

# OFFICIAL TRANSCRIPT OF PROCEEDINGS

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ALWR Passive Plant Utility Requirement  
Document Regulatory Issues

Title: ALWR Utility Steering Committee Meeting  
with NRC Staff

Docket No.

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1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

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4 ALWR PASSIVE PLANT UTILITY REQUIREMENTS

5 DOCUMENT REGULATORY ISSUES

6 \*\*\*

7 OPEN SESSION

8 \*\*\*

9 ALWR Utility Steering Committee Meeting

10 with NRC Staff

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Bethesda, Maryland

14

Thursday, November 29, 1990

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The Steering Committee met in open session,

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pursuant to notice, at 8:30 - 10:30 a.m.

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## 1 IN ATTENDANCE:

2

3 F. Congel, NRC/NRR

4 Richard J. Eckenrode, NRC/NRR/DLPQ/HFAB

5 Joseph P. Joyce, NRC/NRR/SICB

6 A. El-Bassioni, NRC/NRR/PRAB

7 Janice E. Moore, NRC/OGC

8 Patricia Jehle, NRC/OGC

9 C.Y. Li, NRC/NRR/SPLB

10 Catherine Thompson, NRC/NRR/DLPQ

11 Lynn Connor, NRC Calendar

12 Conrad McCracken, NRC/SPLB

13 Frank Ross, DOE

14 Terry Schulz, Westinghouse

15 C.Y. Cheng, NRC/NRR

16 John 'Brien, NRC/RES/DE

17 James A. Norberg, NRC/RES/DE

18 Faust Rosa, NRC/NRR/SELB

19 Brad Hardin, NRC/RES/DRA

20 Jay Lee, NRC/NRR/PRPB

21 Chuck Hendren, NRC/DRIS/RSGB

22 Barry Mendelsohn, NRC/NRR/RSGB

23 Ed Goodwin, NRC/NRR/DST

24 Charles S. Hinson, NRC/NRR/DREP

25 E. Beckjord, NRC

- 1 Luca de Jaca, ENEL/EPRI
- 2 Robin Galer, EPRI
- 3 Stephen Additon, TENERA
- 4 Jim Metcalf, Stone and Webster
- 5 Jack Spraul, NRC/NRR
- 6 R.L. Rothman, NRC/NRR
- 7 D.M. Chapin, MPR
- 8 David Terao, NRC/NRR
- 9 Chuck Johnson, Slevy, Inc.
- 10 Everett Whitaker, EPRI
- 11 Xavier Pouget-Abadie, EDF/EPRI
- 12 David G. Strawson, MPR
- 13 Charles B. Brinkman, ABB/CENP
- 14 Dino Scaletti, NRC
- 15 Alan Levin, NRR/DST
- 16 Joe Quirk, GE
- 17 Stuart Lewis, EPRI/SAROS
- 18 Brian McIntire, Westinghouse
- 19 Rita Beck, Westinghouse
- 20 Jim Watt, NRC/DST
- 21 J.E. Lyons, NRC/DST
- 22 Brian Sheron, NRC/RES
- 23 Mark Rubin, NRC/NRR
- 24 Matt Chiramal, NRC/NRR
- 25 Tony Gody, NRC/NRR

1 Mike Kaltman, NRC/NRR  
2 Jack Kudrick, NRC/NRR/SPLB  
3 Y. Gene Hsii, NRC/NRR  
4 Robert Pierson, NRC/NRR/DARSP  
5 James Lazevnick, NRC/NRR/SELB  
6 S. Singh Bajwa, NRC/NRR/PMAS  
7 H.L. Brammer, NRC/NRR/DET  
8 John Tsao, NRC/NRR/DET/ENCB  
9 Victor M. McCree, NRC/NRR/DARSP  
10 Loren F. Donatell, NRC/NRR/DARSP/PDST  
11 Tom Boyce, NRC/NRR/DARSP/PDST  
12 Dennis Crutchfield, NRC/NRR/DARSP  
13 J. G. Partlow, NRC/NRR/ADP  
14 David Sharp, Westinghouse  
15 Atam Rao, GE  
16 Thomas Kenyon, NRC/NRR/PDS  
17 James Wilson, NRC/NRR/PDS  
18 William Travers, NRC/NRR/DARSP  
19 Jerry Wilson, NRC/RES  
20 Charles Miller, NRC/NRR  
21 Tom Murley, NRR  
22 Jim Richardson, NRR  
23 Gary M. Holahan, NRR/DST  
24 Ashok Thadani, NRR/DST  
25 Robert Jones, NRR/SRXB

1 Jack Roe, NRR/DLPQ  
2 Cecil Thomas, NRR/DLPQ  
3 Bill Brach, NRR/DLPQ  
4 Jared Wermiel, NRR/DLPQ/LHFB  
5 George Bockhold, EPRI/SCS  
6 Bill Sugnet, EPRI  
7 Ted Marston, EPRI  
8 Ed Kintner, GPU-N  
9 Bill Layman, EPRI  
10 Johnb Trotter, EPRI  
11 David Leaver, EPRI  
12 Ed Rumble, EPRI  
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## P R O C E E D I N G S

[8:30 a.m.]

DR. MILLER: Good morning. My name is Charlie Miller and I am the Project Director for Standardization in NRR.

Today's meeting between NRC Staff, members of the Advanced Light Water Reactor Program Steering Committee, and the Electric Power and Research Institute will focus on a number of topics related to advanced passive light water reactor concepts.

The meeting will be conducted in two parts.

The first part will include remarks by the NRC Staff and EPRI and is open to members of the public to attend.

The second part, following the break, will be closed to the public and to all parties other than NRC Staff and those invitees of EPRI.

The reason that the second part of the meeting will be closed is due to a scheduled discussion of material that EPRI has declared proprietary information which they consider privileged and confidential.

They have requested the NRC to withhold that information from the public disclosure pursuant to 10 CFR 2.790. This information was submitted to the NRC on September 7th, 1990 and takes the form of what is known as

1 the EPRI Advanced Light Water Reactor Requirements Document.

2 The NRC is currently evaluating EPRI's request for  
3 treatment of this information as proprietary and until a  
4 decision is made by the NRC regarding the aforementioned  
5 request, the NRC is obligated to protect the information as  
6 requested by EPRI. Therefore, that portion of the meeting  
7 discussing that material will be closed.

8 The meeting today will be transcribed, so I am  
9 going to request that the speakers identify themselves so  
10 that the Reporter can keep a clear record.

11 With those opening remarks, I would like to now  
12 turn the meeting over to Dr. Murley to chair.

13 DR. MURLEY: Good morning. Let me add my welcome  
14 to EPRI and I see some of the reactor designers and vendors  
15 here today.

16 My name is Tom Murley. I am the Director of NRR.  
17 I probably should start by announcing, though it's old news  
18 by now, the new organization that we put in place in NRR to  
19 handle the review of all advanced reactors. It's the new  
20 Division of Advanced Reactors and Special Projects. Denny  
21 Crutchfield is the Director. He is not here yet but Bill  
22 Travers is the Deputy -- you all know Bill, I think.

23 Three project directorates or branches essentially,  
24 are the same. The Standardization Project Director is Dr.  
25 Miller. The Director -- and under that is all the EPRI



1 activity as well as the evolutionary design reviews, the  
2 ABWR, the SP-90, the CE System 80-Plus, as I said, the EPRI  
3 Standardization Requirements Document, the SBWR and  
4 Westinghouse's AP-600, and there may be some other tasks  
5 also included in there but those are the main ones.

6 An existing branch stays at the same -- License  
7 Renewal Project under John Craig.

8 There will be a new Project Directorate for  
9 Advanced Reactors under Bob Pierson and this will include  
10 review of the PIUS, CANDU, the liquid metal reactor, the  
11 MHTGR, and other fast reactor concepts.

12 In addition, we have Decommissioning, Non-Power  
13 Reactors and other items under Si Weiss.

14 The purpose of the organization was to really  
15 focus this division almost solely on reviews of safety  
16 issues and reactor applications. There is no power reactor  
17 operating reactor issues in this division.

18 I think what we'll see and what you'll see is the  
19 undivided attention of Denny Crutchfield, who has since come  
20 in, and he reports of course to Jim Partlow, who reports to  
21 me. The intent of this is to have some cleaner lines of  
22 authority and also as I said the undivided attention of this  
23 staff.

24 With regard -- yes?

25 MR. KINTNER: Could you tell us how many

1 professionals are in each one of those groups but  
2 particularly the ones at left bottom?

3 DR. MURLEY: Yes, I should mention they are also  
4 beefing up these branches, particularly Charlie's. I don't  
5 have the numbers in the new arrangement. Do you, Denny?

6 MR. CRUTCHFIELD: The total division is about 50.  
7 Charlie's project directorate I think is up to about 12 or  
8 13 now, which includes at least three PMs on EPRI and three  
9 on the ABWR. As CSAR becomes more active, we will put more  
10 project managers on that also.

11 DR. MURLEY: So in addition to the organization  
12 we're putting more people in, I'll put in whatever I need to  
13 to make sure that that lack of resources are not holdup  
14 here.

15 Now with regard to this meeting, the purpose of it  
16 is to get out the issues we can early, the fundamental  
17 issues that we see with passive plants.

18 Earlier this month the senior staff of NRR spent a  
19 full day reviewing the issues on the passive plant  
20 requirements document as we understand it. We had probably  
21 well over 500 man-years of safety review experience in that  
22 room for a day. I was there myself all day.

23 To give an idea of how we came out of that meeting,  
24 and what some of the issues are, what I'm going to show is  
25 our understanding of the safety systems and safety features

1 for the AP-600, Westinghouse's PWR.

2 I've broken it into some systems that have been  
3 removed from a standard PWR and the systems that have been  
4 added.

5 Safety grade emergency feedwater has been removed,  
6 high pressure injection, low pressure injection, safety  
7 grade RHR, safety grade emergency AC, continuous containment  
8 spray capability, emergency controlled room ventilation,  
9 safety grade containment cooling, standard heat sink. All  
10 of these have been removed and the staff when we pick up an  
11 application for a PWR we expect to see these things. That  
12 is not to say that they haven't been compensated for in some  
13 way by systems that have been added.

14 Our understanding of those are non-safety startup  
15 feedwater system, passive core linkup tanks, high pressure  
16 system safety grade depressurization -- which as we  
17 understand it is a very important system -- passive low  
18 pressure injection from a storage tank, non-safety grade  
19 RHR, passive high pressure RHR, non-safety diesel generators  
20 for AC power, non-safety 30-minute containment spray system,  
21 bottled air supply for the control room, non-safety  
22 containment cooling, external containment spray plus air  
23 cooling, larger operating margins, canned motor pumps  
24 therefore no seal leaks -- these are positive features, of  
25 course.

