

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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ADVANCED LIGHT WATER REACTOR CERTIFICATION ISSUES

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BRIEFING BY ALWR UTILITY STEERING COMMITTEE
ON ADVANCED LIGHT WATER REACTOR
CERTIFICATION ISSUES

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PUBLIC MEETING

Nuclear Regulatory Commission
One White Flint North
Rockville, Maryland

Monday, June 4, 1990

The Commission met in open session,
pursuant to notice, at 9:00 a.m., Kenneth M. Carr,
Chairman, presiding.

COMMISSIONERS PRESENT:

KENNETH M. CARR, Chairman of the Commission
KENNETH C. ROGERS, Commissioner
JAMES R. CURTISS, Commissioner
FORREST J. REMICK, Commissioner

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STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE:

SAMUEL J. CHILK, Secretary

WILLIAM C. PARLER, General Counsel

E.E. KINTNER, Chairman, ALWR Utility Steering
Committee

J.J. TAYLOR, EPRI

W.R. SUGNET, EPRI

W.H. LAYMAN, EPRI

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

9:05 a.m.

1
2
3 CHAIRMAN CARR: Good morning, ladies and
4 gentlemen.

5 Commissioner Roberts will not be with us
6 today. We expect Commissioner Rogers to join us
7 shortly.

8 The purpose of today's meeting is for the
9 ALWR Utility Steering Committee to brief the
10 Commission on advanced light water reactor
11 certification issues. This meeting was requested by
12 the Steering Committee so that its views on the 15
13 certification issues currently before the Commission
14 could be presented.

15 The Commission was briefed on these issues
16 by the NRC staff on May 3rd, 1990 and has received
17 comments from the Advisory Committee on Reactor
18 Safeguards.

19 I understand that copies of the
20 presentation slides and the paper, SECY-90-016,
21 currently before the Commission, are available at the
22 entrance to the meeting room.

23 Do any of my fellow Commissioners have
24 opening remarks?

25 If not, who is proceeding first, Mr.

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1 Taylor or Mr. Kintner?

2 MR. KINTNER: I guess I will.

3 CHAIRMAN CARR: Ed, go ahead.

4 MR. KINTNER: We really do appreciate
5 being able to talk to you on this subject this
6 morning.

7 I have with me today Byron Lee from
8 NUMARC. Pat McDonald, who I think you know, is a very
9 energetic member of our Steering Committee. These
10 members will be speaking shortly and I think you
11 probably already know them too.

12 We appreciate the statements the
13 Commission has made in the last few months regarding
14 the function and the priority of the requirements
15 documents. They've confirmed our belief that we're
16 dealing with many important, difficult, technical
17 issues we need to resolve to achieve a fresh look
18 towards the safer, better reactors for the future.

19 We also want to thank the staff for the
20 many days of intense discussions which have taken
21 place in the last couple of weeks on these issues. A
22 great deal of progress was made in exchanging and
23 understanding information which resolve the issues and
24 we've made very significant progress which culminated
25 in a meeting with Murley and the senior staff last

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1 Thursday. So, we'll report to you today on what's
2 happened in the meantime, as well as what was the
3 original reason for our request to get together with
4 you.

5 Since we met on September 20th last,
6 several things have happened which affect the ALWR
7 program positively. The first is the Nuclear Power
8 Oversight Committee. Senior utility industry
9 representatives adopted a resolution which, and here I
10 quote, "specifically recognizes and endorses EPRI and
11 the Utility Steering Committee as representing the
12 nuclear utility industry to carry out the following
13 throughout the ALWR program: discuss and resolve with
14 the NRC the priority of industry needs; discuss and
15 resolve with NRC issues of consistency between ALWR
16 design requirements and NRC licensing requirements;
17 act as the nuclear utility's principal interface with
18 the NSS suppliers of ALWR plants." That's the end of
19 the quotation. Very strong endorsement of what we're
20 trying to do.

21 In the meantime, since September, the
22 Department of Energy has entered into two significant
23 contracts with GE and Westinghouse for the further
24 development of the ALWR passive plant designs. These
25 are, we believe, important considerations associated

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1 with strengthening the effort we're embarked on.

2 When we met with you in September was
3 said, "We believe if there is to be a potential for
4 reinauguration in nuclear power plant construction, it
5 must be inspired by a fresh look at how nuclear plants
6 are designed and built. The advanced light water
7 reactor program is an attempt to provide such a fresh
8 look."

9 Now, we requested this meeting because you
10 had the two meetings, the last one the 3rd of May,
11 which were briefings by the staff and which we
12 believed in many respects didn't fully appreciate what
13 we were proposing to do. There are a number of
14 reasons for that, but I think we have now made so much
15 progress in understanding each other there's no point
16 in going into those issues.

17 But there were really significant
18 differences, as we believe, between what we were
19 proposing to do in the requirements document and what
20 the staff understood we were proposing to do.

21 In the preparation of the requirements
22 documents, we worked towards a comprehensive and
23 cohesive approach to safety which we believe answers
24 some of the questions raised by several members of the
25 ACRS about coherence. I know there's a question about

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1 the definition of coherence, but nevertheless it was
2 used and we've tried to present in the requirements
3 document a cohesive, coherent view of safety and
4 reactor plants.

5 The value principles which we've used to
6 provide that coherence are simplicity and margin.
7 Simplicity because the very complexity of reactor
8 plants as they've evolved is a significant part of the
9 difficulty of operating them safely.

10 This point has generally been agreed to by
11 those who are involved in the operations, the
12 utilities, the INPO and the NRC itself. They are not
13 just words, they are significant safety matters and
14 they are not public relations ploys, as you might
15 conclude from the May 3rd briefing, they are honest to
16 God steps toward safety. Simpler plants are easier to
17 operate, easier to maintain and more forgiving of
18 human errors and maintenance staffs.

19 Similarly, increased margins, where it's
20 practical to do that, make future plants more reliable
21 and safer. This increases response times, decreases
22 temperatures and power densities, will further reduce
23 challenges to both equipment and personnel.

24 We have in the requirements document
25 emphasized these points throughout and not only in a

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1 reactor plant, but in the entire plant, the steam
2 plant, the electrical plant as well.

3 Now, these are new avenues toward safety.
4 They follow after years of development in which
5 competitive environment driving forces were far larger
6 and larger plants operating at higher temperatures and
7 with smaller engineering margins. Design and
8 regulation then required increased numbers of safety
9 components and systems. It was inevitable. The
10 results were greater challenges to the operators and
11 greater potential for equipment failure from the added
12 complexity and reduced margin.

13 We believe we're succeeding in moving
14 towards our goals of simplicity and margin and we have
15 in the requirements document established requirements
16 which go beyond those previously accepted or required
17 by the regulations. We've been motivated to do that
18 because we truly believe these are directions towards
19 greater overall efficiency of operation. They also
20 provide greater protection of investment, a goal which
21 has been vital to the utilities since TMI-2. This is
22 an important consideration which is very, very hard to
23 accept, that the utilities have a reason to design for
24 safety because they want to protect the investment.
25 When one of these plants has an action like TMI-2,

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1 it's obvious what that means and if an accident
2 doesn't happen in the first place, it protects the
3 public just as well as if it happened and you had all
4 the other kinds of protective features.

5 We know no better way to improve
6 reliability and reduce potential for severe accidents
7 and we know of no better way to contribute to public
8 safety.

9 Further need for the utilities is, if
10 we're going to enter a new era of nuclear power
11 generation, is regulatory stability. The Commission
12 has been pressed for years with pleas for further
13 stability in its processes. Utilities simply cannot
14 in the future risk the large investments a nuclear
15 plant requirements without greater assurance that that
16 investment can be put to practical use within a
17 reasonable time.

18 Therefore, one of the reasons the
19 requirements documents impose requirements beyond
20 existing regulation is to provide some additional
21 regulatory margin so that there will be greater
22 assurance that plants designed and built to these
23 requirements could be licensed and operated without
24 long and costly delays. We intended that the
25 requirements document would become an important

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1 mechanism towards stabilization through that means and
2 because this could be the framework for the beginning
3 of safety review. If these matters are agreed to as a
4 generic matter in advance, then it ought to be easier
5 for the staff and everyone else to come to conclusions
6 about the matters affecting safety.

7 I would like to point out the requirements
8 documents are requirements, they are not just targets.
9 It's intended that all reasonable steps will be taken
10 to achieve these requirements with or without
11 additional actions on the part of the NRC staff.
12 These requirements are not a public relations ploy.
13 We do need to demonstrate to the public that we're
14 providing increased assurances of safety and we should
15 not apologize for that. But we also need to provide
16 the same assurance to the potential owners.

17 The sincerity with which the ALWR process
18 has worked towards these objectives seems, to some
19 degree, to have been lost by the reviewers. It's
20 understandable that having experienced more than a
21 decade of opposite pressures, the staff would like to
22 take advantage of every opportunity to regulate the
23 higher standards wherever they seem to offer clear
24 advantages. Doing that has negative aspects. The
25 regulatory process, if carried out on that basis, can

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1 result in depreciation of enthusiasm felt by the
2 utilities and their suppliers when their strong
3 efforts to provide additional safety and reliability
4 in fundamental ways are quickly absorbed in
5 regulation.

6 I would like to point out today we're
7 talking about severe accident issues, but this is only
8 one side of the reactor safety considerations. The
9 other is avoiding accidents in the first place. There
10 is a balance which must be struck between these two.
11 That balance, we believe, was heavily in favor of
12 mitigating accidents once they occurred. We've tried
13 in requirements documents to strengthen the side that
14 looks at preventing the accidents in the first place.
15 Then, after having done that, the maximum practical
16 degree we have, in fact, also accepted the requirement
17 that we must mitigate the consequences of anything
18 that should occur.

19 Another important factor of what we've
20 tried to do from the beginning of the EPRI effort was
21 to assure that the great body of additional
22 operational and research information generated over
23 the last 20 years could be applied, revisiting many
24 safety issues on a sounder technical basis than was
25 available when the regulations themselves were

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1 established. Many considerations other than purely
2 technical determine regulation. But a thorough,
3 dialectical process based on the best technical
4 information available is an important first step in
5 moving towards the new generation of safer reactors.
6 The best practical technical understanding is needed
7 if designs and operating procedures are to lead to
8 improved safety and acceptance.

