

# UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

Title: BRIEFING ON THE PROGRESS OF G.E. ADVANCED BWR STANDARD  
PLANT REVIEW

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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BRIEFING ON THE PROGRESS OF G.E. ADVANCED BWR  
STANDARD PLANT REVIEW

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PUBLIC MEETING

\* \* \*

Nuclear Regulatory Commission  
One White Flint North  
Rockville, Maryland

Tuesday, January 24, 1989

The Commission met in open session, pursuant  
to notice, at 2:30 p.m., the Honorable LANDO W. ZECH,  
JR., Chairman of the Commission, presiding.

COMMISSIONERS PRESENT:

LANDO W. ZECH, JR., Chairman of the Commission  
THOMAS M. ROBERTS, Member of the Commission  
KENNETH M. CARR, Member of the Commission  
KENNETH C. ROGERS, Member of the Commission  
JAMES R. CURTISS, Member of the Commission

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1 STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE:

2 SAMUEL J. CHILK, Secretary

3 JAMES P. MURRAY, General Counsel

4 VICTOR STELLO, JR., Executive Director for  
5 Operations

6 JAMES SNIEZEK, Deputy Office Director, NRR

7 CHARLES MILLER, Director, Standardization and Non-  
8 Power Reactor Project Directorate

9 LESTER RUBENSTEIN, Assistant Director for Region IV  
10 and Specifications Project

11 DINO SCALETTI, Project Manager

12 FOR GENERAL ELECTRIC:

13 DAN WILKINS, General Manager, ABWR Program

14 PATRICK MARRIOTT, Manager, Licensing & Consulting  
15 Services

16 JOE QUIRK, Manager, ABWR Certification

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P R O C E E D I N G S

(2:30 p.m.)

CHAIRMAN ZECH: Good afternoon, ladies and gentlemen.

This afternoon the Commission will be briefed by representatives of the General Electric Company, and by the NRC staff, on the General Electric Advanced Boiling Water Reactor.

I would like to welcome the representatives of the General Electric Company, Mr. Dan Wilkins, General Manager of the Advanced Boiling Water Reactor Program; Mr. Patrick Marriott, Manager, Licensing and Consulting Services, and Mr. Joe Quirk, Manager of the Certification Program.

General Electric will provide a status report on their progress to develop and certify an advanced boiling water reactor. General Electric has briefed the Commission on three previous occasions, and this is a follow-up to those discussions.

Following the General Electric presentation, the NRC staff will brief the Commission on the progress of the standard plant review. This is an information briefing, and no formal Commission vote is expected today.

I understand that copies of the slides used in

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1 today's presentation are available as you enter the  
2 meeting room.

3 Do any of my fellow Commissioners have any  
4 opening comments to make?

5 (No response)

6 CHAIRMAN ZECH: If not, then, Mr. Wilkins, you  
7 may proceed. Welcome.

8 MR. WILKINS: Thank you very much, Mr.  
9 Chairman, and Commissioners.

10 We are very pleased to be here for the fourth  
11 progress report on the ABWR Certification Program. Let  
12 me say at the outset that Dr. Wolf, who heads our  
13 nuclear energy business, had planned to be here for this  
14 meeting, but when it got rescheduled, we ran into a  
15 conflict, and so he expresses his regrets. But we will  
16 proceed without him.

17 Our plan today is to give you a very quick  
18 update on the status of the program and highlight some  
19 of the key issues that are being dealt with on the  
20 program, and where we are in terms of the activity and  
21 schedule, and some of the things we have done in  
22 response to your comments at the previous briefings.

23 At the previous meetings, we've described the  
24 advanced boiling water reactor from a technical point of  
25 view in some detail, so I don't propose to repeat that

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1 here, but just on the first chart remind you that the  
2 advanced BWR is a 1350 megawatt electric plant.

3 (Slide)

4 It incorporates internal forced circulation.  
5 It is a world-class team designed by an international  
6 team consisting of General Electric and our BWR  
7 associates in both Europe and Asia, and we think has  
8 pulled together into a single design the best proven  
9 features from boiling water reactors around the world,  
10 and incorporated them all into a single design.

