briefly now, Mr. Chairman, so that I can avoid
18 having to answer the question later. There is a note
19 to Part 100, it's just a note, which refers to the
20 TID-14-844 document. The note says that the
21 calculations of this document may be used as a point
22 of departure for consideration of particular site
23 requirements.

24 So -- now, the practice has been over the
25 years, as I understand it, is to use that document.

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1 So, the regulation itself would not have to be changed
2 for that purpose.

3 CHAIRMAN CARR: It's permissive and not a
4 requirement.

5 MR. PARLER: The regulation might have to be
6 changed for other purposes, which would be a subject
7 of different discussions at a later time.

8 CHAIRMAN CARR: Well, let me ask a couple of
9 questions. The first one is, is what we're doing here
10 with this EPRI requirements document, has it been
11 overcome by events? As I understand it, it started
12 out because the utilities decided they wanted to get
13 in on the design. They knew what they wanted to buy
14 and they were agreeing to work with EPRI and come out
15 with a document that we would bless so everybody could
16 realize that what they wanted to buy would -- had a
17 good chance of being blessed.

18 While we're doing that, we're in the middle
19 of approving three other designs that look like they
20 have a good chance of finishing before we ever get
21 through with this review of the EPRI evolutionary
22 plants. Is that a fair statement?

23 DOCTOR MURLEY: Well, to some extent it's a
24 fair statement, Mr. Chairman. But as I indicated in
25 an earlier answer, I think there is some benefit to

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1 this parallel review. One is that it is forcing us to
2 face these issues now. And we haven't yet --

3 CHAIRMAN CARR: I understand that. Is there
4 enough benefit that we ought to go ahead and do it or
5 should we stop and do what we're doing with the
6 designs and focus on the passive part of the problem
7 or do we have to do it in sequence? Do we have to go
8 through this exercise before we can get to the passive
9 part of the problem?

10 You think about those questions. I'm going
11 to ask EPRI when they get here. But that's one
12 question that bothers me. We've taken so long to do
13 it that the vendors have passed us up. And the idea
14 was that there was no going to be no -- there was
15 going to be no buyer in the U.S. for a plant that
16 hadn't gone through this EPRI requirements document
17 because they knew what they wanted.

18 That brings me to the second policy
19 question, which I think I'm going to have to get my
20 fellow Commissioners to give some thought to. That is
21 when the work gets too busy, who comes first? Who's
22 in the queue? Do we buy America first? Does CANDU
23 come at the end of the line? Does PIUS come at the
24 end of the line? How about the VVER so and so, is it
25 going to come in?

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1 DOCTOR MURLEY: Those are good policy
2 questions we would like you to struggle with, Mr.
3 Chairman.

4 CHAIRMAN CARR: That's something we've got
5 to think about, what's the priority. We've only got X
6 number of people.

7 DOCTOR MURLEY: That's right.

8 CHAIRMAN CARR: And the original estimate
9 from Mr. ~~Dicks~~ ^{Dicks} on this effort was 20 FTE per year.
10 And my recent check is we're doing -- using about
11 four. So I'm not surprised we haven't got our work
12 done and I realize EPRI hasn't got their work done
13 either.

14 But I think the Commissioners are going to
15 have to take a view of who gets in the queue first as
16 far as certification of their design. I have some
17 personal problems with certifying designs that I don't
18 think will ever be sold to a U.S. utility. Therefore,
19 I'm certifying a design for some marketer to go sell.
20 That problem worries me a little bit too. So, you can
21 think about those problems and we need all of us to
22 think about that.

23 DOCTOR MURLEY: I see, Mr. Chairman,
24 though~~ve~~ that Senator Johnston has submitted a bill
25 that would permit producers other than utilities to

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1 generate electricity. So, I would only mention --

2 CHAIRMAN CARR: When I say buyer, I don't
3 necessarily mean a utility.

4 DOCTOR MURLEY: Yes. There may be large
5 companies though who are willing to buy some of these
6 large plants.

7 CHAIRMAN CARR: But there's a lot more
8 reason for me to put a guy at the head of the line who
9 has a got a request to build a plant on my plate than
10 there is for some designer who I want to certify who
11 doesn't have a sale for his product yet, which is what
12 you said. GE is here, they've got a design, we can
13 look at it. It's easier to move that along faster
14 than it is to move these generic questions.