1           We are not sure about hydrogen igniters, whether  
2 they are in or out and storage tank inside containment.

3           MR. KINTNER: What do the brackets mean, for  
4 example --

5           DR. MURLEY: Brackets kind of mean that -- our  
6 understanding is that it's an analog to what was in the  
7 standard PWRs but they are non-safety grade or they are not  
8 up to the same standards that we normally expect to see.

9           Again, this as I said is not meant to be a  
10 definitive conclusion. It's what we understand from our  
11 review.

12           I'll get in a minute to the point I'm trying to  
13 make on this.

14           The same thing happened for the STWR. Over here  
15 is more of what we're used to seeing. Forced circulation in  
16 the vessel is -- there isn't any. High pressure core  
17 injection core spray has been removed. Low pressure core  
18 injection, core spray has been removed.

19           Reactor core, safety grade AC power, safety grade  
20 active containment cooling, active drywell spray, active  
21 standby liquid control systems being removed, standard heat  
22 sink and my understanding is, standby gap treatment.

23           Added are more reliable automatic depressurization,  
24 systems, -- coolant for low pressure, passive high pressure  
25 decay heat removal through isolation condensers, non-safety

1 diesel generators, passive drywell cooling, passive slicks,  
2 electric control rod drive, in addition to hydraulic control  
3 rod drive which was obviously a diverse feature, enhanced  
4 control rod drive water injection and larger operating  
5 margins.

6           Now, there's a point to all this, and that is this  
7 -- these are fundamentally different designs from what we're  
8 used to seeing and what we're used to reviewing, clearly new  
9 concepts with new safety philosophies. PWR seems to place  
10 very heavy reliance on a highly reliable depressurization  
11 system to function in an emergency in order to permit the  
12 gravity fed -- the passive systems -- the gravity fed  
13 emergency core cooling and natural circulation.

14           The BWR appears to us to place total reliance on  
15 natural circulation which, again, appears to reintroduce  
16 stability questions that we thought we resolved 40 years ago  
17 by relying on forced circulation. Neither plant, of course,  
18 intends to rely on safety grade AC electrical power systems  
19 to serve a safety function.

20           Now, it's not immediately obvious to the NRR staff  
21 whether these plants will be more safe or less safe than the  
22 evolutionary designs that we have come to understand. It's  
23 going to take a great deal of work to come to that  
24 conclusion. To judge the safety of these designs is going  
25 to require, we believe, a careful reliability analysis with

1 special emphasis on human errors that could defeat the  
2 passive safety systems.

3 I'm not talking about a PRA that uses just some  
4 normal handbook kinds of numbers for human errors; I'm  
5 talking about a reliability analysis of the depth and level  
6 that we have not seen before. It's probably going to have  
7 to be backed up with some experiments and tests that  
8 demonstrate the reliability of these systems. We do not  
9 have in mind yet, what those tests should be.

10 That's what we're going to look to EPRI and the  
11 industry for. We in NRR are going to have to rewrite our  
12 Standard Review Plan that has been developed over 20 years  
13 to guide the staff reviews. There's simply no way that I  
14 could send these designs down to the staff and ask them to  
15 review it, because it does not meet our Standard Review Plan  
16 and probably does not meet our regulations, for that matter.

17 So, it could be that that's the right thing to do;  
18 is to rewrite the rules and rewrite the plans. Maybe the  
19 safety philosophy needs to be rethought. We don't have any  
20 prejudged opinions on that, but my point here is that it's  
21 not going to be easy and it's not going to be quick; it's  
22 going to take years to do this.

23 It's going to require a lot of reliability  
24 analysis and, as I said, testing to demonstrate that  
25 reliability to us. We've got 1500 reactor years of

1 experience, hard, bitter experience on the evolutionary  
2 plants that has led to many design changes over the years.

3 These concepts, to some extent, rely on it, but  
4 largely are new concepts to us. So, at this meeting today,  
5 we want to identify the major issues that we see, try to get  
6 those focused on early in this process so that we can start  
7 coming to conclusions and start evolving this safety  
8 philosophy for passive plants that's going to have to be  
9 developed.

10 I guess now we'll move into the agenda, but I'll  
11 take questions, if there are any.

12 MR. KINTNER: I'd like to make a few comments.

13 DR. MURLEY: Yes, Ed.

14 MR. KINTNER: I'm Ed Kintner, Chairman of the  
15 Executive Steering Committee. I recently retired as  
16 Executive Vice President of GPU Nuclear Corporation.

17 I want to first say that John Taylor will be here  
18 shortly. He's in the air somewhere between Atlanta and  
19 Washington. He was awarded the George Washington Medal of  
20 the American Society of Mechanical Engineers and he felt he  
21 ought to be there in person to receive it, but he will be  
22 here shortly.

23 Secondly, I am encouraged by your remarks, Tom,  
24 It's clear that there's been a lot of homework done on the  
25 part of the staff to understand what we're trying to do. I

1 would say at the very beginning that I won't argue with a  
2 single word you've said.

3 It seems to me that that's a very, very sound  
4 analysis of what we're talking about in the passive plants.  
5 We, of course, have been working on these for years. I  
6 think some of us understand some of the safety issues that  
7 you have identified. We have tried to work with them, and  
8 before we're through, we're both going to have to be  
9 satisfied that what we've done is correct.

10 I would say in the very beginning that some of us  
11 have been around pressurized water reactors a long time and  
12 we're absolutely convinced that this is the way to safe  
13 reactors. We are not here in an confrontational mode with  
14 you.

15 We have a common interest in the safety of the  
16 next generation of reactors. We believe and hope that there  
17 will be such a next generation, that it's going to be more  
18 than one or ten or whatever, that at some future time, the  
19 nation is going to have to depend in a larger degree than it  
20 does today on reactors for energy.

21 If that's the case and we have these 400 reactors  
22 worldwide and 1400 years of reactor experience that you've  
23 identified, we have to build on that. We would be foolish -'  
24 - I think we would be foolish if we could not, out of all  
25 that experience, gain something better for the future.



1           That's what we're trying to do. In that sense, we  
2 are in common accord with you. The utilities are just as  
3 interested, I think, in the safety of reactors as the NRC,  
4 perhaps moreso. I mean, we had one bitter experience in GPU  
5 as you well know, TMI-2.

6           That's a real experience which all the utilities  
7 see and some protection to their property is one of the  
8 first things they're interested in. That doesn't mean that  
9 they're not interested in public safety. If for no other  
10 reason than the perception of safety in this country of all  
11 reactors, it's something which is preventing the full use of  
12 nuclear power today.

13           We have to, I think, develop another generation of  
14 reactors which is perceived to be safer and is, in fact,  
15 safer. Before we're through with this process, I think  
16 we're all going to be convinced we've done the right thing.  
17 It may not be exactly what we've come forward with.

18           It may not be exactly what you've worked with for  
19 the last 20 or 30 years in terms of pressurized water  
20 reactors, but I think it's going to be -- if we do this  
21 thing properly, it's going to be a better reactor design.

22           Better is like beauty; it's in the eyes of the  
23 beholder. I mean, some people think better is simply cheap,  
24 Some people think better is small. Some people think better  
25 is a different coolant. It's always better on the other

1 side of the fence and so forth.

2 We think that better does include the following  
3 ingredients: first, safer; second, more economical; easier  
4 to build and easier to maintain; third, easier to operate --  
5 when I say that, I think that means something different  
6 from present designs because anybody who has spent any time  
7 managing or working with the operation of the present  
8 reactors knows they are hell. They really are difficult.

9 We spend millions of dollars in simulators, in  
10 training and so forth, and operators still make mistakes. I  
11 think everybody agrees that's the biggest single factor we  
12 still face in these plants, operator error or mistake or  
13 maintenance error or mistake.

14 We can reduce that. We've gone a long way to  
15 reducing the overall safety factors. This is, in fact, a  
16 different way of looking at life. It's a different way of  
17 looking at life in the past which has been in this country -  
18 - and I think perhaps it's been extrapolated to the world --  
19 we'll build bigger plants, we'll drain more power out of  
20 them because that's the way to get it cheap, and then we  
21 have to add additional safety features to them in order to  
22 keep them safe and very soon we come up with very complex  
23 plants which are themselves a problem from that point of  
24 view.

25 There are other features we're trying to inculcate

1 into these new designs which have other than direct safety  
2 considerations. Let's take, for example, steam generator  
3 tubes. The steam generators have been the biggest single  
4 problem in FWRs in terms of the maintenance costs since the  
5 very beginning of the nuclear era.

6 We've said we want to fix that. We'd like to  
7 build steam generators which will, in fact, run for the life  
8 of the 60 plants we're talking about. To do that, we're  
9 going to reduce the temperatures and we're going to use  
10 better materials than we did in the past.

11 These things all are in the direction of safety.  
12 If you go back to the very first chapter of the requirements  
13 documents which apply to both evolutionary plants and the  
14 passive plants, we've said that there are two principles  
15 we're working for.

16 The first is simplicity. We're going to try our  
17 very best to make these plants. The second is margin.  
18 We're going to put engineering margin into them that was  
19 taken away over the years and we think that's the best way  
20 to make them safe.

21 We also think that's the best way to make them  
22 useful and better. I was last week in exhibition here in  
23 Washington at the National Air and Space Museum which has  
24 some examples of the work of Roland Emmett. He was the  
25 cartoonist in Punch. If you haven't seen that exhibit, it's

1 very much worthwhile.

2 There was one spaceship there with Roland Emmett's  
3 wit for the basis for his design which carries with it a  
4 cat. The cat is there in order to determine which way is  
5 gravity in space. I mean, you throw the cat out and  
6 whichever way he turns, that's down.

7 Now, that's a Emmett witticism, but it also  
8 indicates the kinds of things we are trying to build into  
9 these plants which do require a new thought process and  
10 which we hope you will wait until that thought process is  
11 worked out before coming to some final conclusions. What I  
12 am trying to suggest is, if you move decay heat by gravity -  
13 - and let me tell you that there are a lot of plants in the  
14 world that do that -- that then you can, in fact, be assured  
15 that gravity works.

16 You may worry about the check valves and the other  
17 valves that have to open and so forth, but you can be  
18 assured that gravity works and it works more certainly than  
19 four diesel engines. These are the kinds of considerations  
20 we've tried to put into these plants with the intention that  
21 they be safer.

22 We think that, in the end, you will agree with us,  
23 and if you don't, all the work we've done is for naught. ,  
24 If, in fact, the NRC doesn't come away from this feeling  
25 that these plants are, in fact, licensable -- and by that, I

1 mean safer -- then I think we have done our work in vain.