11 The development program that supports the ABWR  
12 is complete. That is a program that is involved in  
13 investment of over a quarter of a billion dollars, and  
14 is a program that has -- each feature of the ABWR is  
15 either proven by field experience, or has been  
16 thoroughly tested through this development program.

17 The US certification effort is well underway.  
18 This is a program we began in late 1986. We hope to see  
19 it become the first US standard plant. The program is a  
20 cooperative effort among General Electric, the Electric  
21 Power Research Institute's effort to develop  
22 requirements for next generation plants, and the  
23 Department of Energy, who is supporting us and funding,  
24 in fact, part of the certification effort.

25 And we think as one of the products of this

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1 effort, we will not only have the ABWR licensed, but in  
2 the process we will have demonstrated a standard plant  
3 certification process here in the US, which we think has  
4 considerable value. And the effort is intended to be  
5 complete in 1991.

6 I would like to give you a brief summary of  
7 what is happening in Japan, since there is a parallel  
8 side to this program in Japan -- second slide, please.

9 (Slide)

10 The ABWR, as we have mentioned, has been  
11 selected as the next generation standard boiling water  
12 reactor in Japan. And, in fact, the lead plants are now  
13 committed by the Tokyo Electric Power Company. They are  
14 what is known as the Kashiwazaki 6 and 7 units, to be  
15 built at the Kashiwazaki site on the Japan Sea.  
16 Licensing, the formal application, was initiated in  
17 1988, and the licensing review is scheduled to be  
18 complete by the beginning of 1991, and the first unit is  
19 scheduled to go commercial in '96; the second one in  
20 mid-'98.

21 The plants will be built by a joint venture of  
22 General Electric, Hitachi and Toshiba. And within the  
23 joint venture General Electric has been selected by  
24 TEPCO to provide the nuclear steam supply system, the  
25 fuel and the turbine generators for those units. So the

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1 heart of the plant and the first-of-a-kind, major first-  
2 of-a-kind portions of the plant are within the General  
3 Electric scope.

4 And we are aware that there is an active dialogue  
5 between the regulatory agencies in both the US and in  
6 Japan, as this plant moves through licensing in both  
7 countries.

8 (Slide)

9 The third chart shows the schedule and scope  
10 of the certification program. This chart, the schedule  
11 dates on this chart in the Nuclear Island -- area, have  
12 not been changed since we initially showed you this  
13 chart a couple of years ago. And we are on schedule.  
14 We are submitting the standard safety analysis report in  
15 modules to phase it to match the effort by Electric  
16 Power Research Institute on the requirements program.  
17 So, as they are bringing their chapters in, our  
18 submittals lag by a few months in order to achieve  
19 maximum consistency between their effort and ours.

20 And all of the chapters, or modules that are  
21 scheduled to have been submitted to-date are in and, in  
22 many cases, we have had active questions and review from  
23 the staff. So, things are proceeding on schedule. And  
24 you can see the tail end of the program is scheduled to  
25 have a final design approval in 1990, and a

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1 certification in 1991.

2 CHAIRMAN ZECH: Does this reflect an expansion  
3 of your original plans as regards to Turbine Island and  
4 the Radwaste Facility, in trying to come up with a  
5 certified program for those?

6 MR. WILKINS: Yes, it does. If you will turn  
7 to the next chart, Mr. Chairman.

8 (Slide)

9 The last time we were here, you spoke quite  
10 eloquently on the need to expand the scope of this  
11 program to include a total plant, and very strongly  
12 encouraged us to go back and see if we could find a way  
13 to do that. We have done that, and the scope is shown  
14 on the chart -- our original scope was what we called a  
15 Nuclear Island. It, essentially, included everything in  
16 the reactor control and service buildings.

17 In response to the Commission's guidance, we  
18 have gone back and recently indicated an expansion of  
19 that scope to include the remainder of the plant and, in  
20 particular, to include the Turbine Island and the  
21 Radwaste Facilities. And we have retained Bechtel to do  
22 the work for us on the Turbine Island portion of the  
23 plant.