15 So, we've got to sort that out, I think, in
16 the near future before you become overloaded. I'm not
17 sure first come, first served is the way we want to
18 end up with that problem.

19 DOCTOR MURLEY: I agree, yes.

20 CHAIRMAN CARR: Well, I think I'd like to
21 thank the staff for airing some of these issues. I'm
22 not sure we've solved any of them. We would also like
23 to be briefed by EPRI and we're looking to that
24 briefing in September. I think, if my fellow
25 Commissioners would agree, it might be good to have

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NUMARC ⁱⁿ ~~and~~ with EPRI, since they kind of kicked off the study and it might be a good idea to see how the buyers tend to agree with the people who are supposedly rating the requirements. So we might invite them to come along.

Following the briefing by EPRI, the Commission is going to have to examine how the reviews of future reactors and the EPRI requirements document for both the evolutionary and passive design should proceed.

Do any of my fellow Commissioners have any other comments?

If not, we stand adjourned.

(Whereupon, at 11:46 a.m., the above-entitled matter was concluded.)

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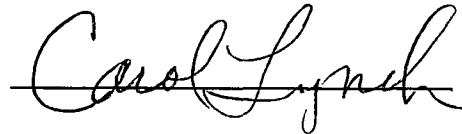
This is to certify that the attached events of a meeting
of the United States Nuclear Regulatory Commission entitled:

TITLE OF MEETING: BRIEFING ON STATUS OF EPRI DESIGN REQUIREMENTS
DOCUMENT FOR ADVANCED LIGHT WATER REACTORS

PLACE OF MEETING: ROCKVILLE, MARYLAND

DATE OF MEETING: AUGUST 1, 1989

were transcribed by me. I further certify that said transcription
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Reporter's name: Peter Lynch

EPRI DESIGN REQUIREMENTS DOCUMENT
FOR
ADVANCED LIGHT WATER REACTORS

- ° INTRODUCTION
- ° BACKGROUND/SCHEDULE
- ° COMMISSION GUIDANCE
- ° ALWR REQUIREMENTS DOCUMENT
- ° REVIEW APPROACH
- ° STATUS OF NRC REVIEW
- ° MAJOR ISSUES IN CHAPTER 5
- ° NEXT STEP

VG-1

BACKGROUND/SCHEDULE

- °EARLY 1980s - STANDARDIZATION INITIATIVES
UNDERTAKEN
- °1985-1987 - COMMISSION ISSUES POLICY
STATEMENTS ON SEVERE ACCIDENTS,
STANDARDIZATION, AND SAFETY GOALS FOR
FUTURE DESIGNS

VG-2

BACKGROUND/SCHEDULE (CONT.)

- °1983-1989 - VENDORS SUBMIT STANDARD
DESIGN APPLICATIONS
- °DECEMBER 1986 - NUREG-1197 LAYS
FOUNDATION FOR ALWR REQUIREMENTS
DOCUMENT REVIEW
- °APRIL 1989 - COMMISSION ISSUES 10 CFR
PART 52

VG-3

BACKGROUND/SCHEDULE (CONT.)

°1990-1992 - EVOLUTIONARY PLANT FDAs ISSUED
(ESTIMATE)

- GE ABWR
- CE SYSTEM 80+
- W RESAR SP/90

VG-4

BACKGROUND (CONT.)

°1991-1993 - EVOLUTIONARY PLANT DESIGN
CERTIFICATIONS COMPLETE (ESTIMATE)

- GE ABWR
- CE SYSTEM 80+
- W RESAR SP/90

VG-5

BACKGROUND (CONT.)

°1993-1995 - PASSIVE PLANT FDAs ISSUED
(ESTIMATE)

- W AP-600
- GE SBWR
- CE SIR

VG-6

BACKGROUND (CONT.)