9 We had hoped that the requirements
10 documents and our discussions with the NRC staff would
11 elicit that sort of open, thorough, technical
12 discussion. To that end we submitted the safety
13 chapter for the evolutionary plant requirements in
14 late 1987 and we received a staff response in February
15 of 1990. So, discussions since that time now have
16 begun, but we've simply not had time for a thorough
17 airing of these complex technical subjects and it may
18 be that such discussions not thought to be needed for
19 the evolutionary plant because of the kinds of
20 chronology that's been involved in that certification
21 effort, but we believe that it is not too late to do a
22 thorough job of airing of the technical issues to the
23 maximum practical degree that either side can bring to
24 the table before we move on as required in the
25 requirements document.

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1 What is decided now in these matters will
2 very likely determine the course of nuclear history
3 for a long time and a great deal is known that wasn't
4 known 20 years ago.

5 Now, we also think there is no particular
6 need to rush to a conclusion on these matters even for
7 the evolutionary plants, although we would not propose
8 to stand in the way of the certification process.

9 With that as a background, let me now ask
10 Bill Layman and Bill Sugnet of EPRI to talk to the
11 individual process and technical issues which we
12 requested at this meeting to discuss with you.

13 MR. LAYMAN: (Slide) Gary Vine, could we
14 start with slide 3, please?

15 We don't believe that regulatory stability
16 will be assured if generic issues resolution is on an
17 application by application basis. The requirements
18 document could supplant the case by case resolution
19 for some of the issues discussed in SECY-90-016.

20 The concept of parallel rulemaking
21 discussed on 5/3 appears unnecessary if the ALWR DSER
22 is the acceptance basis and certification rule locks
23 in this resolution for the design. Generic rulemaking
24 would cause a major delay in certification. The
25 regulatory optimization is appropriate in selected

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1 areas as supported by the technical basis.

2 (Slide) Next slide, please.

3 The Advanced Light Water Reactor Utility
4 Steering Committee has been working very closely with
5 the reactor suppliers and we want to emphasize that
6 the Committee does not want to stand in the way of
7 evolutionary plant certification. Although, as has
8 been stated before in this case, we think the cart got
9 before the horse in the certification versus the
10 requirements document.

11 The Committee does want to continue the
12 dialogue on open issues and we'd like to emphasize
13 that, as Ed mentioned, we believe there's time to have
14 an open dialogue on issues and reach a technically
15 based stable resolution. There are too many
16 expedients that have come back to bite us at a later
17 date.

18 (Slide) Next slide, please.

19 COMMISSIONER REMICK: Bill, could you just
20 be a little bit more specific on that point? I think,
21 Ed, you said there was no need to rush, but not
22 interfere with certification. Bill, you just said it
23 in a slightly different way. Could you be just a
24 little bit more specific in what you mean?

25 MR. LAYMAN: Yes. We don't think that it

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1 will delay things in that there isn't somebody that
2 has a order in at this point in time. We believe that
3 during this hiatus of nuclear construction, it's the
4 time to step back and to resolve some of these
5 technical issues that have been resolved by an
6 arbitrary fiat in the past where there had not been an
7 adequate technical basis established and there may
8 have been years of research and development that have
9 occurred since then that do give us the basis for a
10 relook at some of those particular points. The source
11 term is an obvious issue in this area. Also, the
12 hydrogen problem is another obvious issue in this
13 area.

14 COMMISSIONER REMICK: Doesn't this mean
15 then on some issues though that if you're going to
16 proceed with certification, you're going ahead on a case
17 by case basis and selling some issues?

18 MR. TAYLOR: Forrest, we have accepted
19 that. The point is both the certification and the
20 requirements document evolution for the evolutionary
21 plants have been carried out in parallel and it's not
22 practical to expect the series approach that otherwise
23 would be ideal.

24 A reason for this from the viewpoint of
25 the U.S. program is a demonstration of the

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1 standardization process itself and that has some
2 urgency in light of the complexity of that
3 demonstration.

4 COMMISSIONER REMICK: I understand what
5 you're saying.

6 MR. LAYMAN: Could we have the next slide,
7 please?

8 The stability in the design process does
9 aid in fostering investor confidence also. The margin
10 helps to ensure stability in the design process.
11 Regulatory margin continues to be available for future
12 use. It allows margin to deal with new technical
13 issues in the certification review and to deal with
14 new issues after certification. Margins should be
15 available to subsequent designs for flexibility in
16 their certification and to allow the designers the
17 opportunity to improve on these initially-certified
18 plants.

19 We believe that for reasons such as these
20 it's important that the margin not be absorbed into
21 regulation. There are cases in SECY-90-016 where
22 margin does get absorbed or is recommended to get
23 absorbed into regulation.

24 COMMISSIONER REMICK: Could you be just
25 more specific there? Which ones come to mind?

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1 MR. LAYMAN: Let me go to the next slide.

2 COMMISSIONER REMICK: Fine. Okay.

3 MR. LAYMAN: There's one very good
4 specific one there. We have an example with station
5 blackout. The ALWR requirements go very significantly
6 beyond the station blackout rule. We have required a
7 large capacity alternate AC source. This is a five to
8 ten megawatt combustion turbine. This is one of our
9 requirements documents requirements which is above and
10 beyond that which is specified in the present station
11 blackout rule. 90-016 does recommend putting that
12 into regulation, that that not be considered margin.

13 Now, we've done many other things also to
14 increase the margin over the station blackout rule.
15 We have an independent reserve transformer which is
16 independent from the switchyard. The generator
17 breaker has a load rejection capability, 100 percent
18 rejection capability in the case of the PWR and 40
19 percent in the case of the BWR. The generator breaker
20 will stay shut on load rejection and furnish house
21 loads from the main generator, which gives us an
22 additional power source.

23 We have six safety grade batteries on the
24 PWR and eight safety grade batteries on the BWR.
25 There is a new concept that we've put in on the three

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1 tier distribution system so that we have much more
2 reliability for the important non-safety AC power
3 motors. There's margin and the requirements have
4 provided capability that meet or exceed both the
5 alternate AC option and the coping option for the
6 station blackout rule.

7 In addition to the combustion turbine,
8 which is required, we've required an eight hour coping
9 capability for loss of all off-site and on-site AC.
10 There are no non-safety loads on the safety buses.
11 We've required that. We would hate to see things like
12 this absorbed into the regulatory, so that the
13 designers of future plants then start with this as a
14 base line and then get ratcheted to a new level. We
15 believe that some of these margins that we've
16 discussed here need to be preserved as margin so that
17 there's a flexibility in future designs.

18 COMMISSIONER CURTISS: Your argument here,
19 I take it, is that the existing regulatory base
20 established for the current plants ought to serve as
21 the point of departure that would in turn permit you
22 to add margin on top of what we require for the
23 existing plants.

24 MR. LAYMAN: Definitely, yes. I'd like to
25 add though that once we go through the certification

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1 process, although it is not in the regulation, the
2 certified plant has this margin specified in the
3 certification. So, it isn't something that the
4 operator can take away at a later date. It's part of
5 that certification.

6 COMMISSIONER CURTISS: I guess in a
7 broader sense, I take it what you're saying is that in
8 no respects as a regulatory matter should we as an
9 agency impose requirements that go beyond the existing
10 reactor licensing basis?

11 MR. LAYMAN: I wouldn't go that far.

12 COMMISSIONER CURTISS: As you go through
13 the discussion, I guess I'd like you to give me
14 examples where you think that would be appropriate.

15 MR. LAYMAN: Well, I think Bill Sugnet
16 will pick up on that, I believe, in talking about the
17 issues.

18 COMMISSIONER CURTISS: Okay.

19 MR. LAYMAN: I believe that we're at that
20 point now anyway.

21 So, Bill, would you address the next
22 viewgraphs?

23 MR. SUGNET: (Slide) Yes. On the next
24 two charts, I've listed the 15 issues addressed in
25 SECY-90-016 and I've broken them into two groups. The

1 first group is called potentially resolved issues
2 because we think we are either at the point of
3 resolution or converging on a point of resolution in
4 our discussions with the NRC staff. The second group
5 is unresolved and I'll speak to those individually.

6 But with respect to the first group, the
7 first four items on this chart, we believe that we are
8 essentially resolved with the staff. That is, we
9 think that they understand and accept the position
10 that we've expressed in the requirements document and
11 are ready to state that it resolves the issue.

12 On the last six items on the chart, while
13 we have made progress, particularly in the last two
14 weeks in our discussions with the staff, there is
15 still some difference between our positions and there
16 are also cases where, as a result of these
17 discussions, both our position and the staff's
18 position have changed.

19 For example, in the anticipated transient
20 without scram area, the ACRS commented that they would
21 prefer an approach of allowing a plant to ride through
22 an ATWS rather than requiring simply a diverse scram
23 mechanism. In the May 3rd Commission meeting, and in
24 our recent discussions with the staff, we think we are
25 moving more in the direction of allowing either a

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1 diverse scram capability or a demonstrated capability
2 to ride this event out. So, that's my understanding
3 of the direction where we're headed now, but I don't
4 think that one is completely closed yet.

5 COMMISSIONER REMICK: Question. You're
6 understanding -- I realize you can't speak for the
7 staff, but your understanding of staff positions on
8 these issues that you say are potentially resolved,
9 are these different than what the staff expressed in
10 90-016?

11 MR. SUGNET: We have three bases. The
12 first is the draft safety evaluation report that the
13 staff has provided us on our requirements document,
14 and then the further information that is required in
15 the SECY, augmented by our understanding of the
16 discussions that took place on May 3rd and the
17 discussions we've had with the staff over the last two
18 weeks. So, that collective set of information forms
19 my information base on where I think the staff's
20 position is on these. I agree with you, I'd certainly
21 hesitate to speak for the staff. I'm only giving you
22 our impression of where we think we are.

23 In a number of the issues, we would like
24 to achieve an industry-wide resolution, as was
25 mentioned earlier in the presentation. We'd like to

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1 do that as early as practicable. We would like not to
2 have to wait for application by application resolution
3 where it doesn't appear to be necessary.