24 So that effort is now underway, and we have  
25 taken formal action to expand the docket to include this

1 essentially total plant scope.

2 CHAIRMAN ZECH: I remember our discussions  
3 very well, and I would like to commend GE for expanding  
4 the scope in this regard. I think you've taken a very  
5 important step forward, including the Turbine Island and  
6 the Radwaste Facility in your effort, and I commend you  
7 for that.

8 MR. WILKINS: Thank you very much.

9 (Slide)

10 If you look on the next chart we depict the  
11 scope of the ABWR standard safety analysis report as it  
12 now stands. The cross-hatched areas are all in, and the  
13 portions that are remaining at this point are portions  
14 that are clearly site-specific. And even in those  
15 areas, we intend to establish whatever interface  
16 requirements are needed to make sure that those non-  
17 safety portions do not impact safety portions which are  
18 included in the scope.

19 (Slide)

20 The next chart summarizes where we are in a  
21 little more detail on schedule. The licensing review  
22 basis was issued by the NRC staff in August of '87. We  
23 have found that document to be extremely useful. It has  
24 defined the basic process and ground rules for the  
25 certification effort, and has enabled us to do our work

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1 with a great deal of confidence and certainty, as to  
2 what was needed and when it was needed, and what the  
3 steps and the process would be, and even in some cases  
4 what the acceptance criteria would be.

5 So we have been able to proceed, I think, very  
6 efficiently on our end in terms of preparing our  
7 chapters. As indicated on the chart, the four major  
8 modules have been submitted already. There are two  
9 remaining on the second page of the chart.

10 (Slide)

11 Those are scheduled for January and March of  
12 this year, and we intend to meet both of those dates.  
13 Our PRA, which is one of the major submittals and which  
14 will deal with the severe accident issue, is due in next  
15 week and we will make that schedule.

16 So, as I said earlier, the certification  
17 effort in terms of getting the information before the  
18 staff, is proceeding very well on the schedule we laid  
19 out at the beginning of the program.

20 (Slide)

21 We have had an active dialogue with, as we  
22 mentioned, the Commission and with the ACRS, both full  
23 committee and subcommittee. We have had three full  
24 committee meetings with the ACRS to this point, to go  
25 over specifics of the design. And we have had three

1 meetings with the subcommittee that has been assigned to  
2 look over this program.

3 Again, we think that that activity is  
4 proceeding and is up-to-date with the work we have done  
5 to-date.

6 (Slide)

7 Now, I would like to finish with a comparison,  
8 from General Electric's perspective, of the ABWR design  
9 and our plans, with a letter that we received from the  
10 NRC staff, I guess a couple of months ago, that defines  
11 the staff's expectations in a number of areas, in the  
12 area of what you might call safety enhancements that the  
13 staff expects to see in future designs, or in some cases  
14 clarification of issues that the staff is considering.

15 One of them is in the area of 60-year life.  
16 The ABWR that we are submitting for certification is  
17 designed for a 60-year life. We understand that some  
18 regulatory action may be needed to permit the  
19 certification of a plant that has been designed for  
20 longer than a 40-year life, and we certainly support and  
21 agree with that activity.

22 In the area of fire protection the staff has  
23 indicated a desire to ensure that the plant can survive  
24 a complete loss of any fire area. And that's a bolder  
25 and perhaps more stringent requirement than just the

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1 separation requirements that we have had in the past.  
2 On the other hand, we believe the ABWR will comply with  
3 that requirement, due to the physical electrical and  
4 mechanical redundancy and separation that is built into  
5 the plant.

6 (Slide)

7 The staff has indicated they want to see the  
8 technical specifications included as part of the ABWR  
9 certification program. We agree, and that is part of  
10 our plan to do that.