°1995-1997 - PASSIVE PLANT DESIGN
CERTIFICATIONS COMPLETE (ESTIMATE)

- W AP-600 - CE SIR
- GE SBWR

°TBD - OTHER DESIGN CERTIFICATION
APPLICATIONS

- CANDU - PIUS
- MHTGR - ALMR

VG-7

COMMISSION GUIDANCE

°SEVERE ACCIDENT POLICY STATEMENT

- ESTABLISHED RESOLUTION POLICY
- RULE NOT REQUIRED
- FUTURE PLANTS SHOULD BE SAFER
THAN CURRENT-GENERATION
PLANTS

VG-8

COMMISSION GUIDANCE (CONT.)

°FUTURE PLANTS MUST ADDRESS:

- COMMISSION REGULATIONS
- 10 CFR 50.34(F) (TMI ISSUES)
- ALL UNRESOLVED SAFETY ISSUES
AND MEDIUM-AND HIGH-PRIORITY
GENERIC SAFETY ISSUES
- PRA INSIGHTS TO VULNERABILITIES

°STAFF ISSUED NUREG-1070

COMMISSION GUIDANCE (CON.T)

°10 CFR PART 52

- CODIFIES STANDARDIZATION AND
SEVERE ACCIDENT POLICY
STATEMENT

°STAFF INFORMED COMMISSION OF REVIEW
ACTIVITIES

VG-10

EPRI ALWR REQUIREMENTS DOCUMENT

°PURPOSE: TO SPECIFY DESIGN CRITERIA THAT, IF PROPERLY TRANSLATED INTO A DESIGN IN ACCORDANCE WITH NRC REGULATIONS, SHOULD RESULT IN A NUCLEAR POWER PLANT THAT WILL HAVE ALL THE ATTRIBUTES REQUIRED BY REGULATIONS TO ENSURE THERE IS NO UNDUE RISK TO THE HEALTH AND SAFETY OF THE PUBLIC OR THE ENVIRONMENT.

VG-11

EPRI ALWR REQUIREMENTS
DOCUMENT (CONT.)

°MODULAR SUBMITTALS

- PART I - EXECUTIVE SUMMARY
- PART II - 13 CHAPTERS CONTAINING
DESIGN CRITERIA FOR
EVOLUTIONARY PLANTS
(1350 MWE)

VG-12

EPRI ALWR REQUIREMENTS
DOCUMENT (CONT.)

- PART III - 13 CHAPTERS CONTAINING
DESIGN CRITERIA FOR
PASSIVE PLANTS
(300-610 MWE)