4 An example of that from this first chart
5 is the OBE/SSE issue. Both we and the staff have
6 expressed our view that the operating basis earthquake
7 should not be controlling for the plant design. We've
8 put forward a specific proposal on the magnitude of
9 the operating basis earthquake and the rationale for
10 that magnitude. We'd like to pursue that issue to
11 closure with the staff on an industry-wide basis. We
12 think it can be done and once done, then all of the
13 applications and plants can follow suit thereafter

14 So, one of the themes that we'd like to
15 stress is generic resolution of issues across the
16 industry using our utility requirements document as a
17 vehicle for that.

18 COMMISSIONER CURTISS: Well, let me go
19 back to the earlier question I raised on the four that
20 you've described as resolved, the four at the top
21 there. If I recall what the staff is proposing, at
22 least on -- in fact, maybe on all four of them,
23 they're proposing to go beyond the existing regulatory
24 requirements. When you say they're resolved, is it
25 that they are resolved except for this question about

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1 how you regulate margin?

2 MR. SUGNET: Yes. Let me comment. I
3 don't think we want to assume the position of telling
4 the Commission or the staff whether or not they should
5 make new regulatory requirements. We think that's
6 your business and you're going to have to make those
7 decisions. We simply want to point out that if an
8 improvement that is volunteered by the industry as
9 part of these requirements document is codified into
10 regulatory requirements, then it eliminates the
11 flexibility of the industry and the designers to
12 operate and to assure that they will be licensable at
13 any point in time. That's a very valuable commodity
14 to us. So, we would encourage that you not go further
15 than you think is absolutely necessary for safety, that
16 you now jump to include additional features that we
17 have provided in the requirements document simply
18 because they are there.

19 CHAIRMAN CARR: When we certify that
20 design in a rule, that will become a requirement.

21 MR. SUGNET: We understand that any design
22 certified that includes those provisions is certified
23 on that basis and that can never be taken away. We
24 have no problem with that.

25 CHAIRMAN CARR: We want standardized

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1 designs. I don't want a lot of flexibility in the
2 designers.

3 MR. KINTNER: That's the point. Once this
4 is certified, it is then codified and for not just one
5 plant, but for that whole class of plants, all the
6 sisters as well.

7 MR. TAYLOR: It's our judgment that a real
8 contribution to standardization will occur if we can
9 get generic resolution across plant designs as the
10 first step.

11 MR. LAYMAN: But there will have to be
12 future plants after this first certification.

13 COMMISSIONER CURTISS: I'm still --

14 MR. LAYMAN: Both designers will need some
15 flexibility to get the model.

16 COMMISSIONER CURTISS: I guess I'm still
17 grappling with what your benchmark is or your starting
18 point for purposes of applying the rule that we
19 shouldn't regulate away the margin that you all
20 include, let's say, on station blackout, to take the
21 example that you've given.

22 Let me turn the argument around and ask
23 you, for some of these issues that we have resolved
24 for existing plants, which I take it in the case of
25 station blackout would be your starting point and your

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1 end point for the regulatory requirements with
2 everything else above that constituting your margin
3 for purposes of licensability.

4 But on that one, and perhaps on some of
5 these others, when we look at the requirements for the
6 existing plants, the evaluation that we go through,
7 including a cost benefit analysis, may actually take a
8 look at an issue and decide what's feasible based upon
9 the fact that you've got an existing plant operating
10 out there with concrete having been poured and options
11 available to you that might be more constrained than
12 what you could do with the advanced reactors.

13 Wouldn't the cost benefit balance if you
14 applied it for an advanced reactor be struck
15 differently in the case of some of these? If that's
16 the case, is it appropriate to say that for the
17 resolutions achieved for the existing plants, that
18 ought to be the end point for regulatory requirements
19 and everything beyond that ought to be, let's say,
20 EPRI margin, if you will?

21 MR. SUGNET: I think, as I said earlier,
22 we would not presume to tell the Commission where to
23 draw that line. We think that's your business. We
24 simply want you to understand that it's valuable to us
25 to have margin between what the minimum regulatory

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1 requirements are and what the industry's requirements
2 of the designer are so that we assure that we have a
3 wide white space between our design and the minimum
4 regulatory requirements.

5 MR. LAYMAN: I think that we do know
6 historically how the margins have been absorbed.

7 COMMISSIONER CURTISS: Right.

8 COMMISSIONER ROGERS: Well, I don't know,
9 I'm having a little trouble with this argument because
10 it seems to me that there's a question of whether
11 you're objecting to the margin or the mechanisms for
12 achieving that margin. I don't understand whether
13 you're calling them the same or not. I can understand
14 locking into particular ways of establishing a margin
15 as a constraint on designers. There may be some other
16 way to achieve that margin through some kind of
17 technical ingenuity, and I would be in favor of
18 allowing that freedom, but it seems to me that safety
19 margins by themselves, if they are achievable and
20 generally achievable throughout the industry, can be
21 reached and are being reached, should then become
22 codified and expected by the regulatory agency.

23 I don't see how a regulatory agency can
24 maintain its credibility if it maintains its
25 requirements perpetually at a certain level that is

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1 farther and farther behind what the industry can, in
2 fact, achieve in safety.

3 MR. TAYLOR: The codification,
4 Commissioner, will occur in the certification process.
5 There's no question that will be the case. We're
6 suggesting that the approval of the requirements
7 document, which will include this margin, not include
8 in that same sense a change in the regulations to, in
9 effect, take the margin into regulation.

10 COMMISSIONER ROGERS: Well, I don't know.
11 It seems to me what you're arguing for is codifying
12 the margins through the design certification process
13 which, in fact then, is making specific ways of
14 achieving those margins codified. I would just raise
15 the question whether it isn't fair for the regulatory
16 agency to consider those achievable at some point
17 without specifying exactly how those margins are to be
18 achieved. I'm wondering whether you're really
19 addressing that question or not in your suggestion.

20 MR. KINTNER: I think we are addressing
21 it. This is, as you say, a question of mechanism more
22 than anything else. If you look at what has happened
23 from the other side, you see that here is a case where
24 in a number of steps we have taken actions which I
25 think the staff would not on its own have been able to

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1 carry out.

2 One example is maximum temperature out of
3 the reactor vessel. That was a real battle with us
4 and the vendors. The staff was, I think, prepared to
5 accept temperatures much higher. But now, that's in
6 this document. It will be codified when the plants
7 that are certified to this document are certified and
8 will become an equal mechanism for the regulator to
9 assure that the best safety practices are being
10 followed. Obviously, we can't take the position that
11 we shouldn't be doing that.

12 But let me say also that, and you must
13 understand that this is a reasonable thing to have
14 occurred, when these issues came up with us, many of
15 them were debated and debated intensively within the
16 Steering Committee and with the vendors. It was
17 argued to us that, "If you do that, it will quickly be
18 lost. It's just going to be taken away." So, that
19 kind of interest in doing things which fundamentally
20 are correct from a safety point of view is deadened to
21 some degree if, in fact, you immediately lose it for
22 an absolute fiat which then is extremely difficult to
23 change.

24 Now, what we've said is that what we hope
25 would happen is that the requirements document, once

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1 adopted, once it has gone through the process of
2 resolving the issues with the staff and they have
3 issued us an SER which says, "This is licensable,"
4 that any deviation from it would have to be justified
5 on an ad hoc basis, which means that to some degree
6 the requirements document now is a part of the
7 regulatory process. That allows the capability to do
8 additional work and additional design efforts without
9 the sense that as soon as you do something good, it's
10 gone.

11 I go back to what I said previously, which
12 is the question of stabilization. The industry is
13 just frightened of ratcheting, a continually
14 ratcheting process in the name of safety, which is
15 obviously hard to argue against. But sooner or later
16 it gets to the point where the design efforts and the
17 construction efforts drag out and plants are not
18 feasible, they're just not feasible.

19 So, that's what's behind this. As Bill
20 says, we can't possibly tell you you can't regulate to
21 the best safety considerations. But the mechanism by
22 which you do that might be somewhat different.

23 COMMISSIONER CURTISS: I find the argument
24 more persuasive when it comes down to a question like
25 the 10^{-4} versus 10^{-5} safety goal. We talked about

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1 that at the last meeting and if the Commission should
2 decide to establish 10^{-4} as the target for both
3 existing and future plants, then it does seem to me
4 that it's imprudent. It takes away your margin for us in
5 the context of the EPRI requirements document to
6 regulate to 10^{-5} .

7 The concern I guess I have and the
8 question that I'm raising is a narrower one and that
9 is take station blackout as an example. Do you
10 propose, in that case or others, that the end point
11 for regulatory action be the existing set of
12 requirements for, say, station blackout? If you do,
13 how do you respond to the argument that those
14 requirements were developed with the existing reactors
15 in mind and with the cost benefit considerations
16 focused on existing as opposed to future reactors?

17 I'm not unsympathetic to the argument that
18 the ratcheting concern is one that we ought to be
19 careful to address. I'm not sure at this point where
20 you define the benchmark, but it's a question.

21 MR. TAYLOR: It's not a simple answer, but
22 that is a good example of what I was talking about.
23 We really wrestled with this question of how do you
24 provide insurance --

25 CHAIRMAN CARR: Well, I think the

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1 arguments boil down to is the next generation going to
2 be safer because we regulate it to require it to be
3 safer or is it going to be safer because you're going
4 to design it and build it to be safer? We're not
5 going to solve that here, right now, but that's where
6 we're going.

7 In the interest of time, let's proceed.

8 MR. SUGNET: (Slide) On the next chart,
9 I've listed the issues not yet resolved. The first
10 one, the safety goal issue, I think we and the staff
11 don't have any strong disagreements about the levels
12 of the various safety goals. I think this does boil
13 down to the discussion of the margin between what the
14 designer works to as opposed to what the regulatory
15 requirement is. I have a chart that describes that in
16 the handout, but I'm not going to speak to it further
17 in this presentation. I think it's self-evident and I
18 think we've talked enough about the margin question.

19 The other three are the hydrogen issue,
20 the containment performance and vent issue, and the
21 source term. I will speak to each of those
22 individually in the following charts.