11 (Slide)

12 In the area of testing and maintenance the  
13 staff has indicated a desire to have a program which  
14 will ensure that over the life of the plant the  
15 probabilistic -- the level of safety implied in the PRA  
16 is maintained. And we certainly agree in principle that  
17 that is something that needs to be done, and we are  
18 under discussion as to exactly how to do that. That is  
19 not a trivial thing to figure out exactly how you do,  
20 and we are under discussion right now as to exactly how  
21 to carry that out. We certainly agree with the concept.

22 The staff letter included a plan to use its  
23 own codes in place of the industry map code, as a means  
24 of evaluating the design. We have no problem with that.

25 They've indicated a desire for diverse power

1 sources to improve the protection against station  
2 blackout. Our plan is to require the ABWR diesel-  
3 generators to come from at least two manufacturers.  
4 There are three diesels, and we would have at least two  
5 different manufacturers supply them.

6 (Slide)

7 In the area of leak before break, the staff  
8 has expressed some guidance and willingness to consider  
9 the leak before break technology, where justified. And  
10 we have planned to include in our safety analysis report  
11 the methodology and acceptance criteria that we will use  
12 in applying leak before break criteria. So we agree.

13 The staff has also indicated a plan to look at  
14 more realistic source terms in certain areas. We have,  
15 in the ABWR certification effort, used more realistic  
16 source terms, particularly in the area of gaining some  
17 recognition of the value of water in scrubbing certain  
18 of the fission products in the case of a severe  
19 accident. And in our PRAs we have used some credit for  
20 that. So that's included in our effort.

21 (Slide)

22 The staff has indicated a desire to look very  
23 carefully at the physical security area, and we plan to  
24 comply in all respects to the staff's objectives in that  
25 area. We think the ABWR is going to represent a very

1 good design from that point of view because of the  
2 separation barriers and access controls that are  
3 inherent in a very redundant design that is laid out  
4 basically by quadrants.

5 (Slide)

6 The staff has indicated a desire that the safe  
7 shutdown earthquake, rather than the operating basis  
8 earthquake, ought to be the one that controls the  
9 design. We agree philosophically with that position,  
10 but we have a design which will meet the acceptance  
11 criteria for either and both of the two earthquakes, as  
12 they currently are defined. So, we don't consider this  
13 a difficult issue.

14 We agree with the staff's plan to recognize  
15 that containment leakage is dependent on containment  
16 pressure. One of the conservativisms in the past has  
17 been to not recognize that factor, and we certainly  
18 agree that that is the way the physics is, and it ought  
19 to be recognized.

20 The staff has indicated that they expect to  
21 see the design accommodate 100 percent metal-water  
22 reaction, and we have designed the ABWR to do that, from  
23 the point of view of hydrogen control.

24 So, again, these are all issues that we will  
25 be in detailed discussion with the staff over the coming



1 months, as the review proceeds, but our assessment,  
2 having seen the staff's positions in writing, is that we  
3 basically agree. And we don't see any areas here that  
4 represent difficult problems, or obstacles to continuing  
5 with the program. That's GE's opinion. We will  
6 obviously have to, over the coming months, go into the  
7 details with the staff and see if they agree with our  
8 opinion. But that's our view right now.

9 (Slide)

10 So my summary on the last chart is very  
11 simple. We have responded to what was the major issue  
12 at our last review here, namely, the scope issue. We  
13 have expanded to include essentially the entire plant.  
14 And the program overall is on the track that we set it  
15 on three years ago, and is going down through the  
16 milestones, basically, on schedule. We have really no  
17 issues. We only ask that we continue to get the very  
18 strong support from the staff that we have received to-  
19 date, and we think that this program will be completed  
20 successfully.

21 CHAIRMAN ZECH: Thank you very much.

22 Questions from my fellow Commissioners?  
23 Commissioner Roberts?

24 COMMISSIONER ROBERTS: I would just repeat  
25 what I think I heard you say, TEPCO has committed to

1 these Number 6 and 7 plants?

2 MR. WILKINS: Yes.

3 COMMISSIONER ROBERTS: That's all I have.

4 Thank you.

5 CHAIRMAN ZECH: Commissioner Carr.

6 COMMISSIONER CARR: On your 60-year life, did  
7 you do some special studies on that? What is the  
8 controlling component on the 60-year life?