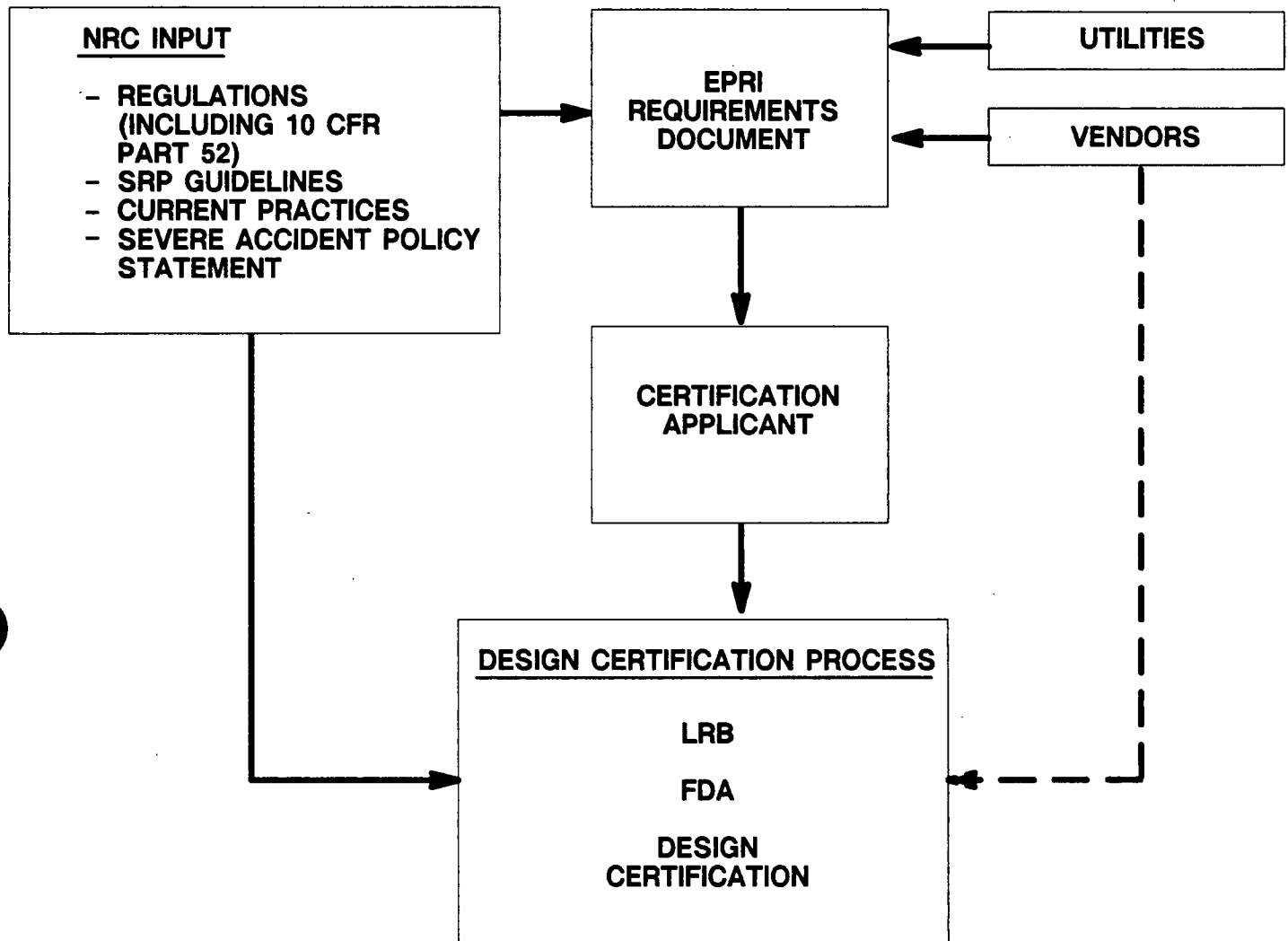
*EXECUTIVE SUMMARY AND 12 OF 13 CHAPTERS
(PART II) SUBMITTED

VG-13

REVIEW APPROACH

- ° REQUIREMENTS DOCUMENT AND DESIGN
CERTIFICATION PROCESS COMPLEMENT
EACH OTHER
 - REQUIREMENTS DOCUMENT PROVIDES
DESIGN CRITERIA
- ° DESIGN CERTIFICATION DEMONSTRATES
ACCEPTABILITY OF DESIGN CRITERIA
THROUGH RULEMAKING

DESIGN CERTIFICATION PROCESS



STATUS OF NRC REVIEW

°STATUS

- DSERs ON EXECUTIVE SUMMARY AND FIRST 4 CHAPTERS (PART II) ISSUED
- COMMISSION HAS DSER ON CHAPTER 5
- STAFF IS REVIEWING REMAINING CHAPTERS