23 (Slide) With respect to the hydrogen
24 issue, we have proposed that the deterministic
25 evaluation case for hydrogen control should be based

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1 on 75 percent active fuel cladding oxidation as
2 opposed to the 100 percent active fuel cladding
3 oxidation that is in 10 CFR 50.34(f).

4 We have provided a technical report that
5 considers both the experimental data, the TMI data
6 point, and a host of analyses and supports our 75
7 percent cladding oxidation as a reasonable upper limit
8 considering both hydrogen generated within the reactor
9 vessel during core overheating and after the reactor
10 vessel were to be failed.

11 One point that we want to make, the ALWR
12 requirements relies on the strength and the volume of
13 the containment to deal with hydrogen. In the case
14 that we have proposed, that is 75 percent active
15 reacted clad, when we perform our evaluation against
16 10 CFR 50.34(f), we would include the steam pressure
17 from an accident coupled with the global burn of 75
18 percent hydrogen. This would be a more demanding
19 evaluation case than an accident pressure with smaller
20 incremental burns on top of that that are caused by a
21 control system.

22 So, we believe that the evaluation case
23 that we have proposed to deal with is a more
24 challenging one from the standpoint of containment
25 strength and capability.

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1 With respect to prevention of detonation,
2 the requirements document has proposed a criterion of
3 13 percent hydrogen concentration as the criterion for
4 prevention of detonation, as compared with the 10
5 percent criterion contained in 10 CFR 50.34(f). We
6 have similarly provided a technical report that
7 supports this position.

8 We note that if the 100 percent/10 percent
9 criteria that are currently in 10 CFR 50.34(f) are
10 retained, this would pretty much force a large dry
11 containment to rely on an active control system. It
12 would not be practical to build a containment of the
13 size and strength required to deal with that without a
14 control system.

15 The strong position of the utilities is
16 that they wish to avoid putting in extra plant systems
17 and equipment, unless they're absolutely necessary for
18 some clear technical need.

19 We would like to continue the technical
20 dialogue with the staff to complete the discussions of
21 both the hydrogen generation question and the
22 detonability concentration question in order to arrive
23 at a common technical understanding before we jump to
24 any kind of an active hydrogen control system.

25 CHAIRMAN CARR: I guess my only question

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1 here is are you talking into consideration in your
2 calculations the experiments and the calculations that
3 INEL just got through doing on this that said that 75
4 percent may not be conservative?

5 MR. SUGNET: I'm not aware of any
6 experimental or calculation work that INEL is doing.

7 CHAIRMAN CARR: Okay.

8 MR. SUGNET: But we do have -- this past
9 week we had a meeting with the staff. It was the
10 first time that we've really gotten down to the
11 technical issues. We're going to have a follow-on
12 series of meetings. I'm sure if those things are
13 being done under the Commission sponsorship that we
14 will hear about them.

15 COMMISSIONER REMICK: What gives you
16 difficulty on the containment design? Is it the
17 additional 25 percent of hydrogen that might burn? I
18 don't see where the lower concentration would
19 necessarily challenge a containment.

20 MR. SUGNET: The lower concentration --

21 COMMISSIONER REMICK: Means igniters,
22 probably.

23 MR. SUGNET: The lower concentration means
24 that you can't stay below the 10 percent concentration
25 limit in a reasonable size containment. To meet the

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1 10 percent concentration limit for an ALWR would
2 require something on the order of a four and a half
3 million cubic foot containment, and this is simply
4 larger than is economic to build and so this would
5 dictate an active control system. We would prefer not
6 to go to that measure unless we are all convinced
7 technically that that's necessary.

8 (Slide) The next chart gives a little bit
9 of the history of resolution of the hydrogen issue.
10 We submitted a technical report to the staff in early
11 1989. We met with the staff in June of that year, and
12 as a result of some of their comments revised some of
13 our analyses and did some more sensitivity cases and
14 resubmitted a revised report in November of last year.

15 This past week we had a technical meeting.
16 We had tried to schedule one earlier and because of
17 our industry needs we had had to reschedule that
18 meeting, but we had a good technical dialogue last
19 week. We did not get down all the way to a comparison
20 point by point of our evaluation cases versus the
21 staff's and we'd like to do that to see if we can
22 understand the reasons for the difference of technical
23 position. And we think once that's done, then we will
24 be in a position to know better where these
25 differences are and what the technical need might be

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1 for any kind of control system.

2 (Slide) With respect to the containment
3 performance area, on the next two charts I have shown
4 in summary form the requirements contained in the ALWR
5 requirements document to assure good containment
6 performance. We've divided them into two groups. The
7 first chart addresses those that are part of the
8 design basis and the second chart shows items that are
9 what we call safety margin basis. That is, they are
10 contained in the requirements document. They are
11 called requirements, but they are outside the
12 traditional licensing cases.

13 On the first chart, in the design basis
14 cases, we absolutely require a rugged containment for
15 an ALWR irrespective of what the predicted accident
16 frequencies are. We call for the containment. We
17 specify its requirements. It is a design pressure
18 containment based on the double-ended break loss of
19 coolant accident pressure. We evaluate the
20 containment integrity during an accident, including a
21 global burn of 75 percent hydrogen. And we include
22 requirements for containment -- heat removal systems,
23 containment isolation systems, spray systems, and so
24 forth -- to meet all the existing regulatory
25 requirements. So that's our design case.

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1 In addition to that, in the safety margin
2 basis area, we have specified a core damage frequency
3 of less than 10^{-6} per year of exceeding a site
4 boundary dose of 25 rem; and in addition to that, a
5 number of deterministic design requirements that are
6 intended to cut off all of the identified mechanisms
7 for causing failure of the containment. Let me give
8 you some specific examples of this.

9 We mentioned before the measures that we
10 have taken to reduce the likelihood of a prolonged
11 station blackout to what we consider to be a
12 negligibly low likelihood.

13 We have improved the heat removal
14 capabilities from the containment, three full trains
15 for the boiling water reactor, a reliable two-train
16 for the pressurized water reactor.

17 We have specified higher pressure
18 interfacing systems to rule out the likelihood of an
19 intersystem LOCA that would cause a bypass of the
20 containment.

21 We have specified a cavity area and a
22 capability to flood the cavity rapidly with large
23 amounts of water to cool core debris in the event of a
24 core damage accident that breaches the reactor vessel.

25 We've specified a large strong

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1 containment, as I described a few minutes ago.

2 And we've included requirements for
3 reactor depressurization system capabilities to
4 minimize the possibility of a high-pressure core melt
5 ejection situation.

6 So we think that we have done a great deal
7 to address the issue of containment performance. It's
8 our position that the ALWR requirements are
9 satisfactory from a standpoint of meeting the
10 Commission's safety goal policy and the severe
11 accident policy statements.

12 Our preference is to address any credible
13 challenges to the containment frontally in the design,
14 so that there is no need for reliance on something
15 like a containment vent to assure that the containment
16 isn't failed early in an adverse way. So our
17 preference is put in design requirements to deal with
18 the issue, as opposed to intentionally putting a vent
19 path into the containment.

20 There has been quite a discussion about
21 containment performance criteria, including the
22 concept of conditional containment failure
23 probability. We have not included a conditional
24 containment failure probability criterion in our
25 requirements document. The principal reason we have

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1 not included it is because it would be a disincentive
2 for a designer to reduce core damage frequency.

3 The simple example, if you have a design
4 that is exactly at 10^{-5} core damage frequency and
5 10^{-6} of the 25 rem dose, any reduction in core damage
6 frequency immediately would put you out of compliance
7 with the conditional containment failure probability.
8 We don't think we want the designer to be in that kind
9 of a predicament.

10 COMMISSIONER REMICK: Isn't there still an
11 economic incentive, though, whether the designer cares
12 to do it or not, to keep that core damage frequency
13 low?

14 MR. SUGNET: There is. On the other hand,
15 if he were required to meet a particular conditional
16 containment failure probability, then he would also
17 have to reduce the likelihood of significant release
18 by the same factor as he reduces core damage frequency
19 and this can be difficult to do. The more you --

20 MR. LAYMAN: It would not be economic.

21 MR. SUGNET: The more that you do to deal
22 with the easy sequences, the more difficult becomes
23 the residue to control.

24 The other problem that we have with the
25 conditional containment failure probability concept is

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1 it relies on knowing how to define what constitutes
2 containment failure. In other words, do you define it
3 in terms of dose to the public? Do you define it in
4 terms of mass leakage from the containment, or some
5 other definition? And it also relies on the numerical
6 calculations, which we know are uncertain.
7 Admittedly, the same uncertainty exists in our 10^{-5}
8 and 10^{-6} criteria. It would simply be compounded if
9 carried into another criteria.

10 MR. KINTNER: What we agreed with the
11 staff in our discussions Thursday, there really does
12 need to be some intelligent criteria on which
13 containments are tested. Just saying .1 doesn't seem
14 to be enough. And I think the ACRS is working on this
15 subject. I think Brookhaven is working on it too.

16 We've agreed to go back and try to write
17 down a set of criteria by which containments can be
18 designed and tested and to come back to the staff with
19 a proposal and discuss that with them. This is
20 obviously a very, very significant subject in the
21 long-run and one which just -- .1 doesn't do what
22 anybody wants to do, I don't think.

23 MR. SUGNET: I'd like to reiterate that we
24 definitely are willing to discuss this, study it
25 further, dialogue with the staff further. On the

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1 other hand, we would like recognition that we have
2 gone a long way in the deterministic features that are
3 already included in the ALWR requirements document
4 towards cutting off the likely causes of containment
5 failure in a core damage accident.

6 Let me move on to the last issue, the ALWR
7 source term issue. Ed alluded earlier to the desire
8 to bring to bear recent decades of new information in
9 the design of advanced light water reactors. We
10 believe that this source term area is a very fertile
11 area in that respect. There has been a great deal
12 about radionuclide behavior learned in the last few
13 decades and we would like to capitalize on that to
14 modernize the source term from where it is now.

15 The TID source term which is current
16 regulatory practice was developed in 1962. As a point
17 of departure, we would like to incorporate the new
18 knowledge to bring that up to snuff and to help
19 produce a more rational system design basis in the
20 process.