2 There are some factors which you mentioned on your  
3 charts which, I believe, need to be reemphasized. The first  
4 one is lower power densities. In the passive plants, we are  
5 about 60 power density of a PWR. So help me, that is a  
6 tremendous safety factor. Just getting that power density  
7 down.

8 In any accident, it reduces the Source Term  
9 equivalently. It reduces the heat release rates in decay  
10 that have be taken care of. It's a tremendous safety  
11 factor.

12 We've increased the inventory of water by, in  
13 BWRs, a factor of four. One of the things that we learned  
14 from TMI is that wherever there's water, the fuel is not  
15 damaged. If we can keep the core covered, that's the first  
16 and biggest step towards safety.

17 Therefore, we've got much more water in these  
18 designs by specification and that's going to help. There  
19 are a number of other places where, as we go along, these  
20 kinds of special steps towards safety are going to show.  
21 I'm not trying to convince you of anything today.

22 I think what you've said with regard to this is  
23 going to be a long process of hard technical debate between  
24 us to understand what we're up to, we will work with you  
25 absolutely mutually on this matter. We understand things

1 like stability of BWRs has got to be taken into  
2 consideration in great detail. It's one of the things we've  
3 identified for years working with GE and so on.

4 What I'm suggesting is that we do have these  
5 differences we have to look at differently. You've  
6 identified them very, very well and understand them well and  
7 that's a very encouraging thing. We will work with you to  
8 try to resolve them.

9 The idea that you have your minds open, that you  
10 can listen to us, we're going to mutually discuss them to  
11 some final conclusions is very encouraging. Thank you very  
12 much for coming with this array of talent and before these  
13 two days are over, I think we're going to understand what  
14 we're doing and what we have to do to resolve the remaining  
15 questions very, very well.

16 DR. MILLER: Okay, I'd like to move on into the  
17 next item on the agenda which will be a discussion of the  
18 process and the schedule for the passive plant reviews and  
19 industry needs and expectations. Did EPRI have anything  
20 that they would like to say?

21 MR. MARSTON: I'm Ted Marston from EPRI. Since  
22 the 6th of November, I've been the Director of the Advanced  
23 Reactors Department, so I'm clearly the new kid on the  
24 block. I would demonstrate and show our continuing and  
25 growing commitment to the Advanced Lightwater Reactor by

1 just briefly describing some of the expansion we placed in  
2 the Advanced Reactor Department, particularly in the  
3 advanced lightwater.

4 As I say, since the 6th of November, we've  
5 expanded the effort. Bill Layman is the Chief Technical  
6 Advisor now. He brings a wealth of experience, as is known  
7 to all of you. We have also added a matrix manager and his  
8 principal function is to go back within the nuclear power  
9 division and bring the technology that is being developed  
10 and the other efforts effectively and efficiently into the  
11 ALWR.

12 We also have instituted a strategic planning  
13 effort because, as you know, it takes tremendous resources  
14 to do this kind of thing, well beyond the capability of  
15 EPRI, so we have to develop a strategy for developing those  
16 resources currently and in the future.

17 Now, adding to Phase II<sup>r</sup> which is Bill Sugnet's  
18 effort, which is the primary area of discussion here, we've  
19 added two small, but, I think, very capable teams. One is  
20 related to the BWR and their principal effort is to look at  
21 conformance by the designer to the utility requirements  
22 document.

23 In that, we're adding Rich Ferk, who you probably ,  
24 know from the license renewal effort, and Robin Gaylor, who  
25 I think is our expert in instability. Instability or

1 stability has come up several times this morning.

2 In the pressurized water reactor side, we've added  
3 Chuck Welte, who you probably know through the steam  
4 generator effort and Ed Whittaker who is a loan in from the  
5 Tennessee Valley Authority. We're pleased to add an  
6 operations and design interface and this is George Bochwald  
7 who you will hear from later today. He's a utility loan in  
8 from Sinapco.

9 We have additional domestic utility loan-ins which  
10 will certainly augment the effort and bring clearly that  
11 utility perspective to our organization. In addition, we  
12 have several foreign utilities loan-ins. As you know, this  
13 is of great interest to utilities worldwide, so they bring a  
14 wealth of experience and a good perspective.

15 I welcome this meeting. I welcome your comments,  
16 Tom, and the committment that you've made. I think it's  
17 going to take a large committment from both sides of the  
18 house to get the job done. You clearly identified the key  
19 issues and that's one of our functions today and tomorrow,  
20 to get those key issues out so that we can get working on  
21 those.

22 I think we've got a story that will at least  
23 address many of the issues that you've raised. We have four'  
24 tasks that are clearly articulated in the NPOC plan. I'd  
25 like to just briefly go through those.



1           The first is to obtain the final SER on the  
2 passive plant ALWR utility requirements document and the  
3 date we've stated there -- or that's in the plan that NPOC  
4 has put together is February of 1992. That's a very  
5 ambitious schedule. We just want to say that we'll provide  
6 the commitments necessary to support our end of the bargain.

7  
8           Of course, all of the utility requirements  
9 activities are closely and appropriately controlled by the  
10 Utility Steering Committee. We want to make sure that we  
11 don't short-circuit that at all. It's necessary to have  
12 them leading the effort. We're really just providing the  
13 support for that.

14           The second effort is to assess the AP-600  
15 certification design conformance to the utility requirements  
16 documents. The date on that is June of 1992.

17           The third task is to assess the SBWR certification  
18 design conformance to the utility requirements document.  
19 That is, again, June of 1992, and finally to assess the  
20 passive ALWR first-of-a-kind engineering design for  
21 conformance to the utility requirements documents -- that's  
22 December of 1995, which goes well beyond the certification  
23 stage.

24           As I see it -- and I must say, I have a very naive  
25 perspective on this, having been on the job only three

1 weeks, but it looks like if we can accomplish four things at  
2 this meeting, it would be -- you have already identified  
3 several of those -- and that's to get those key issues out  
4 on the table and start working on them.

5 To establish the committment on both sides of the  
6 house on getting the job done in a timely manner, the  
7 industry has shown their intent to reopen the nuclear  
8 option, I think, by the NPOC plan and the actions that it's  
9 taken. We certainly want to increase communications and  
10 improve those and the sense of teamwork.

11 It has to be that kind of effort with ourselves  
12 and the vendors and also with the NRC, and, I think, to  
13 increase the degree of confidence that we have in each  
14 other.

15 I think the issues that you have laid on the table  
16 are substantive ones and you're going to put the industry at  
17 task on that. That's all I would like to say. I would just  
18 like to finally close with -- John was hoping to be here and  
19 I'm sure he would like to add a few comments of his own  
20 because he always has a lot to add, so I would like to, at  
21 some point, hold an item on the agenda for his comments.  
22 Thank you.

23 DR. MILLER: Bill, are you going to make some  
24 remarks now? Okay.

25 MR. SUGNET: My name is Bill Sugnet. I'm the EPRI

1 Program Manager for the ALWR program activity.

2 Charlie Miller introduced the meeting earlier and  
3 he gave you a general idea of the plans for today.

4 On this chart I have shown our proposed agenda for  
5 the next day and a half. As you can see, it includes open  
6 session up to late morning of today, which will include my  
7 discussion on process and schedule items and review of the  
8 ALWR passive plant requirements conformance compared to the  
9 15 certification issues that have been raised over the last  
10 several months by the NRC Staff.

11 Then we will propose to have a break and go into  
12 the closed session portions, where we will discuss some more  
13 of the detailed material contained in the ALWR passive plant  
14 requirements.

15 Charlie, we are certainly willing to be flexible  
16 with respect to the needs and desires of the Staff reviewers  
17 here today, so if you would like to suggest any changes in  
18 the plans or any further adjustments to the agenda, feel  
19 free to do so as we go along.

20 DR. MILLER: I guess what I'd like to do is be  
21 able to, Bill, have you complete a dialogue on what you feel  
22 that you would like to cover in an open forum, so that at  
23 such a time that we close the meeting, the remainder of the ,  
24 meeting will be in a closed forum.

25 MR. SUGNET: Yes.

1 DR. MILLER: So I am going to ask you to proceed  
2 at whatever pace, at whatever issues you want to cover in  
3 whatever depth and at the break, as you mentioned, we will  
4 close the meeting.

5 MR. SUGNET: Good.

6 DR. MILLER: If I could make a request while you  
7 are putting that slide up, there is an attendance list that  
8 is being passed around. I would like to ask everyone in  
9 attendance today to please sign that list.

10 MR. KINTNER: Are you going to talk about reasons  
11 for closure?

12 MR. SUGNET: Yes, I will. I have a chart, a few  
13 charts that cover that subject.

14 MR. RUMBLE: Do you want to pass out --

15 MR. SUGNET: Yes. The ALWR staff will be passing  
16 out copies of the presentation charts I am using for this  
17 portion of the presentation.

18 This chart states pretty simply what we would like  
19 to accomplish in this meeting, and that is to have a  
20 technical dialogue between the NRC Staff, technical  
21 reviewers and management and our program staff and  
22 contractors including our partners, the reactor vendors.

23 I think Tom Murley said it very well at the  
24 beginning of the meeting. We would like to get out early  
25 what the important issues are for the passive plants and

1 deal with them early so that we can have the most  
2 expeditious process in accomplishing this difficult task of  
3 joining the technical review of these rather innovative  
4 design concepts.

5 The main points that we want to cover in this  
6 meeting are listed on this chart. Some discussion of  
7 process and schedule related to the review -- the ALWR  
8 passive plant requirements document positions on the 15  
9 certification issues. Some PRA and passive plant systems  
10 insights regarding the utility requirements document for  
11 passive plants. This will be much along the lines of a  
12 further investigation of the chart that Tom Murley presented  
13 earlier, which is a comparison of how the passive plants  
14 compare with previously reviewed kinds of plants. A session  
15 on discussion of several important topics regarding passive  
16 plant systems, specifically the operations maintenance  
17 aspects, the treatment of non-safety systems and the  
18 reliability characteristics of the passive systems.

19 We want to talk about the containment performance  
20 characteristics of passive ALWRs, the work that has been  
21 done recently on the radionuclide source term and the  
22 subject of simplification of emergency plans.

23 We'll want to discuss the important requirements  
24 on the man-machine interface systems, and we will talk  
25 briefly on a number of the thermal hydraulic issues,

1     although I think many of those are more detailed than we  
2     want to get into in this meeting.

3             Those are the subject we plan to cover in today's  
4     presentations.

5             Charlie Miller mentioned earlier that we had  
6     requested a portion of this meeting to be closed. We have  
7     submitted the requirements documents as proprietary  
8     documents to NRC. These documents represent the investment  
9     of approximately 30 million dollars of industry resources to  
10    develop and constitute an important investment of industry  
11    resources. These have been supported by U.S. utilities and  
12    by international utility partners.