VG-16

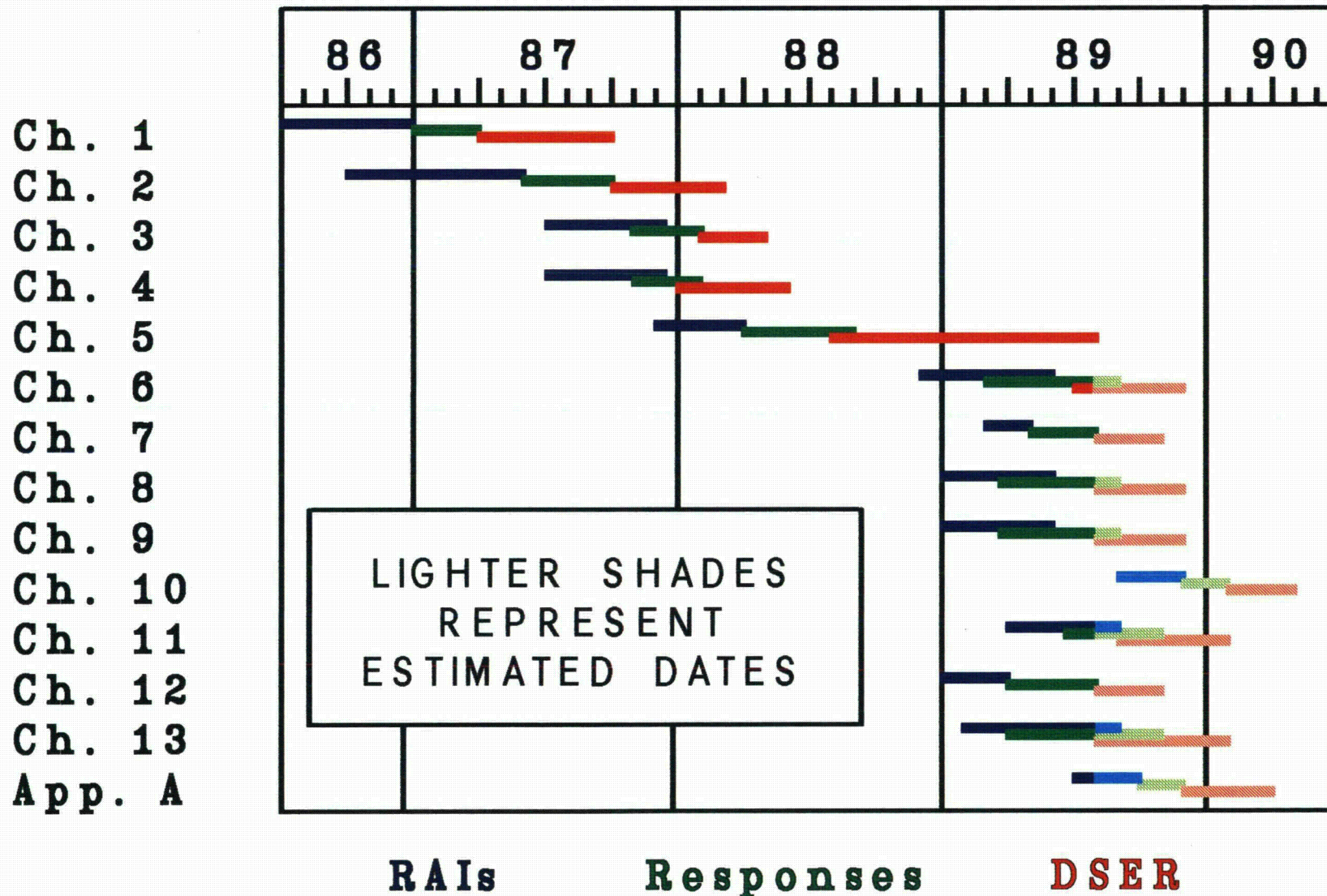
STATUS OF NRC REVIEW (CONT.)

° REQUIREMENTS DOCUMENT REVIEW IS UNIQUE

- FORMAT UNIQUE
- ISSUES DIFFICULT TO RESOLVE
- ISSUES TREATED UNEVENLY
- EARLY CHAPTERS RELIED ON FUTURE ONES

VG-17

REVIEW SCHEDULE EPRI REQUIREMENTS DOCUMENT PART II - EVOLUTIONARY LWRS



MAJOR OPEN ISSUES

- ° SEVERE-ACCIDENT CONTAINMENT PERFORMANCE
CRITERIA
- ° HYDROGEN GENERATION AND CONTROL
- ° SOURCE-TERM
- ° ATWS
- ° PWR HIGH/LOW PRESSURE INTERFACE
- ° MID-LOOP OPERATION

VG-19

MAJOR OPEN ISSUES

- °EQUIPMENT SURVIVABILITY DURING A
SEVERE ACCIDENT
- °STATION BLACKOUT
- ° FIRE PROTECTION

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NEXT STEP

THE STAFF PROPOSES TO CONTINUE TO REVIEW THE ALWR REQUIREMENTS DOCUMENT AND STANDARD PLANT DESIGNS TO ENSURE CONSISTENT REGULATORY TREATMENT FOR EVENTUAL DESIGN CERTIFICATION. POLICY MATTERS WILL CONTINUE TO BE BROUGHT TO THE ATTENTION OF THE COMMISSION.

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