21 The things that -- the kind of things that
22 would be affected, for example, would be a slower
23 valve closure time limit that could allow a better
24 valve design for leak tight isolation and reduce the
25 maintenance burden on the plant in this area; allow

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1 realistic credit for scrubbing from a boiling water
2 reactor suppression pool; and realistic hold-up in the
3 piping systems and in the buildings for both
4 pressurized and boiling water reactors.

5 We would also like to relax slightly the
6 allowance on allowable containment leak rate to
7 provide the opportunity to reduce the maintenance
8 burden and the likelihood of repeating containment
9 leak tests, which are difficult and expensive, and
10 still have a very satisfactory protection of the
11 public. So we foresee the pursuit of improvement and
12 modernization of the source term as providing the
13 opportunity to achieve some of these benefits.

14 COMMISSIONER REMICK: I always thought
15 that one of the advantages of the subatmospheric
16 containment was the fact that you had an ongoing check
17 on the tightness. Has this been considered in your
18 requirements document at all, the advisability of
19 that?

20 MR. SUGNET: We have just discussed last
21 week with the staff a concept which we are probably
22 going to require in the ALWR requirements document.
23 This would be a capability to monitor for gross
24 leakage of the containment by cycling the containment
25 pressure and by monitoring pressure and temperature

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1 rates. We would be able to -- probably not to detect
2 something as small as design basis leakage, but we
3 certainly could detect any significant opening in the
4 containment and we think that's a prudent thing to do.
5 It does not add any significant amount of equipment or
6 burden to the plant and we will require that.

7 COMMISSIONER REMICK: Thank you.

8 MR. SUGNET: The kinds of things that
9 we're thinking of doing in the source term area are to
10 broaden the consideration of fission isotope releases.
11 Currently, the TID source term, in simple terms, deals
12 with noble gases and iodine as the surrogate for all
13 fission products. There is new knowledge available
14 now that can allow us to separately describe the
15 various fission products. We think that that's the
16 way nature really behaves and we think that's the
17 right thing to do for the plant design considerations.

18 The original prescription for source term
19 was to have an instantaneous release. We think that
20 that is certainly not physically accurate and can lead
21 to some bad design practices, so we want to pursue a
22 more realistic timing of the overheating of the core
23 and the release of fission products to the reactor
24 coolant system to the containment and then to
25 atmosphere.

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1 We want to use the best available
2 information on the chemical and physical forms of the
3 radionuclides. Again, this points you in the
4 direction of a more effective and rational set of
5 containment systems.

6 More realistic treatment of deposition of
7 aerosols. We understand that a large fraction of
8 fission products will be in aerosol form, therefore we
9 need to do a better job of characterizing the
10 retention of those aerosols.

11 We have undertaken a technical dialogue
12 with the staff. Just this past week we had an
13 extensive meeting. They told us what initiatives
14 they're undertaking. We described to them the work
15 that we have done. I think we are both moving in the
16 same direction. We are very pleased with this
17 development, that there is a movement within the staff
18 now to revisit the source term and to try to make it a
19 better source term.

20 And we would like to achieve some
21 generically applicable statement of the source term
22 improvements that can be, again, relied on and used
23 industry-wide, rather than any specific application
24 type of treatment.

25 So that completes my discussion of the 15

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1 technical issues. Let me ask John Taylor to
2 summarize.

3 COMMISSIONER REMICK: Before going to
4 that, just a quick question. Do you feel that there's
5 any international consensus of peers on that source
6 term issue?

7 MR. SUGNET: We've had a --

8 COMMISSIONER REMICK: I realize you'd
9 never have a perfect, but --

10 MR. SUGNET: We've had a six man group
11 working on this for a little less than a year now, and
12 in that group we have represented people from the
13 Idaho laboratory who did a lot of the experimental
14 work early-on. We have utility involvement. It has a
15 fairly broad representation on it. And that group has
16 come to a consensus on a number of points, so I think
17 there is hope in this area. And I think that if we
18 get down to a careful description of what the event is
19 that we're trying to describe and then get the best
20 scientists together, I think they can come to a
21 consensus on this.

22 MR. TAYLOR: I don't believe,
23 Commissioner, there's yet an international consensus
24 on this subject. We however have in the program
25 representation, through the steering committee and

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1 through staff involvement both, of most of the major
2 organizations overseas -- Japan, Korea, Taiwan,
3 France, the Netherlands, Italy -- and expect that to
4 be enlarged. And we're hoping that through this
5 process working it out in detail, we'll achieve
6 ultimately a consensus. I think it's very important
7 we do.

8 MR. SUGNET: John, let me add one other
9 comment about this issue, and that is we are trying to
10 arrive at a deterministic single source term to be
11 applied for several design provisions, things like
12 qualification of equipment, calculation of exposures
13 in the control room, these sorts of needs for the
14 design, shielding.

15 We think, given that there will be a PRA
16 for these modern plants that will the whole spectrum
17 of events and for each of those events it will define
18 an appropriate source term based on the types of
19 failures that have occurred, that perhaps some of the
20 burden is relieved to be completely bounded for this
21 single deterministic case. We think perhaps it may be
22 more appropriate to try to come up with a realistic
23 case, an expected case, and make the design source
24 term deal with that expected case and then consider
25 the more far-out possibilities as part of the context

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1 of the PRA and the risk evaluation.

2 MR. TAYLOR: Well, let me sum up very
3 briefly. As you hear, we really believe that the ALWR
4 requirements provide an opportunity and mechanism for
5 technical resolution of issues in keeping with the
6 standardization process by defining industry-wide
7 resolution in the safety evaluation report of the
8 requirements document, which then would be formalized
9 in subsequent design certification.

10 We believe -- and we're very grateful for
11 your support for this approach, but have been
12 concerned from the discussions in the May 3rd meeting
13 and some of the statements on case by case treatment
14 in SECY 90.016. But we see the process working,
15 although substantially more technical dialogue is
16 needed in our judgement with the staff. Since May
17 3rd, we've had four days of intensive discussion with
18 the staff, which is actually more discussion than
19 we've had on the evolutionary requirements since we
20 started working with the staff, so we're encouraged by
21 that movement ahead.

22 On the passive plant, we already have a
23 more favorable picture of that interaction. A large
24 number of senior staff people visited EPRI and spent
25 two days with us discussing where we stood on the

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1 passive plant work, and we understand that the staff
2 is arranging for meetings with the reactor
3 manufacturers to go into substantial detail in the
4 test results they've achieved thus far and their
5 continued testing program plans. We're very, very
6 pleased to see that.

7 But we want to be sure that this technical
8 dialogue is continued on a very timely basis in the
9 hope that we can resolve. Not that we're demanding
10 that everything that we say is right, but that we sit
11 down as openly as we know how with all the data
12 available and come to the right conclusions.

13 We don't think there's a need for generic
14 rulemaking. We've heard about those discussions. As
15 we've talked in the meeting here today, think it's
16 undesirable to absorb into the regulations the margins
17 that we're identifying in the requirements document.

18 Finally, the Nuclear Power Oversight
19 Committee, which as you know is the top executive
20 industry-guiding body, recently formally endorsed our
21 program and its goals and reinforced their strong
22 conviction that the regulatory stabilization which we
23 think can be achieved through the processes we're
24 discussing here, is an essential enabling condition
25 for considering any new U.S. nuclear plant.

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1 Thank you for the time you've given us.

2 CHAIRMAN CARR: Okay. Before we go for
3 questions, we're -- a couple of us are going to have
4 to leave in about 15 minutes. So, if you can make
5 those questions crisp and the answers crisper, we'll
6 proceed.

7 COMMISSIONER REMICK: You indicated that
8 you applaud the staff working with the vendors and
9 looking at experimental data and facilities.

10 MR. TAYLOR: Yes.

11 COMMISSIONER REMICK: Also, some vendors
12 have submitted what I would call conceptual documents.
13 Do you see this in any way undercutting your efforts
14 if our staff works with the vendors on those
15 conceptual documents?

16 MR. TAYLOR: It's awfully important,
17 Commissioner, that the staff have full visibility of
18 the work that's going on. So, we encourage that.
19 Now, if it's converted into try and make decisions and
20 get, for the passive plant, the cart before the horse,
21 as Commissioner Curtiss has described it, then it's
22 clearly wrong. We've had recent discussions with the
23 vendors and have their assurances that in these
24 discussions there's not going to be that -- the
25 process isn't going to be subverted. I'm reasonably

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1 confident that we will work that out in the proper
2 manner. But to say to the staff, "Don't come and talk
3 to the vendors," to me would be in error.

4 MR. KINTNER: What we're afraid of is
5 auctioneering.

6 COMMISSIONER REMICK: Yes, I understand.
7 Okay.

8 I don't have any problem understanding
9 your concerns for the ratcheting and a preference for
10 having things codified in the certification rulemaking
11 versus regulations. I wonder to what extent your
12 concerns include that we might codify in the
13 regulations certain requirements for the evolutionary
14 plants that would then lock your hands on what I call
15 the true advanced light water reactors that you
16 referred to earlier that DOE and EPRI are funding and
17 so forth. Are those some of your concerns if we
18 codify --

19 MR. KINTNER: Yes, they are some of our
20 concerns. But we think, as John says, that the staff
21 is, in fact, beginning now to work with us in the
22 passive plant and trying to identify the differences
23 so that these can be sorted out. In some cases, in
24 the May 3rd meeting, they identified that they
25 intended this decision to carry on into the passive

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1 plant. So, we do have that concern. We do think that
2 there does need to be a somewhat different viewpoint
3 in the passive plant.

4 COMMISSIONER REMICK: Okay. I don't want
5 to put our General Counsel on the spot, but I wonder,
6 do you have any comments in light of what you heard
7 today on generic rulemaking? I think at the previous
8 meeting, Bill, you indicated that ideally that was a
9 preferable route.

10 MR. PARLER: Well, I think that the
11 obvious has been tasked and will shortly be tasked in
12 looking at that. I'd just as soon do it all at one
13 time. Of course, the word "requirements" has been
14 used quite frequently at this meeting this morning and
15 where everything is fine if folks agree on the so-
16 called requirements, but if the requirements are not
17 expressed in the regulations after a rulemaking action
18 or in the certification proceeding, the guidelines,
19 which are not requirements, could be fair game to be
20 challenged.