13            We have a number of potential additional financial  
14    participants who may contribute to future research. We  
15    think it is important that those people not be able to  
16    access freely that which has been supported by the U.S. and  
17    international utility participants to date, so for those  
18    reasons we have submitted the requirements documents on a  
19    proprietary basis and have asked for a portion of this  
20    meeting to be closed.

21            I wanted to note that Volume 1 of the ALWR  
22    requirements document, which contains a summary of the top  
23    tier requirements and most important, requirements and  
24    policies contained in the utility requirements document is a  
25    public document, so in that sense, although the very

1 detailed requirements are held proprietary, the essence of  
2 the ALWR program thrust, policies and requirements are  
3 available in a public document.

4 The NRC recently supplied us with a letter  
5 containing about four or five pages of pretty detailed  
6 discussion questions for this meeting. We think those are a  
7 very helpful starting point. The magnitude of the questions  
8 that were listed in that letter are probably more than we'll  
9 be able to take in one bite in this day and a half meeting.

10 We will try to touch on all the main points here.  
11 We will commit that we are going to provide a written  
12 response to these items within 60 days, so that anything we  
13 haven't touched on here will get covered and you'll get  
14 feedback pretty promptly on those areas.

15 We also think that probably as a result of this  
16 meeting we will want to identify technical areas that should  
17 be further pursued and schedule a series of follow-on  
18 technical meetings in topical areas that need to be pursued  
19 in more detail and we can do it in this forum.

20 Just a word on the utility requirements document,  
21 its meaning and its role. The utilities think that given  
22 now they have about three decades of operating experience  
23 with light water reactors that they have a very important  
24 experience base to bring back to future reactors to ensure  
25 their safe and reliable operation.

1           The utilities also realize that they have the  
2 principal safety responsibility for future nuclear reactors  
3 and for that reason they have taken it upon themselves to  
4 develop the utility requirements document, which is a  
5 statement of needs on the part of the user-owner-operator  
6 for what the basic elements of the design should be.

7           These are directed at achieving a safe and  
8 reliable design but are also a high level vehicle for  
9 establishing engineering requirements to resolve important  
10 regulatory and safety issues, so we are pleased that the  
11 Commission has chosen to utilize the passive plant  
12 requirements documents as a vehicle to resolve high level  
13 technical issues. We're anxious to join with you in  
14 discussion of these and to grapple with the tough issues to  
15 get them resolved quickly in the next year or so such that  
16 the course of review and certification of the passive plants  
17 can proceed more smoothly.

18           I wish that John Taylor were here to be saying  
19 this part of the message --

20           DR. MILLER: He's here.

21           MR. SUGNET: He is here! John, I think this might  
22 be a good point for you to make some remarks because I know  
23 you would want to have covered in your introductory material  
24 the Nuclear Power Oversight Committee Strategic Plan and the  
25 role that the requirements document plays in that plan, and



1 that's the material that I got to at this point.

2 Maybe it would be good for you just to add your  
3 introductory remarks.

4 MR. TAYLOR: Thank you very much, Bill. I must  
5 apologize for being late. Hard to get up here on time from  
6 Atlanta this morning.

7 As you know, just a couple of weeks ago the  
8 utilities under the auspices of the Nuclear Power Oversight  
9 Committee issued a strategic plan which has as its goal the  
10 achieving of an order for a new nuclear power plant by the  
11 middle of this decade, proceeding then with the  
12 construction, licensing of course and construction, which  
13 would lead to the initial expansion of the nuclear power  
14 generation in the country again by the turn of the century.

15 That plan has been organized in the form of what  
16 we call building blocks, which really are enabling  
17 conditions which would permit the goals of the plan to be  
18 successfully met.

19 Block 3 of the 14 building blocks is the  
20 successful completion and acceptance by NRC of the utility  
21 requirements for future advanced light water reactors. We  
22 believe very strongly this is a fundamental on which we  
23 should build the new generation.

24 First, it is a means by which the utilities who  
25 have now gained tremendous experience in operation and

1 maintenance of these plants can have a real say in the  
2 characteristics of the plants in the future. The  
3 requirements give guidance to the designers on what the  
4 owner-operator wants in a new plant.

5 Some fundamentals are elicited in those  
6 requirements. I think the first and foremost one is a  
7 greater level of simplicity -- a simpler plant to build, a  
8 simpler plant to operate and maintain.

9 Second, a high level of safety -- and I say  
10 "second" not because there is any priority there -- the  
11 priority, it goes the other way -- but we believe that  
12 simplicity in design and operation and maintenance is a  
13 contributor to safety. By means of the available measures  
14 of safety we are stipulating roughly a factor of 10  
15 improvement over the typical probabilistic risk assessment  
16 evaluations for present systems.

17 It is very important that these requirements be  
18 accepted by the Nuclear Regulatory Commission. Some of them  
19 are not safety issues. Some of them are not directly under  
20 NRC regulation but we are submitting all of them so the NRC  
21 can see what we are trying to accomplish and can give us the  
22 signal that they approve the direction we are taking.

23 Needless to say, on those issues that are -- that ,  
24 do bear on safety, and which are under the cognizance of  
25 NRC, it's of course vital that we achieve from NRC a signal

1 that these requirements are acceptable from a safety  
2 standpoint.

3 We would like to see the fundamental issues of  
4 safety in fact resolved through the review and approval of  
5 the utility requirements document, a generic resolution  
6 which then could provide the foundation for the specific  
7 approvals through the design certification process.

8 We are extremely pleased that the Nuclear  
9 Regulatory Commission has accepted the role of review and  
10 approval of this documentation, has devoted the resources  
11 and as I understand, even more resources are planned to be  
12 devoted to move ahead in a detailed review on the schedules  
13 which we are now firming up as a result of the strategic  
14 plan.

15 Thank you very much, Bill.

16 MR. SUGNET: Jack, can I have that?

17 MR. TAYLOR: Yes.

18 MR. SUGNET: Let me note that the chart in your  
19 handout shows the other building blocks in the NPOC  
20 strategic plan. The highlights indicate those items in bold  
21 are those which are related to licensing and regulation and  
22 Block No. 3, as John mentioned, is the ALWR utility  
23 requirements document.

24 MR. PARTLOW: Is that it on schedules?

25 MR. SUGNET: No, I have another chart at the end,

1 Jim, that I am going to get back to on schedules.

2 MR. PARTLOW: The GE-SBWR application date I have  
3 is different than the one you have. The last thing I had  
4 was August of '92.

5 MR. SUGNET: Let me ask Joe Quirk what his  
6 understanding is. I thought we'd taken these dates directly  
7 out of the NBOC plan but I may be mistaken.

8 MR. QUIRK: August of '92 is the correct  
9 application date.

10 MR. SUGNET: I stand corrected. August of '92 is  
11 correct.

12 MR. PARTLOW: Thank you.

13 MR. SUGNET: When we began the review of the  
14 utility requirements with NRC several years ago, there was a  
15 short NUREG document that was developed and issued called  
16 NUREG 1197 and in NUREG 1197 we tried to capture together  
17 with the regulatory staff the process by which these  
18 requirements would get reviewed and the kinds of findings  
19 that the Staff could make in the safety evaluation report  
20 for these reviews.

21 In the handout I have quoted a couple of excerpts  
22 from NUREG 1197 with respect to findings by the Staff in  
23 safety evaluation reports. The essential message is that we,  
24 would like to achieve a level of technical review and  
25 resolution such that the regulatory staff can say with

1 confidence that the requirements in the document, given that  
2 they are properly translated into a design in accordance  
3 with current practice in licensing, would develop a nuclear  
4 power plant design that meets NRC regulations.

5 Obviously this is not a formal licensing action  
6 and therefore this is simply a statement by the staff in a  
7 safety evaluation report. The formal license review and the  
8 formal licensing of the plant would be done under the  
9 follow-on certification program for the passive pressurized  
10 water and boiling water reactor applications.

11 A point I would like to reinforce is that it's  
12 important for the industry to get an understanding of the  
13 key points as early as we can, and therefore we would prefer  
14 to resolve issues where we can on the requirements document  
15 and make sure we have got those, the main course firmly  
16 nailed down on those issues with the details to be filled in  
17 in the design and the design review.

18 We would prefer to get as much acceptance as we  
19 can of the major issues at the requirements document level  
20 followed by an implementation of those requirements and a  
21 final review and approval in the certification activity.

22 The next two charts are an illustration of the  
23 issues that we see before us.

24 There are three principal sources that we have  
25 identified for important regulatory issues related to the

1 ALWR passive plant requirements review.

2 The first one is the list of 15 certification  
3 issues that were identified earlier in SECY 90.016. We are  
4 going to discuss today the applicability and the conformance  
5 to those issues and resolutions as part of the follow-on  
6 presentation..

7 There are also some issues that have remained open  
8 from the review of the evolutionary ALWR requirements. Many  
9 of those issues translate directly over into the passive  
10 plant requirements area, so that is another source of  
11 important subjects that we should get resolved early.

12 On my next chart I show, and it's a little more  
13 detailed in your handout, that in addition to those two sets  
14 of technical issues, we, the ALWR program and the utility  
15 steering committee together with Westinghouse, GE, and the  
16 Department of Energy have agreed to identify a common list  
17 of regulatory issues that we think are central design in  
18 order to get these on the table early and to have early  
19 discussions with NRC so that the design work that is being  
20 performed in the vendor shops preparing their applications  
21 for certification will be guided by the early feedback from  
22 our discussions with NRC on these issues.

23 We plan to identify jointly with the vendors these,  
24 issues on a list. The list will identify the title, a  
25 description of the issue including reference to the

1 applicable requirements and requirements document, a  
2 description of how these impact the design so the Staff can  
3 understand the need for early attention and resolution, and  
4 some indication of the date by which feedback is important  
5 in order to help guide the expenditure of resources in the  
6 design process that is leading to the certification  
7 applications.

8 This is our thought on the way to try to surface  
9 the important issues at an early date and of course we don't  
10 consider these to be closed lists. We consider these to be  
11 lists that we will continue to refine and add to or delete  
12 from as we go through the process of issue resolution.

13 DR. MURLEY: Bill, can I ask a point?

14 MR. SUGNET: Yes.

15 DR. MURLEY: Tom Murley. Is this thing on?

16 I would like to -- there is a technical issue that  
17 I guess surrounds many of these subsidiary issues and I want  
18 to speak to a point that Ed made today.

19 The technical issue has to do with human  
20 reliability.

21 We are going to, we have to review these plants in  
22 much, much greater detail with regard to human reliability  
23 than we did 30 years ago in the first plants. That is what ,  
24 experience has taught us.