9 MR. WILKINS: Well, we have to look at many  
10 different factors, but certainly fluence levels,  
11 corrosion allowances, fatigue usage are the three major  
12 ones. And it is just a matter of making sure that you  
13 specify and include in the design the necessary  
14 allowances for the extra 20 years.

15 COMMISSIONER CARR: And that's ongoing, or  
16 that is done?

17 MR. WILKINS: The feasibility of it, I would  
18 say, is done. We are convinced it can be done, but it  
19 is ongoing in the sense that it has to be implemented  
20 into each component one-by-one, as the designs are  
21 finalized.

22 COMMISSIONER CARR: On the testing and  
23 maintenance issue which is under discussion, what is  
24 being discussed?

25 MR. WILKINS: Well, the issue is maintaining

1 the level of safety that is in the PRA. When you look  
2 at a PRA, it is a very large document that has, I would  
3 say, thousands of numbers and assumptions in it. And  
4 the challenge is how do you take that and boil it down  
5 to exactly what it is you monitor and check throughout  
6 the life of the plant, to maintain that level.

7 And it would be very easy to say, well, just  
8 make sure that every assumption and number that is in  
9 the PRA is maintained. But there has got to be a more  
10 practical way to do that. And that's what we are trying  
11 to find.

12 COMMISSIONER CARR: I would assume that if you  
13 did that as it is stated, that at the end of the plant  
14 life it would still be worth 60 years.

15 MR. WILKINS: Well, I --

16 COMMISSIONER CARR: I mean, you are going to  
17 keep it in new condition all that time.

18 MR. WILKINS: Well, I think in terms of the  
19 margins that are taken credit for in the PRA, I think in  
20 most cases we would have the sufficient margin at the  
21 end of life to support the PRA. We probably have more,  
22 in some cases, at the beginning of life.

23 COMMISSIONER CARR: I am a little curious that  
24 you pick two manufacturers for your diesel generators.  
25 Does that make you feel warm, that you have two guys

1 making diesels?

2 MR. WILKINS: Well, it is only in the sense  
3 that it eliminates some possibilities of common mode  
4 failure that could come from having --

5 COMMISSIONER CARR: Because we are  
6 standardization now, you are going to build all of these  
7 reactor plants alike.

8 MR. WILKINS: One of the trade-offs is between  
9 common mode failure and standardization.

10 COMMISSIONER CARR: Have you also looked at  
11 gas turbines as opposed to diesel generators, as for  
12 another source?

13 MR. WILKINS: We have looked at that. Our  
14 present feeling is that diesel is a more practical way  
15 to go.

16 COMMISSIONER CARR: All of these have a common  
17 fuel supply.

18 MR. WILKINS: Yes, you don't eliminate them  
19 all. We agree.

20 COMMISSIONER CARR: Are you as uncomfortable  
21 as I am with potential review subjects, these letters  
22 that you get, like two months ago? How do you know what  
23 the one you get next month is going to say?

24 MR. WILKINS: I think our dialogue with the  
25 staff has been very much real-time and effective, and,

1 no, that letter -- I don't think it contained any  
2 surprises, from our point of view.

3 COMMISSIONER CARR: Okay, that's all I have.

4 CHAIRMAN ZECH: Thank you.

5 Commissioner Rogers?

6 MR. WILKINS: Let me say, I would say that is  
7 consistent with the licensing review basis, in most  
8 respects, that the staff gave us in '87. And so we have  
9 no problem with that.

10 CHAIRMAN ZECH: Commissioner Rogers?

11 COMMISSIONER ROGERS: I don't have anything.

12 CHAIRMAN ZECH: Commissioner Curtiss?

13 COMMISSIONER CURTISS: No.

14 CHAIRMAN ZECH: Let me just make a couple of  
15 comments. First of all, you mentioned Dr. Wolf, and I  
16 would appreciate you giving him my respects, because I  
17 remember very well the discussion we had at the last  
18 meeting when he was here. And you've mentioned  
19 expanding the design, and I recognize that you have done  
20 that, to include the turbine and the radwaste parts of  
21 the plant.