21 If you have a certification proceeding and
22 you're going to impose requirements which differ from
23 the requirements in the existing regulations, that is
24 a fertile field for challenge and a prolonged process.
25 That's essentially the bottom line that I'm going to

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1 tell you when I report to you formally.

2 COMMISSIONER REMICK: Thank you.

3 CHAIRMAN CARR: Commissioner Rogers?

4 COMMISSIONER ROGERS: Well, I know our
5 time is limited, but I wonder if you could say a
6 little bit more about your concerns with respect to
7 regulatory stability, just exactly what you're talking
8 about. We hear these words constantly as an industry
9 concern, regulatory stability. I have a feeling they
10 mean different things to different people.

11 What's your particular concern? Are you
12 most concerned right now about the new designs, the
13 preoperational aspects of regulatory stability? Are
14 you concerned about regulatory stability after plants
15 are built and in operation? Where do you see this--
16 the real center of your concern with respect to
17 regulatory stability?

18 MR. TAYLOR: Commissioner, our concern
19 because of our role is in the preoperational stage.
20 It reflects the utility's strong conviction that they
21 don't want to be involved in major expenditures of
22 funding until they have an understanding of what will
23 be required in a new plant by the Nuclear Regulatory
24 Commission.

25 The other issues are equally important and

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1 would come after this phase and are being addressed
2 today by NUMARC in their ITAAC program and in the
3 dialogue which is underway with the staff. That is
4 equally important and there are equal concerns in that
5 area which NUMARC is pursuing with you.

6 COMMISSIONER ROGERS: Okay. Thanks.

7 CHAIRMAN CARR: Commissioner Curtiss?

8 COMMISSIONER CURTISS: I just have two or
9 three quick questions here.

10 On your last graph there, I'm not sure I
11 understand what you mean when you say that completion
12 of the evolutionary requirements document roll-up
13 without NRC staff, DSER input will be necessary. Why
14 is that?

15 MR. SUGNET: The process that we had
16 followed was to provide a chapter to the staff, have
17 their review and get a draft safety evaluation report,
18 then deal with the issues in that report, finalize it
19 and get a final safety evaluation report. Because of
20 the timing, we have to proceed to close out now and
21 finalize Chapter 6 through 13 without any further
22 draft safety evaluation input from the staff.

23 COMMISSIONER CURTISS: Okay. Based upon
24 what you've done so far with the requirements
25 document, where you see it heading on the passive

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1 plants, do you continue to see a need for a licensing
2 review basis type document for individual vendor
3 design reviews?

4 MR. SUGNET: I think that there will be a
5 need for a licensing review basis document to deal
6 with some things other than technical things for
7 certain. We have, in the last two weeks, reached
8 agreement with the vendors in the Department of Energy
9 to work together to define what the content of the
10 licensing review basis should be, which elements in
11 that should be in lock step with the requirements
12 document and which of them can proceed independently.
13 Things like administrative review schedules, manpower
14 commitments, these sorts of things certainly don't
15 need to be held up for a review of the requirements
16 document.

17 COMMISSIONER CURTISS: Well, to take the
18 one that we've completed to date, the GE ABWR, which
19 addresses a number of technical issues, from the
20 standpoint of technical issues, you don't see a role
21 for an LRB?

22 MR. SUGNET: We will arrange for the LRB
23 to be in lock step with the requirements. It may be
24 desirable to deal with those in the LRB for the needs
25 of the applicant and the staff, but if so, it should

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1 be held until the requirements document is resolved
2 and then implemented in that same way in the LRB.

3 COMMISSIONER CURTISS: Okay. All right.

4 On the relationship of the requirements
5 document to the individual vendor design reviews, the
6 so-called horse/cart question, for the passive plants
7 where we have decided that the Commission review of
8 the requirements document should be complete before
9 individual vendor LRBs are submitted to the ACRS for
10 review and approval, assuming sufficient resources to
11 carry out the review of the EPRI requirements
12 document, is that a horse/cart relationship that about
13 approximates what you all --

14 MR. KINTNER: We think that's great. If
15 it's carried out that way, it will be very helpful.

16 COMMISSIONER CURTISS: Okay. One final
17 question, really not squarely on the topic here. But
18 based upon the review that you've undertaken, do you
19 have any thoughts on the question of level of design
20 detail or is that something that's going to be
21 addressed strictly in the NUMARC context?

22 MR. TAYLOR: Again, as I mentioned, that's
23 a NUMARC area and Byron Lee is here. I think I'm
24 going to ask him to comment.

25 MR. LEE: Yes.

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1 CHAIRMAN CARR: Would you go to the
2 microphone, please, and identify yourself?

3 MR. LEE: Byron Lee from NUMARC.

4 Yes, we will be handling the design
5 completion aspects, Commissioner. In fact, we have a
6 meeting with the staff management later this week and
7 we have arranged a briefing of the Commission on the
8 ITAAC design completion information on July 16th, I
9 believe it's tentatively set.

10 COMMISSIONER CURTISS: Okay. That's all I
11 have.

12 CHAIRMAN CARR: Can you give us a copy of
13 the resolution that the utilities passed?

14 MR. KINTNER: Absolutely, yes.

15 CHAIRMAN CARR: I'd be interested in --

16 MR. KINTNER: I thought we already had.

17 MR. TAYLOR: I sent a copy of that to
18 Commissioner Curtiss in light of some questions he had
19 raised.

20 CHAIRMAN CARR: Okay.

21 MR. TAYLOR: I'll see to it that all of
22 the Commissioners get a copy.

23 CHAIRMAN CARR: He'll share it with us.

24 MR. KINTNER: One other thing I was going
25 to mention and we should really have one if you

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1 haven't already seen it. We've completed Volume 1, a
2 top level document for both evolutionary and passive
3 plant. I think it's a very impressive piece of work
4 by everyone who participated

5 Have those copies been sent?

6 MR. SUGNET: I believe some copies have
7 been sent to the SECY Office.

8 MR. KINTNER: We'll get you a copy of that
9 as well.

10 CHAIRMAN CARR: How do you envision -- at
11 the end of the time when the requirements document is
12 finished, what do you see as the way we put our
13 imprimatur on this thing to make it -- as the General
14 Counsel says, how is it going to be really a
15 requirement?

16 MR. SUGNET: The way we envision that
17 occurring is that the staff safety evaluation report
18 will state their agreement that the requirements
19 proposed will be licensable. This would have the same
20 weight as a safety evaluation report on a normal
21 design application.

22 CHAIRMAN CARR: Well, are we not, in fact,
23 making that part of our regulations?

24 MR. SUGNET: I don't think you are.

25 CHAIRMAN CARR: It depends on how we write

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1 it, I guess.

2 MR. SUGNET: And then following that, that
3 the certification -- the proposed design and the
4 certification process would actually make it a part of
5 the regulation. At that point it would be locked out.

6 MR. PARLER: Mr. Chairman, I realize the
7 time is important here, but you can't make anything a
8 part of regulations without going through rulemaking
9 procedures and opportunity for the public to be on
10 notice and to comment. So, that's a detail --

11 CHAIRMAN CARR: Yes. I'm trying to figure
12 out how we're going to get this thing done in that --

13 MR. SUGNET: I think that the requirements
14 document review and staff acceptance in the SER is an
15 informal understanding and it's formalized when the
16 design is certified.

17 CHAIRMAN CARR: Okay. It's interesting to
18 me, you said something that I've kind of been saying
19 all along. There's not all the rush in doing this so
20 that we don't do it right this time. We don't want to
21 build another hundred like we built the last hundred,
22 and so we want to do this differently.

23 In your -- the reason I ask for that
24 resolution, I'm trying to find out if there's an
25 indication of us still having time to do that or are

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1 the utilities getting eager to get one of those
2 evolutionary advanced designs certified so they can
3 start construction? Do you get any indication of that
4 in your --

5 MR. SUGNET: Maybe John could talk to --

6 CHAIRMAN CARR: Do you get a sense of
7 urgency that there are people pressing you to get your
8 work done?

9 MR. KINTNER: We're working with this
10 INPOC subcommittee and I think the fact that such a
11 statement was made and such an effort to begin is
12 itself significant. But I don't see, quite frankly, a
13 great urgency from any utility in the United States to
14 go buy a reactor plant. Now, it may very well be that
15 there is or it may also be that once certified and
16 everything is worked out, they can feel comfortable
17 with proceeding and they will proceed. But I don't
18 see that as a driving force on getting it right before
19 we step off in the next generation.

20 CHAIRMAN CARR: It certainly appears to me
21 that you're concern about regulatory stability goes
22 away if we have what we have defined as an essentially
23 complete design when we certify it. Then there isn't
24 any lack of stability to be -- if you build that
25 plant, you build that plant. Is that not --

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1 MR. TAYLOR: The first step, which we are
2 trying to pursue, Commissioner, is to have an
3 understanding of what is needed before a tremendous
4 expenditure of money is placed on getting that
5 detailed design. A second step which NUMARC is
6 following will be a process by which verification can
7 be established that the principles have been agreed to
8 in the regulations that have been --

9 CHAIRMAN CARR: Is that money that's--

10 MR. TAYLOR: -- sent through the
11 certification will be met as the plant is designed,
12 detailed and constructed.

13 CHAIRMAN CARR: That money that's going to
14 have to be spent on that detail design is going to
15 have to be spent at some point in time.

16 MR. TAYLOR: And the issue is spend it
17 with some assurance you're going to get your money
18 back in terms of a plant that will run.

19 CHAIRMAN CARR: The more complete that
20 design is when it's certified, the more likely
21 everybody is going to know what's in it. That's
22 motherhood, right?

23 Commissioner Remick, you had one more
24 questions?

25 COMMISSIONER REMICK: Does EPRI envision a

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1 requirements document for either the advanced liquid
2 metal reactor, as it's called now, or the modular
3 HTGR?