25 We quite agree with Ed Kittner's point that

1 gravity is more reliable than full emergency diesels, but  
2 that is a little too simple, I think, because the people  
3 that maintain them and do surveillance on them are not  
4 necessarily any more reliable. If you defeat let's say by  
5 either poor maintenance or poor design or whatever, if you  
6 defeat a passive system relative to defeating an emergency  
7 diesel, it may not be as easy to overcome that failure as it  
8 is to overcome the failure of a diesel because you can  
9 always get a diesel generator started at some time but you  
10 may not be able to go into containment and fix the result of  
11 a human error that's defeated a passive system.

12 So it is in that sense that we are concerned -- I  
13 don't know if concerned is the right word -- but we are  
14 really going to look at these new designs because we're very  
15 sensitive about how sensitive these designs are to human  
16 errors because we see them happen every day.

17 To amplify my earlier remarks a bit, I think we  
18 are going to need a new level of reliability analysis,  
19 better than anything I have seen before, that convinces us  
20 that either these are forgiving with regard to the kinds of  
21 human errors we see every day, or they can be overcome  
22 somehow, the human mistakes can be overcome.

23 Now insofar as you have thought about that through,  
24 your discussions today or you can think we can frame some  
25 special discussions on that, we don't have our thoughts



1 totally together. I am just trying to give you an overview  
2 of a concern that we have behind some of these things.

3 MR. KINTNER: Thomas, can I respond to that, at  
4 least preliminarily?

5 I think there are two comments to be made with  
6 regard to it.

7 One of them is that we have feedwater systems and  
8 we have pumps and we have power supplies and we have spent a  
9 lot of time and effort on assuring their reliability. In  
10 some sense we have gone well beyond what your normal  
11 requirements are.

12 Those reliable systems, reliable because many of  
13 them needed to run the plant are still there -- the  
14 feedwater systems and so forth. The fact that they are not  
15 safety grade has some implications and that's got to be  
16 understood but it isn't that we are totally dependent on  
17 those systems. The passive systems are the final gate after  
18 everything else has failed up to that point in the whole  
19 chain of emergency controls.

20 That is one thing that I think has to be kept in  
21 mind. We are not just substituting a gravity-fed system for  
22 a diesel, electric-driven system. We have got a diesel  
23 electric driven system. It's not safety grade and it isn't  
24 duplicated four times but it is duplicated twice or three  
25 times and so forth.

1 I mean those are considerations that have to be  
2 made.

3 There is another point which is sort of an  
4 extrapolation of what you have said, which I think you  
5 probably are already thinking about, even in the present  
6 plants and one which I think is troubling with regard to the  
7 kind of comments I made in my opening remarks with regard to  
8 the implications of simplicity, implications of larger water  
9 inventories and so forth, which is that PRAs in the normal  
10 sense don't consider that.

11 PRA's say if I add another feedwater train then I  
12 get this much more safety. I add another one, then I get  
13 this much more safety. If you add a tenth, you get that  
14 much more safety, but you know and I know that isn't  
15 necessarily the case so the question of how do you consider  
16 control room or maintenance implications on operational  
17 safety in total is something which I think we only have some  
18 gut feelings about and maybe we are going to have to think a  
19 little bit more specifically about how do we think about  
20 that and calculate it when we are talking about safety  
21 features in a significantly simplified plant dependent on  
22 other things than the conventional safety systems that we  
23 are used to.

24 That is just an extrapolation of your comment.  
25 Some of your letters which you have written us imply that

1 and I don't have any immediate sense of how the hell you  
2 come to grips with it, but I am sure it's there. I am  
3 absolutely sure it's there.

4 MR. TAYLOR: Just a quick one. I certainly welcome  
5 that emphasis, Tom, that you have mentioned, to examine  
6 human reliability. Where we have the experience from the  
7 past we have seriously introduced features in the system  
8 that make the system more forgiving, put less burden on the  
9 operator, tolerate more error both in equipment and the  
10 human side.

11 We too are at a less experienced stage in some of  
12 the features of the passive system, so this kind of scrutiny  
13 can only be to the benefit and success of the effort.

14 We certainly welcome it. I know you can help us  
15 work our way through it.

16 MR. SUGNET: Tom, I'd like to add in response to  
17 that particular question I agree that our experience has  
18 taught us that the human element is very important and that  
19 is something we need to take to heart in the future designs  
20 and look very carefully at it.

21 To the extent that I understand completely what  
22 you have said, I think I disagree a little in that I don't  
23 think this is a different problem from one that we have  
24 faced before. We are probably getting more sophisticated  
25 based on experience in dealing with it.

1 I think it is the same problem for current plant  
2 design that we ought to look at these.

3 Based on what I have seen so far in the  
4 requirements and in the designs, these plants and systems  
5 are going to be simpler, such that the dependence on human  
6 action, number one, and the opportunity for human  
7 misoperation, maintenance error and so on, both will be less  
8 than they are in current plants.

9 I believe that when we get finished with this  
10 process, and it is going to take us a few years to bring it  
11 out in a detailed PRA, but I believe that when we finish we  
12 will all be satisfied that the sensitivity of these designs  
13 to failure to act on the part of humans or to misoperation,  
14 maintenance errors, that sort of thing, will be much less  
15 than current plants, so I feel pretty good about that  
16 element going in but I certainly agree with you it's one  
17 that we want to look at very carefully.

18 A second technical point that I wanted to touch  
19 on, in your earlier remarks you talked about reliance on  
20 natural circulation. I agree that that is an important  
21 subject. On the other hand, we have reliance on natural  
22 circulation now in the current plants. The pressurized  
23 water reactors rely on natural circulation through the  
24 primary loop for core heat removal in most transient events.

25 In the boiling water reactors the requirements for

1 the passive boiling water reactor include a much larger  
2 stability margin than the force-flow boiling water reactors  
3 do. I don't know if the Staff has noted that yet, because  
4 you haven't had much time to dig into these requirements  
5 documents, but you will find that the requirements on  
6 stability margin are considerably greater for the passive  
7 BWR.

8 The other thing I would point out is in the  
9 passive boiling water reactor you are in the natural  
10 circulation mode all the time, from zero power up to full  
11 power and therefore it is not possible to drop from a force-  
12 flow mode where you were very stable to a less stable  
13 naturally circulating mode. That possibility doesn't exist  
14 for the passive boiling water reactor.

15 In the natural circulation and stability area I  
16 think it is a point we want to scrutinize carefully but  
17 again I think we are going to find that it is in pretty good  
18 shape.

19 DR. MURLEY: I just have to respond to that. Here  
20 is where I think we may diverge.

21 I mean, sure, we rely on natural circulation, but  
22 you know some of us were sitting in the emergency response  
23 center in March of 1979 when TMI was going through it, and  
24 we weren't relying on natural circulation to keep that  
25 plant; we were glad there was a pump running in that

1       circumstance and that there was power.

2               What we're talking about is natural circulation  
3 during all conditions including really severe accident  
4 conditions where you have got masses of non-condensable  
5 gases.

6               I think it is just a little too glib to say that,  
7 well, it's just something we already rely on.

8               I think we are going to ask for a much higher  
9 standard of demonstration that natural circulation will  
10 handle things during really severe accidents that you can  
11 get into. That is what we are talking about.

12              MR. SUGNET: Tom, I think we have to be fair and  
13 talk about apples and apples. In these plants we are going  
14 to have pumps just like the pumps at TMI. They are going to  
15 be electrically driven, just like the pumps at TMI, no  
16 difference at all.

17              The reactor circulating pumps at TMI were non-  
18 safety systems. They were powered by a non-safety power  
19 supply. We are going to be in exactly the same situation in  
20 these plants.

21              The last chart that I have, and I think this is a  
22 good lead-in for any comments that the Staff would like to  
23 make on this subject, in our discussions with the project  
24 managers showing this chart, our understanding of the Staff  
25 plans for the review schedules for the ALWR passive plant

1 requirements document, those include an issue by the end of  
2 the year of request for additional information based on your  
3 review to date of the requirements documents, responses on  
4 our part by March of this year with draft safety evaluation  
5 reports then issued in the June time frame, a period of  
6 approximately six months for issue resolution after the  
7 draft safety evaluation reports are issued which then would  
8 allow the issuance of a final safety evaluation report in  
9 February of '92.

10 This schedule is compatible with the needs for  
11 feedback and submittal of the passive plant detailed  
12 designed for certification, so we are pleased that the Staff  
13 has established this pretty aggressive schedule.

14 At this point I would like to ask Charlie Miller  
15 and any of the other members of the Staff to make any  
16 comments that you would like to on the issue of the process  
17 or the schedule for the requirements document review.

18 One of the items that I would be interested in is  
19 when we last talked you were doing internal scheduling of  
20 your technical resources to make sure that it was compatible  
21 with this overall schedule and I wonder if that has been  
22 completed and if it appears to match.

23 DR. MILLER: I guess the comment that I would like,  
24 to make, Bill, is that the final date for the SER or  
25 thereabouts is a schedule that, you know, we are

1 aggressively trying to achieve.

2           Whether or not we hit all these intermediate  
3 milestones at exactly the same time that has been portrayed  
4 there is another question. I think what we are trying to do  
5 and Dr. Murley has committed to do is to put the necessary  
6 resources on it so that we can continue to move at a rapid  
7 pace.

8           In that context the information that I have  
9 already sent to Ed is our first step at what I would call a  
10 set of RAI type of materials so that as we uncover  
11 information and as we uncover questions we can get that  
12 information to you in a rapid fashion.

13           I can't resist, however, making the comment that I  
14 think at the time that the original schedules were sort of  
15 drawn and the Commission papers were written it was prior to  
16 the formal submittal of the rollup document for the  
17 evolutionary and the passive plant submittal. It goes  
18 without saying that the proprietary treatment of that  
19 information causes a little bit more, a lot more complex  
20 process to have to take place, especially down the road when  
21 we start writing back and forth to each other.

22           Now I also have to say that that information and  
23 the request is being evaluated by the NRC and we hope to get  
24 a timely resolution of that issue. I think that is going to  
25 be tantamount to trying to achieve the schedules that



1 everyone is shooting for.

2 In summary, we are going to do our best to  
3 continue the dialogue and have an aggressive review. A lot  
4 of issues that were brought up earlier by Dr. Murley  
5 especially concerning experimental programs and testing are  
6 going to intertwine with what we are doing here.

7 The Commission has made the EPRI passive  
8 requirements the vehicle for trying to resolve major issues  
9 generically.

10 However, the underlying theme in resolving those  
11 issues lies with a lot of the programs that the vendors  
12 themselves are conducting to be able to bear out the  
13 principals that we're going to be evaluating. So, I think  
14 we have to keep that in mind in discussing schedules. I  
15 don't think it's as simple a matter of being able to say  
16 that we'll look at the material, we'll pass judgment on the  
17 material and we'll close the books on the material.

18 MR. KINTNER: I'd like to comment on that too.  
19 John may have a different view; but from my perspective, the  
20 important point is to get the effort underway and put the  
21 kinds of resources on that are required to resolve these  
22 sorts of issues. I mean, we really have to think, and  
23 that's what I tried to say earlier, in a broader sense, and  
24 we're just licensing one plant. We're trying to set a  
25 safety pattern, a regulatory pattern for hopefully a large

1 number of plants for a long time. Therefore, it's important  
2 for the national program that's laid out by the NPOC  
3 Strategic Committee and hopefully by the rest of us, that  
4 these dates be met to the maximum practical degree.

5 But there is one thing that we have said from the  
6 beginning and we said this with the evolutionary plants too,  
7 although I think we're past that; but it's particularly with  
8 the kinds of issues that Tom has raised and has talked to up  
9 to this point. We do not wish to bypass them or try to  
10 bypass them with arbitrary decisions. We have to get the  
11 technical consensus, the realities and take the time to do  
12 that and do that thoroughly.

13 I think that these kinds of dates and schedules  
14 and so forth are reasonable to do that if we come to grips  
15 with the issues and -- and work with the intent of settling  
16 them, but the schedules -- John may disagree, but I -- from  
17 my perspective, the schedule is secondary to getting it  
18 right. We don't want to work these out with a gun at your  
19 head or a gun at our head, we want to get them correct --  
20 technically correct.

21 DR. MILLER: Getting it right is what's driving  
22 us.

23 MR. KINTNER: Is what?

24 DR. MILLER: Getting right is our mission.

25 MR. KINTNER: Right.

1 MR. THADANI: Ashok Thadani. I'd like to make a  
2 comment on the issue of human factors and potential for  
3 maintenance type errors. I think the thrust of most of the  
4 safety systems are inside containment. So, in fact, if  
5 there are maintenance-type errors, it may be very difficult  
6 to rectify the situation.

7 The response that you get was that we do have non-  
8 safety systems which can overcome those types of problems.

9 Subsequently, on the issue of natural circulation  
10 was raised, again, Bill Sugnet came back and said, you know,  
11 there are non-safety systems there which can overcome  
12 potential problems from natural circulation. So, it seems  
13 to me that, judgmentally or otherwise, you're placing a  
14 great deal of reliance on these non-safety systems; and thus  
15 their reliability becomes very critical. That would be an  
16 issue that we would be paying very close attention to.

17 MR. KINTNER: I think that we are not saying that  
18 is not an issue, only don't -- don't proceed -- we don't  
19 think you should proceed from the sense that if a system is  
20 not safety-grade you can't count on it. It's got some  
21 probability of success, even if it's non-safety grade.

22 DR. MILLER: Bill, are you through with your  
23 presentation?

24 MR. TROTTER: No, we have one other topic which  
25 we'd like to speak to in this session. John Trotter is

1 going to review the 15 certification issues and give a  
2 summary view of where we stand with respect to the  
3 requirements document and its conformance with the  
4 resolutions which he used as part of the SECY 90-016  
5 process.

6 DR. MURLEY: You want that as part of the open  
7 discussion?

8 MR. SUGNET: Yes.

9 MR. TROTTER: My name is John Trotter and I work  
10 with the ALWR program and am responsible for the regulatory  
11 interface. Over the last 18 months or so there was  
12 considerable discussion, both by the staff -- the staff and  
13 commission -- by the staff and the ACRS and with the  
14 industry, over a set of issues which the staff determined to  
15 be policy and needing a commission decision and these became  
16 called the certification issues the evolutionary plant  
17 certification issues, or very often just abbreviated to the  
18 SECY 90-016 issues.

19 We're going to talk about these issues in 2 forums  
20 this morning. The first forum will be this summary, which  
21 will very briefly identify which of those issues -- which of  
22 those certification issues the passive plant meets in an  
23 essentially identical manner to earlier discussions and  
24 those few for which we believe the passive plant features  
25 warrant some continued work.

1           If we just go down the, by now famous list, it's  
2 clear that the first issue was the light water reactor  
3 public safety goal. It is clear that the requirements and  
4 the designs that are coming in from the designers meet the  
5 Commission's safety goal policy. Indeed they are -- they  
6 meet the more stringent industry goals.

7           For ATWS, the passive plants meet the requirements  
8 -- or meet the Commission position as stated in the SRN and  
9 SECY, which allow for either diverse scram or ride out  
10 capability.

11           Mid-loop operation, which is PWR issue, again, the  
12 passive plants will meet those requirements in essentially  
13 the same manner as the evolutionary plants. There will be  
14 some -- there is some difference in the terminology because  
15 in the passive plants, the pumped decay heat removal system  
16 is a non-safety system, but the engineering requirements  
17 that are on there to minimize the occurrence or to decrease  
18 the frequency of operating at midloop operation and minimize  
19 the potential problems of operating at midloop operation,  
20 those engineering requirements are being applied to that  
21 non-safety system -- things such as keeping the vortexes out  
22 of section lines, direction of section lines, that sort of  
23 thing. So we are applying them to this non-safety system. ,

24           DR. MURLEY: How about things like the layout of  
25 the plant and the steam generator, so that you don't have to

1 get into this mode very much if at all; is that possible --  
2 thinking that broadly?

3 MR. TROTTER: Yes, we have thought that and that's  
4 -- that was, in fact, the first -- the first line of the  
5 attack is to minimize the amount of time one would have to  
6 spend there during a refueling. We have not been able to  
7 come up with a scheme or a lay-out which eliminates it  
8 entirely; but the passive plant -- we believe the passive  
9 plant designs require much less time at -- at levels where  
10 the rack -- is not full. But we have not been able to  
11 eliminate it entirely.

12 MR. THADANI: Ashok Thadani, again. I guess I may  
13 have misread some of the documentation you sent us then. I  
14 sort of got the impressions that that layout had been  
15 modified sufficient that while you have not eliminated this  
16 problem, that the range that's available to the operators,  
17 in terms of being able -- having to control the level, is  
18 much larger and the likelihood of the operator making a  
19 mistake due to uncertainties in instrumentation and so on,  
20 is essentially eliminated. Maybe I misread. That's the  
21 impression I got.

22 MR. TROTTER: I think with the evolutionary  
23 designs, we made significant improvements over current  
24 designs and with the passive designs, that margin is even  
25 greater -- has been engineered to be even greater. But

1 nonethless, we are engineering the -- the de-pumped decay  
2 heat removal systems to be highly reliable, as were the  
3 safety grade RHR systems in the evolutionary plant.

4 Is that --

5 For the station blackout certification issue, we  
6 believe the passive plants overwhelm the concern that was  
7 expressed in that certification issue by being able to  
8 withstand a minimum of 72 hours without bulk AC power and in  
9 addition. the requirements do require 2 onsite non-safety AC  
10 power sources.

11 MR. THADANI: Let me ask you a question. Pardon  
12 me for not raising this issue when you were talking about  
13 ATWS, and in your notes I noticed you said you need to have  
14 some further discussion with the staff in terms of what is  
15 meant by riding out an ATWS.

16 MR. TROTTER: Well, --

17 MR. THADANI: Is -- let me ask you the question.  
18 Is -- for the passive reactors, are you analyzing ATWS  
19 events, do you have analyses as to what the response would  
20 be under different states of the reactor?

21 MR. TROTTER: Yes. Yes.

22 MR. THADANI: Okay. Good.

23 MR. TROTTER: We do the same analysis. And -- and,  
24 the comment that is in the handout, I guess I wouldn't --  
25 certainly wouldn't want to stress that at all. We -- the

1 discussions are still ongoing and the staff, in our  
2 interaction has been -- has been drawn up with completing  
3 some SERs that are still pending and we just simply haven't  
4 gotten around to, and it's not the -- defining what is  
5 right, but rather defining the regulatory use of the term  
6 "prefer."

7 I consider it a pretty straight-forward matter  
8 when there are -- when we have time and resources to do that  
9 and I expect to do that in the next few weeks, if not -- if  
10 not sooner. So, I -- I think we are in agreement on that --  
11 I am not aware of any particular difference between us and  
12 the staff.

13 Fire protection. Again, the words in the  
14 requirements are identical from passive plants and  
15 evolutionary plants. We do have complete separation of  
16 safety divisions. The recent staff question that came in  
17 with the discussion questions, specifically pointed that out  
18 and we went back and looked at the requirements, and we  
19 believe there may be some -- we are going to reexamine,  
20 specifically, the requirements we have on preventing smoke -  
21 - smoke and fume migration to both -- both safety divisions.

22 It may not -- because we took the -- there was a  
23 lot of rearranging as we took the -- some of the systems  
24 into non-safety systems. We're not certain that our words  
25 were as clear as they should be.



1           But clearly our intention is to maintain the same  
2 separation of safety divisions, including their  
3 environmental controls, as was part of the evolutionary  
4 plant discussion and we believe it is the right way to go.

5           On intersystem LOCA again we meet the SRM and SECY  
6 requirement to have higher pressure, connected systems and  
7 special features for isolation valves.

8           Again, we don't think there's any difference and  
9 our requirements again are similar between the two volumes  
10 of the requirements document.

11           MR. THADANI: Are you -- Mr. Thadani -- the  
12 systems connected to the reactor coolant system, are the all  
13 going to be designed to some high pressure level or if not  
14 how far is the passive design going to go in terms of  
15 potential for intersystem LOCA that might exist otherwise?

16           MR. SUGNET: I think that we can get into the  
17 specifics of that in the next session, but the general  
18 answer is we are going to follow the same principles that we  
19 proposed in the evolutionary plant, which is to design a  
20 connecting system to pressure such that if they were exposed  
21 the full system pressure wouldn't be expected to rupture.

22           MR. TROTTER: The next issue is the core concrete  
23 interaction, debris coolability. Once again our  
24 requirements and criteria are the same for evolutionary and  
25 passive plants.

1           The high pressure melt -- high pressure core melt  
2           ejection certification issue, the passive plant we believe  
3           is overwhelming this with the approach identified in the  
4           SECY and SRM with the depressurization system. The  
5           depressurization system in the passive plants is much more  
6           reliable, it's much more robust.

7           Equipment survivability -- which is the last of  
8           these issues. We believe we simply meet the SECY and SRM.  
9           We agree with the SRM as it points out that we are not, this  
10          equipment need not be subject to 50.49, Appendix B, ncr 10  
11          CFR, Appendix A redundancy and diversity requirements.