4 MR. TAYLOR: The concept of the
5 owner/operator establishing as a base a set of
6 requirements that reflect his needs as the ultimate
7 owner and operator has been accepted not only by the
8 advanced systems such as gas-cooled and liquid metal
9 in the U.S. Department of Energy is sponsoring
10 developing requirements for both of those. But also
11 in the new production reactor program where DOE is
12 also asking for requirements and by movement overseas,
13 in individual countries and by the International
14 Atomic Energy Agency to establish requirements.

15 Hopefully, and I think that is the case at
16 this point, a substantial amount of leaning on what
17 we've done to date is going on.

18 COMMISSIONER REMICK: But you have no
19 specific plans at EPRI now for requirements documents
20 for those two --

21 MR. TAYLOR: We do not have the resources
22 to sponsor requirements for the liquid metal and gas-
23 cooled systems. That would have to be done by those
24 who are more directly involved in funding those
25 programs.

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1 COMMISSIONER REMICK: Thank you.

2 MR. LAYMAN: GCRA has written requirements
3 document for that.

4 MR. TAYLOR: They've taken a step.

5 MR. LAYMAN: HTGR is the equivalent, maybe
6 half an inch thick at this point in time.

7 COMMISSIONER REMICK: Okay.

8 COMMISSIONER CURTISS: Ken, I just have
9 one quick question.

10 Awhile back we set out in a NUREG the
11 process and the relationship between the staff and the
12 NRC -- between the staff and EPRI on how we're going
13 to review the requirements documents. I've assumed
14 throughout this discussion that that document which
15 was promulgated in, what, '86 or '87, thereabouts,
16 still provides a useful and relevant approach. Is
17 there anything that the document -- now that it's two
18 or three years old, I'm assuming that it still
19 provides the framework for how we intend to approach
20 this.

21 MR. SUGNET: I'm not sure which document
22 you're referring to. But my response in general would
23 be we think that we need to have more freedom to have
24 open dialogue with the staff on these issues. Our
25 understanding is that a lot of the discussion priority

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1 and process in the staff's eyes has constrained them
2 not to discuss some of these technical issues with us.
3 We think that that hasn't been helpful. So, we would
4 suggest as open a process as you think is appropriate.

5 CHAIRMAN CARR: Well, I'd like to thank
6 the ALWR Steering Committee for providing the
7 Commission with your views on advanced light water
8 reactor certification issues. The Commission believes
9 the requirements document is a valuable vehicle for
10 identifying those advanced reactor design
11 characteristics desired by the utilities who will
12 purchase the new designs.

13 In addition, it provides the mechanism for
14 resolving issues in a generic way as opposed to
15 dealing with them individually for each specific
16 reactor design. Recognizing the value of this
17 document, the Commission has set its review priorities
18 for advanced reactors accordingly.

19 Do any of my fellow Commissioners have
20 additional comments?

21 If not, we stand adjourned.

22 (Whereupon, at 10:29 a.m., the above-
23 entitled matter was concluded.)

24
25

CERTIFICATE OF TRANSCRIBER

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

TITLE OF MEETING: BRIEFING BY ALWR UTILITY STEERING COMMITTEE ON
ADVANCED LIGHT WATER REACTOR CERTIFICATION ISSUES

PLACE OF MEETING: ROCKVILLE, MARYLAND

DATE OF MEETING: JUNE 4, 1990

were transcribed by me. I further certify that said transcription
is accurate and complete, to the best of my ability, and that the
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Carol Lynch

Reporter's name: Peter Lynch

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EPRI

**PRESENTATION TO
NRC COMMISSIONERS**

**UTILITY / EPRI
ALWR PROGRAM RESOLUTION
OF EVOLUTIONARY PLANT
KEY REGULATORY ISSUES**

**E. E. Kintner
Chairman, ALWR Utility Steering Committee**

**J. J. Taylor / EPRI
W. H. Layman / EPRI
W. R. Sugnet / EPRI**

June 4, 1990

Utility/EPRI

Presentation to NRC Commissioners

ALWR Program Resolution of Evolutionary Plant Key Regulatory Issues

June 4, 1990

Advanced LWR Program

NRC-890-1

- ALWR Program is a UTILITY-driven Program
- ALWR Utility Requirements are technically based, with major emphasis on simplification and margin
- Industry recognition and support formalized by Nuclear Power Oversight Committee endorsement of ALWR Utility Steering Committee and EPRI ALWR Program
 - The ALWR Utility Steering Committee represents utility industry with NRC and vendors

Why We Requested This Meeting

- **ALWR Requirements not fully represented in the 5/3/90 Commission Meeting**
- **Extensive recent progress in resolving key issues**
- **SECY 90-016 would absorb some margin into regulatory requirements**

Advanced LWR Program

NRC-6/90-2

- Current ALWR Requirements for several important issues were not fully represented in the 5/3/90 Commission Meeting
 - lack of technical dialogue between Staff and ALWR Program (Chapter 5 DSER took 27 months; process discussions major contributor to delay)
 - Staff review did not completely account for a few ALWR Requirements and responses
 - 8 month delay in Chapter 5 DSER between completion and issuance
- Effectiveness of ALWR Requirements in resolving key issues is greater than could be inferred from the 5/3/90 meeting discussion:
 - Mid-loop
 - Station Blackout
 - Fire Protection
 - Inservice Testing of Pumps and Valves
- Unresolved Issues for which ALWR position not fully represented:
 - Safety Goal
 - Hydrogen
 - Containment Performance/Vent
 - Source Term
- On some issues, SECY 90-016 proposes to adopt ALWR Requirements as regulatory requirements, thus eliminating margin to regulation

Industry-Wide Issue Resolution

- **ALWR Requirements Document SER provides mechanism for NRC Staff to indicate acceptance of issue resolutions prior to Design Certification**
- **Thus generic rulemaking for ALWR issues may be unnecessary**
- **Generic rulemaking would cause major delay and is thus undesirable**

Advanced LWR Program

NRC-8903

- Regulatory stability not assured if issue resolution is on application by application basis.
- ALWR Requirements provide sufficient basis for generic resolution. Where PWR/BWR distinctions are necessary, Requirements provide that detail
- This mechanism could supplant case by case resolution for some of the issues discussed in SECY 90-016
- Generic severe accident rulemaking prior to Certification
 - EPRI and NUMARC letters of January 9, 1989 explained why generic rulemaking is neither necessary nor desirable
 - Concept of "parallel" rulemaking discussed 5/3 appears unnecessary if ALWR DSER is acceptance basis and Certification rule locks-in this resolution for the design
 - Generic rulemaking would cause major delay in Certification
- Regulatory optimization is appropriate in selected areas, as supported by technical basis

Relationship to Evolutionary Plant Certification

- ALWR Utility Steering Committee working closely with reactor suppliers
- The Committee does not want to stand in the way of Evolutionary Plant Certification
- The Committee does want to continue dialogue on open issues to a technically-based, stable resolution

- The ALWR Utility Steering Committee is working closely with reactor suppliers on implementation of the ALWR Requirements to develop designs that meet the perceived need of the utilities for safe, reliable and economic ALWRs
- The Committee does not want technical dialogue on the Requirements Document to stand in the way of Certification of Evolutionary Plant designs that will demonstrate the Certification process, and will provide near term options to the marketplace
- The Committee does want to continue dialogue on open issues to a technically-based, stable resolution

Design Margin to Regulation

- **Stability in design process aids in fostering investor confidence**
- **Regulatory margin available for future use**
- **Assured licensability at Combined Operating License stage**

- Margin helps insure stability in design process through Certification for a particular design, helping to foster utility management and investor confidence
- Assured licensability at Combined Operating License stage
- Regulatory margin continues to be available for future use
 - Deal with new technical issues in certification review
 - Amendment to deal with new issue after Certification
 - Available to subsequent designs
- Public acceptance is added benefit, but not the reason for regulatory margin

Regulatory Margin Example--Station Blackout

- **ALWR features significantly beyond SBO rule**
 - large capacity Alternate AC Source
 - independent reserve transformer
 - generator breaker with load rejection capability
- **ALWR Requirements overwhelm SBO issue generically**

- ALWR Requirements go significantly beyond SBO rule:
 - large capacity Alternate AC Source (AAC) (powers non-safety loads on loss of offsite power; capable of backing up safety loads if needed)
 - independent reserve transformer
 - generator breaker with load rejection capability
 - three tier distribution system
 - improved DC power redundancy and capacity
 - capability to cope for 8 hours before core damage
- Margin -- requirements provide capability that meets or exceeds both the AAC option and the coping option in the SBO rule
- ALWR Requirements resolve SBO issue generically
 - independent of site characteristics
 - staff approval of SBO issue resolution can be unconditional

Potentially Resolved Issues

- Fire protection
- Mid-loop
- Station blackout
- Pump and valve inservice testing
- ATWS
- Intersystem LOCA
- OBE/SSE
- High-pressure melt ejection
- Core debris coolability
- Equipment survivability

NRC-6907

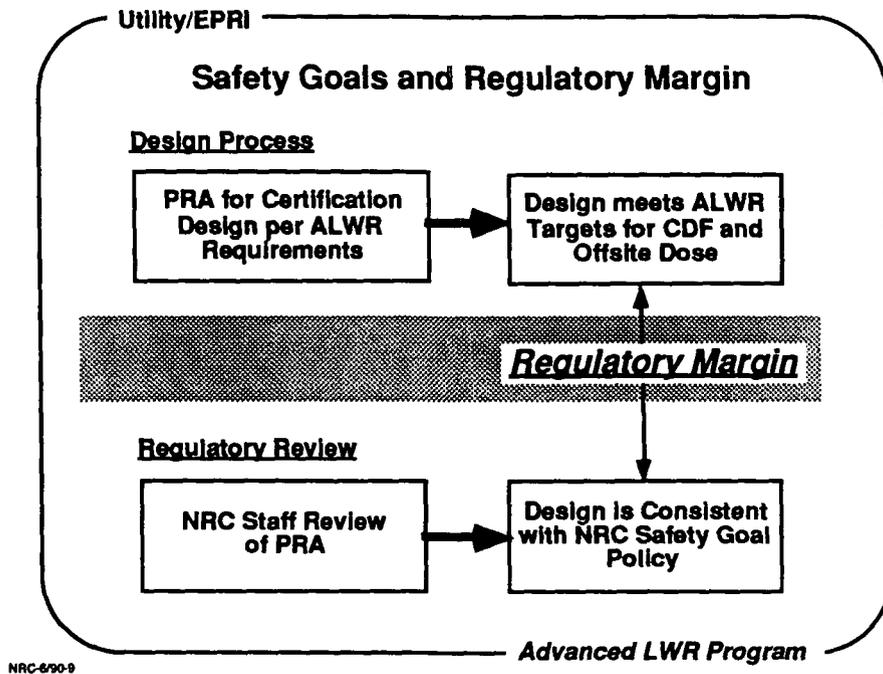
Advanced LWR Program

- The technical basis for resolution of these issues has been developed over the last two years and ALWR Requirements and NRC Staff positions are converging
- Further technical dialogue has taken place over the last two weeks on these issues
- Issues marked " • " are considered resolved, pending confirmation from the NRC Staff
- Issues marked " ○ " are converging. Recent technical dialogue has resulted in progress, and in some cases changes in the NRC Staff position.
- Once achieved, resolutions of these issues can be accepted in the Requirements Document SER, and implemented via the Certification rule for each design that conforms to the requirements