12          We have one issue -- I'm sorry -- we still have  
13          two more where we meet the requirements.

14          The first of these is OBE/SSE, the SECY and SRM.  
15          We said that the goal here is to not have the OBE control  
16          the design. We endorsed that. We are in the process of  
17          very active discussion with the Staff on how to do that and  
18          we will be discussing later on proposed changes to our  
19          submittal which we believe go in that direction in a much  
20          clearer, much more correct manner and which we believe the  
21          Staff will be able to support because it goes along with the  
22          direction that the NRC are themselves going.

23          Inservice testing of pumps and valves -- again our  
24          requirements are identical from one requirement to the  
25          other. There are obviously fewer pumps. As a matter of

1 fact, there are no safety grade pumps. We are requiring  
2 adherence to industry standards for pumps and valves and did  
3 in the evolutionary requirements and will now in the passive  
4 requirements.

5 There is one issue which we feel is not applicable  
6 to the passive design and that is the certification issue of  
7 the ABWR containment vent design. The utility steering  
8 committee feels very strongly that we should require that  
9 any accident sequence which creates the need for a vent be  
10 addressed by other means. Therefore we consider this not  
11 applicable to the passive plant design.

12 MR. RICHARDSON: May I ask a question, please?

13 I would like to back up to 15, inservice testing  
14 of pumps and valves. I just want to make sure that a point  
15 hasn't been missed and that is in the statement where you  
16 say in fact passive plants have no safety related pumps but  
17 the requirements continue to endorse latest industry  
18 standards.

19 One of the points that we were trying to make  
20 regarding reliability of pumps and valves as related to  
21 industry standards is that there is some dissatisfaction  
22 with the industry standards as they exist today. There is a  
23 need to improve those standards as evidenced by Generic  
24 Letter 89.10 on motor operated valves that more work has to  
25 be done to assure reliability of these values, that the

1 industry standards in our opinion are not sufficient.

2 That was the point that we would hope to make to  
3 you.

4 MR. TROTTER: We are intending to incorporate the  
5 latest of the research and industry developments on both  
6 pump reliability and valve reliability and valve testing and  
7 pump testing.

8 I don't want to imply that we are freezing our  
9 search for better, more reliable components based on the  
10 state-of-the-art 1.1.90 --

11 MR. RICHARDSON: Or in the testing of those too.

12 MR. TROTTER: Or in the testing of those.

13 MR. THADANI: On the vent viewgraph that you had  
14 just before this one, the ABWR vent, I recall reading in  
15 your report that venting would be included in procedures as  
16 part of accident management, I think it was.

17 Can you kind of expand on that between the  
18 statement there and what you've said here?

19 MR. TROTTER: Do we want to cover that now or in  
20 the closed section?

21 MR. SUGNET: Yes, I think it would be better to  
22 cover that and come back. We are going to have to cover the  
23 same ground again in the next session in a little more  
24 detail.

25 MR. TROTTER: Yes, there will be considerably more

1 detail there.

2 There are three of the 15 certification issues  
3 which we believe merit passive plant specific consideration.

4 The first of these is source term, where we  
5 believe additional progress can be made toward implementing  
6 a physically based source term for both plant design and  
7 emergency planning. We will have an extensive discussion of  
8 that, both some today and even more tomorrow. Dave Leaver  
9 will present considerable detail on that.

10 The next issue, which proves how brave I am, is to  
11 bring up the hydrogen word and this was a subject of  
12 considerable discussion and we believe that in the interest  
13 of pursuing the right, correct answer, perhaps a bit more  
14 work can be done. The passive plant has certain features  
15 which the evolutionary plants did not do which we believe  
16 limit the extent of hydrogen generation and to a degree  
17 limit the peak concentration.

18 So we have discussed, have broached the subject of  
19 continuing some amount of analysis to further that  
20 discussion.

21 The last issue is containment performance where we  
22 have been struggling with this for, well, almost two years  
23 to come up with -- to respond to Dr. Murley's challenge to  
24 come up with a better containment performance criteria.  
25 What we are going to describe in more detail is a systematic

1 identification of potential challenges to containment  
2 integrity with probabilistic and deterministic requirements  
3 to address each challenge.

4 This is a -- we feel this is the approach that  
5 makes engineering sense and it makes -- we believe it should  
6 be able to make regulatory sense as well.

7 Like I say, Dave Leaver will go into considerable  
8 detail on that tomorrow I believe -- tomorrow morning.

9 That concludes my summary remarks on the  
10 certification issues as they apply to the passive plant  
11 requirements.

12 MR. SUGNET: Charlie, at this point it might be  
13 useful to allow the Staff representatives here to raise any  
14 other general questions they might have on the material that  
15 was presented in the morning session.

16 DR. MILLER: Does anyone from the Staff wish to  
17 make any further remarks or ask any questions at this point?

18 I take it then, EPRI, you are finished with your  
19 presentation for this portion?

20 MR. TAYLOR: A final remark on the issue of  
21 closing the rest of the meeting.

22 As you know, EPRI has submitted an application for  
23 withholding proprietary information associated with the ,  
24 requirements.

25 We have also I think in our material that has been

1 sent to you have made it clear that we think it is important  
2 to preserve the public's interest in adequate access to  
3 information about the ALWR design requirements and want to  
4 work out a scheme that will preserve that interest.

5 First of all, of course volume 1, which is a  
6 summary of the requirements, has unrestricted access to the  
7 public, and we're in addition willing to consider possible  
8 means of allowing interested persons representing the public  
9 interest to have access to volumes two and three of the  
10 final requirements document.

11 Even outside the context of a formal proceeding  
12 EPRI would be willing to consider procedures to allow  
13 interested non-commercial activities to inspect volumes two  
14 and three based upon execution of the confidentiality  
15 agreements and that sort of thing.

16 Charlie, we recognize the potential for added  
17 administrative burden as we go down this path and we want to  
18 work with you to minimize the Staff burden in reviewing the  
19 final requirements document while preserving our interest in  
20 the licensability of this property that's been paid for by  
21 the utilities.

22 For example, we would be willing to relinquish in  
23 advance our claim of proprietary protection as to that  
24 material from the final requirements document which the NRC  
25 Staff includes in its safety evaluation report. This would

1 eliminate the need for the NRC Staff to prepare both  
2 proprietary and non-proprietary version of the SER.

3 Thank you.

4 DR. MILLER: Any other comments from any members  
5 of NRC or EPRI?

6 All right, at this time then I would propose that  
7 we take about a fifteen minute or twenty minute break.

8 Let's reconvene at 10:30. At that point in time  
9 the meeting will be closed to the public.

10 Thank you.

11 [Recess.]

12 [Whereupon, at 10:30 a.m., the meeting proceeded  
13 in closed session.]

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REPORTER'S CERTIFICATE

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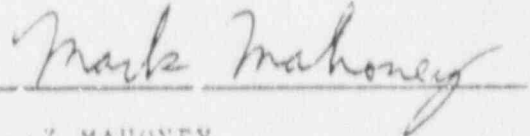
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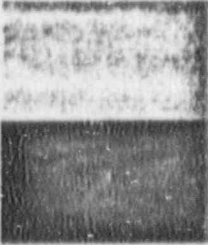
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MARK MAHONEY  
Official Reporter  
Riley & Associates, Ltd.

**EPRI**



**ALWR  
PASSIVE PLANT  
UTILITY REQUIREMENTS  
DOCUMENT  
REGULATORY ISSUES**

Open Session  
November 29, 1990  
8:30 - 10:30 a.m.

ALWR Utility Steering Committee Meeting  
with NRC Staff  
Bethesda, Maryland

## Speaker

## Thursday, November 29

open	8:30	Introduction -Utility Steering Committee/EPRI	E. Kintner J. Taylor T. Marston
	9:00	Introduction -NRC Overview	NRC
open	9:30	Process & Schedule for Passive Plants - Industry Needs and Expectations.	W. Sugnet
		Process & Schedule for Passive Plants - NRC Views, Plans and Constraints	NRC
open	10:15	Certification Issues (15) -- Overview	J. Trotter
		Break	
closed	10:30	Certification Issues - - Severe Accident - Other	D. Leaver J. Trotter
	12:15	Lunch	
closed	1:15	PRA Insights for ALWR Passive Plant Utility Requirements Document	S. Lewis
closed	2:30	Passive Plant Systems -- Topical Discussion	G. Bockhold J. Trotter W. Sugnet All
	5:00	Adjourn	

## Friday, November 30

closed	8:30	ALWR Issues - Containment Performance, Source Term and Emergency Planning	D. Leaver
closed	10:30	ALWR Issues - MMIS	E. Rumble
	12:00	Lunch	
closed	1:00	ALWR Issues - Thermal Hydraulics	W. Sugnet / W / GE
closed	1:45	Open Discussion	All
closed	2:45	Meeting Summary and Conclusions	NRC/USC
	3:00	Adjourn	

Utility/EPRI

**Process and Schedule for  
Review of  
ALWR Passive Plant  
Utility Requirements Document**

W. R. Sugnet

*Advanced LWR Program*

NRC 1190 01.1

Utility/EPRI

**Introduction**

**Purpose**

Provide an opportunity for NRC Staff management and Utility/EPRI ALWP program management to discuss the technical topics important to NRC review of the ALWR Passive Plant Utility Requirements Document

*Advanced LWR Program*

NRC 1190 01.2

## Introduction

### Main Agenda Topics:

- Process and schedule for review
- ALWR positions on the 15 issues
- PRA insights regarding the ALWR Passive Plant Utility Requirements
- Passive Plant Systems – Topical Discussion
- Containment Performance / Source Term / Emergency Plan Simplification
- Man-Machine Interface Systems
- Thermal/hydraulic issues

*Advanced LWR Program*

MRC 11802-1-3

## Introduction

### Requirements Document Proprietary Content

- Volume I of the Requirements Document, which contains the Top-level requirements, is a public document
- EPRI has submitted Requirements Document Volumes II and III as proprietary, requesting withholding from public disclosure
- Thus the part of this meeting that deals with the detailed requirements in Volumes II and III will be a closed session

*Advanced LWR Program*

MRC 11802-1-4

## Introduction

### NRC Discussion Questions

- Helpful starting point for stimulating discussion
- Can't cover all at this meeting
- Discuss the main points here
- Provide thorough written response to all in 60 days
- Address some of the more detailed questions in written response and followup technical meetings as appropriate

## Introduction

### Role of the Requirements Document

- Utilities have sponsored the development of this Requirements Document to represent the owner / operator needs in future LWR designs
- Utilities are encouraged that NRC has assigned an important lead role for the Requirements Document as the vehicle for resolution of regulatory technical issues for Passive ALWR designs

Utility/EPRI

## Process and Schedule for Review of Passive Plants Requirements

- Overall Plan
- Issue Identification and Resolution
- Schedule Needs

*Advanced LWR Program*

NRC 11/90/117

**November 29 and 30**

### **Passive Plant Discussion**

- Objective is to identify the issues, concerns and questions which the EPRI/ALWR Requirements will have to address in order to get a clear and useful Safety Evaluation Report
  - Limited discussion of individual designs
  - Limited discussion of matters beyond certification
- Second in a series
  - First after submittal of Volume III, Passive Plant Requirements
  - First after major NRC internal discussions
- Discussion will attempt to cover many but not all of the "Discussion Questions" sent on November 20
  - Question very specific to AP600/SBWR designs will be answered to the degree that they illustrate compliance with Utility Requirements
  - Some questions require considerable additional review and discussion. We will reply to those as soon as possible. This includes some, such as seismic design, which have already been identified as subjects of future meetings.