Issues Not Resolved

- **Safety goals**
- **Hydrogen**
- **Containment performance / vent**
- **Source term**

- Current list of unresolved issues for which there are major technical disagreements between the ALWR Requirements and the Staff Positions:
 - Safety goals
 - Hydrogen
 - Containment performance / vent
- For Source Term, agreement on need for change; differences in approach and technical aspects are under discussion
- Although progress has been made in the last two weeks, technical dialogue needs to be completed on these issues



- Safety Goals should be the framework in which technical issue priority and resolution are evaluated and decided
- ALWR Requirements on Safety Goals are utility requirements to vendor, not proposals to NRC for new regulatory requirements
- This figure shows schematically how the concept of margin to regulatory requirements can be effectively used to provide licensing stability
- The designer develops his design with the necessary capability and features, and conducts a detailed PRA showing the design complies with the ALWR Requirements for Core Damage Frequency and Offsite Dose
- The NRC Staff reviews the design and the PRA, and confirms that the design is consistent with the Quantitative Health Objectives in the Commission's Safety Goal Policy Statement
- While there are bound to be uncertainties and technical disagreements over the details of the analysis, they are not likely to be large enough to prevent a successful conclusion

ALWR Hydrogen Control

Cladding Oxidation

75% active fuel cladding vs. 100%

Prevention of Detonation

Concentration < 13% vs. 10%

**ALWR relies on containment strength
and volume**

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NRC-690-10

Cladding Oxidation

- The ALWR Requirements document has proposed a Regulatory Optimization to base the deterministic case for hydrogen accommodation on 75% active fuel cladding oxidation.
- 10CFR50.34(f) specifies 100% active fuel cladding oxidation as the requirement for hydrogen accommodation; technical basis not well defined
- A technical report has been submitted to the Staff that considers existing experimental data, analysis results, and ALWR Requirements supports the 75% considering both in-vessel and ex-vessel hydrogen generation.
- We note that accommodation of 75% without reliance on a control system requires a more stringent 10CFR50.34(f) evaluation than accommodation of 100% with reliance on a control system, and can result in a stronger containment

Prevention of Detonation

- The ALWR Requirements document has proposed a Regulatory Optimization to establish 13% hydrogen concentration as the criterion for prevention of hydrogen detonation
- 10CFR50.34(f) requires hydrogen concentration less than 10% as criterion for preventing hydrogen detonation; technical basis not well defined
- A technical report that considers the existing experimental data, energy of realistic ignition sources, and ALWR containment conditions and supports this 13% criterion has been submitted to the Staff

If the 100% /10% criteria are retained, it will not be practical for a large dry containment strength and volume alone to meet these criteria, and designers will be forced to add the complexity of a hydrogen control system to the design

Hydrogen Issue Resolution

- **Technical report to Staff early 1989**
- **Meeting with Staff in June 1989**
- **Revised report in November 1989**
- **Recent technical meetings--dialogue not yet complete**

- Technical report to Staff early 1989
- Meeting June 1989 indicated some additional Staff concerns
- Additional analysis cases in revised report in November 1989
- Technical meeting planned for April 1990 aborted due to logistics problems on industry side
- Technical meeting held May 30. As a followup, the Staff has committed to participate in the near future in a technical dialogue on the ALWR Requirements, and the technical basis for the Staff 100% / 10% positions.

Containment Performance

ALWR Requirements: Licensing Design Basis

- Rugged containment required; design pressure based on LOCA
- Containment integrity maintained during accident with hydrogen generation from 75% active clad oxidation (and hydrogen burning if not inerted)
- Containment systems (e.g., heat removal, containment isolation) shall meet all regulatory requirements

Licensing Design Basis -- The following summarize the principal design basis requirements for containment:

- A rugged containment shall be provided, irrespective of assessed core damage frequency, with design pressure based on LOCA
- Containment integrity shall be maintained during an accident with hydrogen generation from 75% active clad oxidation (and hydrogen burning if not inerted)
- Containment systems (e.g., heat removal, containment isolation) shall meet all regulatory requirements

Containment Performance

ALWR Requirements: Safety Margin Basis

- Core damage frequency $< 10^{-5}$ per year
- Site boundary dose < 25 rem for accidents with frequency $> 10^{-6}$
- Many features that prevent early containment failure (e.g., system to flood core debris in reactor cavity)

Examples of specific requirements for severe accident issues:

- Prolonged station blackout made even less likely by combustion turbine
- Improved containment heat removal capability
- Use higher pressure interfacing systems to prevent intersystem LOCA
- Cavity/lower drywell spreading area and flooding capability to cool core debris
- PWR containment size/strength to accommodate hydrogen; control system if necessary
- BWR containment -- control system required: inerting or igniters
- Reactor depressurization to address high pressure melt ejection concern

Utility Steering Committee Position

- **Address credible sequences frontally in the design requirements so there is no need for a containment vent**
- **Conditional containment failure probability can be a disincentive to designer to reduce core damage frequency**
- **ALWR requirements are sufficient to meet the Commission Safety Goal Policy and Severe Accident Policy**

NRC-690-14

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- The ALWR Requirements are sufficient to meet the Commission Safety Goal Policy and Severe Accident Policy in that they provide a rugged containment with margin and a higher standard of severe accident safety performance than prior designs
- The Committee considers that any identified issue regarding the adequacy of the severe accident provided by the ALWR Requirements should be addressed frontally in the design as opposed to relying on a containment vent
 - philosophically inconsistent for advanced plants to design in a vent path in a rugged leaktight containment
 - technical need for vent is eliminated by design features
 - there is significant concern for operational issues related to a containment vent; no existing regulatory policy
- Use of conditional containment failure probability is not considered necessary, and is not included in Requirements Document because it could be a disincentive to Plant Designer to further reduce core damage frequency

Source Term Issue

- **Base ALWR safety on technical knowledge, updated according to regulatory and industry research**
- **More reliable containment isolation valves**
- **Realistic suppression pool scrubbing and holdup in main steam lines and condenser**
- **Reduced maintenance and test burden for containment and MSIV**

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NRC-90-15

- TID 14844 was developed in 1962 as a "point of departure"
- Incorporate source term knowledge gained from research over the past three decades
- Desire for ALWR safety to be based on technical facts as opposed to non-mechanistic assumptions which may not be physically realistic
- Basis for more rational mitigation system design
- Slower containment isolation valve closure time allowing better valve design for better leaktight isolation and less maintenance
- Suppression pool scrubbing credit including consideration of realistic timing of fission product release
- More rational basis for evaluating leakage holdup in main steam lines and main condenser allowing elimination of MSIV leakage control system
- Justification of slightly higher allowable containment and MSIV leak rate test limits leading to reduced maintenance burden and reduced likelihood of need for repeated tests

ALWR Source Term

- **Consider other fission isotope releases**
- **More realistic release timing**
- **Best available data on chemical and physical form**
- **More realistic basis for aerosol deposition**
- **Pursue technical dialogue on generic improvements**

NRC-890-16

Advanced LWR Program

- Retain the approach currently embodied in regulatory guidance which calls for a single source term intended to represent an accident resulting "in substantial meltdown of the core with subsequent release of appreciable quantities of fission products"
- Consider fission product releases to containment other than noble gas and iodine; be more technically realistic with respect to release timing
- Use best available data on chemical and physical form; use a more technically realistic basis for aerosol deposition in containment (since the physical form for nearly all of the non-noble fission products is particulate)
- ALWR proposed source term improvements are under active discussion with staff
- Objective is generically applicable realistic source term for ALWR that allows more rational basis for mitigation system design

Conclusion

- **ALWR Requirements provide opportunity and mechanism for technical resolution of issues**
 - **Define industry-wide resolution in SER for Requirements Document**
 - **Formalize in Design Certification**
- **This process is working, but more technical dialogue is needed**

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NRC-890-17

- Technical dialogue between the Staff and the ALWR Utility Steering Committee on several of these Key Issues has not been completed
 - No Staff response 12/87 - 2/90 (27 months)
 - Little technical dialogue between the Staff and the ALWR Program occurred on 15 issues prior to 5/3/90 brief
 - Recent meetings 5/22-31/90 have resulted in significant progress
- Opportunity exists to take advantage of this industry-wide resolution mechanism to pave the way for individual design certification reviews

Conclusion

- **No need for generic rulemaking**
- **Undesirable to absorb regulatory margin by adopting new regulatory requirements**
- **Utilities view regulatory stabilization as necessary enabling condition for new U. S. nuclear plant**

- More timely review of ALWR Requirements is needed
- Chapters 6-13 DSERs all overdue; no schedule for completion at this time
- Completion of Evolutionary ALWR Requirements Document "rollup" without NRC Staff DSER input will be necessary
- Staff resources dedicated to ALWR Requirements review appear to be inadequate
- Preparations must be made for a much faster review of ALWR Passive Plant Requirements; initiatives being taken now by NRC Staff on Passive Plant analytical base and testing are in the right direction
- **Utilities consider that regulatory stabilization is an enabling condition for new U. S. nuclear plants**