Utility/EPRI

## Overall Plan and Schedule

Requirements are "Block 3" in the Nuclear Power Oversight Committee (NPOC) Strategic Plan

Review of Requirements is Prerequisite to Certification Submittals for Passive Plants

AP600 SSAR submittal June 1992

SBWR SSAR submittal March 1993

Requires Completion of Staff Safety Evaluation Report in February 1992

*Advanced LWR Program*

NRC 1190-018

## NPOC Strategic Plan for Building Nuclear Power Plants

- Block 1 Current Nuclear Plant Performance
- Block 2 Predictable Licensing and Stable Regulation**
- Block 3 *ALWR Utility Requirements*
- Block 4 NRC Design Certification**
- Block 5 Siting**
- Block 6 First-of-a-Kind Engineering
- Block 7 Enhanced Standardization Beyond Design
- Block 8 Enhanced Public Acceptance
- Block 9 Clarification of Ownership and Financing
- Block 10 State Economic Regulatory Issues
- Block 11 High-Level Radioactive Waste**
- Block 12 Low-Level Radioactive Waste**
- Block 13 Adequate, Economic Fuel Supply
- Block 14 Enhanced Governmental Support



Utility/EPRI

### Goal for the Review of Passive Plants Requirements

Review goal and guidance from NUREG-1197 still applicable

Resolution of issues based on the functional requirements

Where possible, do not wait for specific application except  
for confirmation

Certification applicants will compare their designs to the ALWR  
Requirements

Combination of Requirements SER and the Certification  
Rulemaking should allow practical resolution of new issues  
without requiring changes to individual regulations and  
guidance as prerequisites

*Advanced LWR Program*

MRC 1190-11-9

#### Specific Guidance From NUREG-1197 on the Meaning of the NRC SER:

"The staff has reviewed the Requirements Document and finds that it contains the necessary requirements that, if properly translated into a design in accordance with current practice and licensing guidance, it will generate a nuclear power plant design which will have all the attributes required by NRC regulations to assure there is no undue risk to the public health and safety as required by the regulations."

#### Three Tests for Staff Review

- Is the specification complete?
- Is it clearly stated?
- If the requirement is to be implemented in a design, using the Engineering Rationale to guide the designer, will the NRC criteria (regulations) be met? An alternate to this test would be: "Can the NRC criteria (regulations) be met?"

## Goal for the Review of Passive Plants Requirements

Review goal and guidance from NUREG-1197 still applicable

Resolution of issues based on the functional requirements

Where possible, do not wait for specific application except for confirmation

Certification applicants will compare their designs to the ALWR Requirements

Combination of Requirements SER and the Certification Rulemaking should allow practical resolution of new issues without requiring changes to individual regulations and guidance as prerequisites

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NRC 1197-11.9

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## Technical Issue Identification and Resolution

15 Evolutionary Plant Certification Issues

See later summary and discussion

Most of the open, non-policy issues from the  
Evolutionary Plant draft SERs are applicable to the  
Passive Plants

ALWR will pursue closure of those issues that are  
common between the Evolutionary and Passive  
Plants

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NRC 1190 91-10

### **Certification Issues**

1. Evolutionary LWR Public Safety Goal
2. Source Term
3. ATWS
4. Mid-loop Operation
5. Station Blackout
6. Fire Protection
7. Intersystem LOCA
8. Hydrogen Generation and Control
9. Core-Concrete Interaction and Debris Cooling
10. High-pressure Core Melt Ejection
11. Containment Performance
12. ABWR Containment Vent Design
13. Equipment Survivability
14. OBE/SSE
15. Inservice Testing of Pumps and Valves

### **Example Issues common to EP and PP**

Simplification of Post Accident Sampling Systems  
Equipment Seismic Qualification by Experience  
Tornado Design  
Reactor Vessel Level Instrumentation

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## Technical Issues (continued)

EPRI/ALWR, Westinghouse, General Electric and the Department of Energy have agreed to prepare a common list of "Regulatory Issues Central to Design"

Work is in progress

Each Issue will be identified with:

- Title
- Description - including reference to Requirements
- Impact on Design
- Need date to support design

NRC 1490-01-11

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### Preliminary List of Regulatory Issue Central to Design

- OBE and Analysis Methods
- Technical Basis for Emergency Planning Criteria
- Source Term
- Hydrogen Control
- Dedicated Containment Vent Penetration
- Safe Shutdown
- Control Room Habitability
- Modern I & C
- Seismic Issues - Generic Resolution
- Containment Performance Criteria - Leakage
- Core Debris Coolability
- In Service Testing of Pumps and Valves
- Leak-Before-Break for Subcompartment Design
- Active Backups for Passive Systems
- NRC Endorsement of Latest Codes and Standards
- Safety Classification

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## NRC's Safety Evaluation Review Schedule for ALWR Passive Plant RD

- |                                       |                |
|---------------------------------------|----------------|
| - Requests for Additional Information | December 1990  |
| - RAI Response                        | March 1991     |
| - Draft SERs                          | June 1991      |
| - Issue Resolution                    | June -Dec 1991 |
| - SER                                 | February 1992  |

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Overview of  
SECY 90-016 Issues

J. D. Trotter

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MRC 11/90 01 13

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**Overview of  
SECY 90-016 Issues**

**J. D. Trotter**

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MRC 1190 #1 13

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## SECY 90-016 Issues - Overview

- SECY-90-016 identified 15 issues in Evolutionary Plant submittals that were of policy nature
- These were reviewed by the ACRS and were also subject to some discussion between the Staff and the industry
- The Commission ruled on these issues for the Evolutionary Plants (SRM dated June 26, 1990)
- For Passive Designs, some issues are identical, others are affected by either the passive features or by the schedules to make different treatment appropriate
- This presentation summarizes ALWR Passive Plant positions for each

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NRC 11/90/21-14



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## SECY-90-016 Issues

### ALWR Passive Plant Requirements Meet SRM

1. LWR Public Safety Goal
3. ATWS
4. Mid-loop Operation
5. Station Blackout
6. Fire Protection

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MRC 11/90 71 15

- 1. LWR Public Safety Goal
  - Passive Plant meets Commission Safety Goal Policy
- 3. ATWS
  - Passive Plant meets SRM which allows for either diverse scram or "ride out" capability. Some clarification on "prefer ride out" from various Staff statements is needed
- 4. Mid-loop Operation
  - Passive Plant meets SRM which endorsed requiring design features to ensure high reliability of shutdown decay heat removal systems. Features to ensure high reliability of the active shutdown decay heat removal system are similar to those of the safety-grade system on the Evolutionary designs
- 5. Station Blackout
  - Passive Plant meets intent of SRM. Basic design allows much longer period without AC power. Non-safety on-site AC power sources are also required
- 6. Fire Protection
  - Passive Plant meets SRM. Requirements for separation of Safety division are identical for Evolutionary and Passive designs. Recent Staff question has caused reexamination of the requirements dealing with smoke migration in the passive Plants.

## SECY-90-016 Issues

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MRC 1490 71 18

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## SECY-90-016 Issues

### ALWR Passive Plant Requirements Meet SP'4 (Continued)

- 7. Intersystem LOCA
- 9. Core-Concrete Interaction and Debris Cooling
- 10. High-pressure Core Melt Ejection
- 13. Equipment Survivability

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NRC 1190 01 14

#### 7. Intersystem LOCA

- Passive Plant meets the SRM endorsement of resolution of higher pressure connected systems and special features for isolation valves. Clarification is needed on the scope and details of the isolation valve requirements

#### 9. Core-Concrete Interaction and Debris Cooling

- Passive Plant meets SRM endorsement of resolution by debris spreading and quenching. Staff evaluation of the specific numerical criteria in the Requirements is still expected

#### 10. High-pressure Core Melt Ejection

- Passive Plant meets SRM endorsement of resolution by depressurization system.

#### 13. Equipment Survivability

- Passive Plant meets SRM endorsement of resolution that severe accident features need not be subject to 10CFR50.49, 10CFR50 App. B nor 10CFR app. A (redundancy/diversity). Clarification is needed for the scope and degree of qualification activities

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## SECY-90-016 Issues

### ALWR Passive Plant Requirements Meet SRM (Continued)

#### 14. OBE/SSE

#### 15. Inservice Testing of Pumps and Valves

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MAC 11/90 21.17

#### 14. OBE/SSE

- Passive Plants meets SRM endorsement of resolution stating that OBE should not control the design of safety systems. ALWR Program believes that generic resolution is possible and preferred to the design-specific approach of SECY-90-016. Active discussion with staff and industry are underway.

#### 15. Inservice Testing of Pumps and Valves

- Passive Plants meets SRM endorsement of resolution requiring particular features for all safety related pumps and valves. In fact, Passive plants have no safety related pumps but the Requirements continue to endorse latest industry standards for all pump and valve inservice testing.

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## SECY-90-016 Issues

Issue Not Applicable to Passive Plants

### 12. ABWR Containment Vent Design

- ALWR requires that accident sequences which create the need for a vent are addressed by other means.

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## SECY-90-016 Issues

### Issues Merit Passive Plant Specific Consideration

#### 2. Source Term

- Physically-based Source Term for basis for plant design and emergency planning

#### 8. Hydrogen Generation and Control

- Passive PWR Features
  - Rapid depressurization
  - Cavity Preflooding
  - Larger (per megawatt) Containment
- ALWR proposes limited additional analysis specifically accounting for new ALWR Passive Plant features

#### 11. Containment Performance

- Systematic identification of potential challenges to containment integrity. Probabilistic and deterministic requirements to address each challenge.

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and Special Projects**

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W. D. Travers, Deputy Director**

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**S. H. Weiss, Director**

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**Standardization  
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**Advanced Reactors  
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Directorate**

**R. C. Pierson, Director**

**ABWR  
SP 90  
CE System 80+**

**SBWR  
AP 600**

**PIUS  
CANDU**

**ALMR  
MHTGR  
IFR**