22 Also, we talked about, at the last meeting,  
23 Japan and working with them, so that we would benefit  
24 from their experience and their views. And it looks  
25 like you have done that very well, and I appreciate that

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1 very much.

2 Are there any significant design differences  
3 that you can see regarding the Japanese program and the  
4 US program?

5 MR. WILKINS: There are a few, and I would say  
6 on both sides of the ocean we are trying to make that as  
7 few as possible. The design -- the analysis methods --

8 CHAIRMAN ZECH: I don't mean the regulatory  
9 differences. I really mean the design differences.

10 MR. WILKINS: Well, let me just mention a  
11 couple to give you a feel for it, because we keep very  
12 close track of exactly what they are, and we discuss  
13 each one of them in detail with the Japanese, to try to  
14 eliminate them, but analysis methods are a little  
15 different in Japan than they are here in the US and, so,  
16 we are analyzing the plant both ways.

17 Now, in general, that doesn't change the  
18 design at all. It just means that they do their seismic  
19 analysis one way, we do it a little different, and we  
20 check it to make sure that it satisfies both.

21 One difference that will be very noticeable is  
22 in Japan, because of the rocky sea coast sites, the  
23 turbines are typically oriented -- we orient them in  
24 line, they orient them crossways -- L-shaped  
25 configuration, transverse configuration. And so we

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1 have, because of practice here in the US, turned the  
2 turbine.

3 We are licensing a single unit plant here in  
4 the US, for the certification, whereas what is being  
5 built in Japan is a two-unit plant. And so we have had  
6 to basically pick out the portions of the two-unit plant  
7 that are needed for one. And that's what we are  
8 certifying here.

9 COMMISSIONER CARR: How much common have you  
10 got between the two? Have you got a lot of common?

11 MR. WILKINS: Common design, you mean?

12 COMMISSIONER CARR: No, no, I mean the two  
13 units will use, common equipment? Shared facilities?

14 MR. WILKINS: Shared facilities, the radwaste  
15 facility will be shared among the two units. The  
16 control room is physically adjacent but, of course, with  
17 different equipment for each unit. That's basically it.  
18 All of the safety systems, diesels and so forth, are  
19 redundant.

20 CHAIRMAN ZECH: But if we looked at the  
21 completed Japanese design and the completed US design as  
22 you envision them now, we would see two facilities that  
23 looked very much the same, is that what you are telling  
24 us?

25 MR. WILKINS: That's right. We hope that

1 anyone who considers using this certification in the  
2 future will be able to go to Japan and see it.

3 CHAIRMAN ZECH: Another subject that was  
4 talked about at the last meeting was carefully testing  
5 the acceptability of the advanced electronic and control  
6 systems. And I understand, I've been told that you are  
7 in the process of doing this.

8 MR. WILKINS: Yes.

9 CHAIRMAN ZECH: Could you comment any further  
10 on that?

11 MR. WILKINS: Well, the advanced control and  
12 instrumentation designs that are being used in this  
13 plant are digital. They use a lot of fiber optic  
14 transmission. They have a very high level of redundancy  
15 and self-testing, so that if a failure occurs, you can  
16 -- it immediately identifies itself. It announces  
17 itself and you have enough redundancy to replace a card  
18 and, without taking the plant off-line, get back to the  
19 unfailed state.

20 Now, that product line is something GE is  
21 already doing and operating, selling to operating plants  
22 around the world. We have developed, in our case what  
23 we call a NUMAC product line, which incorporates those  
24 features. And it is being used for many instruments in  
25 current operating plants.



1           What we are doing with the ABWR, for the first  
2 time, is expanding that to encompass the total control  
3 and instrumentation. But by the time we get there, I  
4 think we will already have done most of it, piece-by-  
5 piece in operating plants.

6           CHAIRMAN ZECH: But do most of these state-of-  
7 the-art facilities and equipment you are talking about-  
8 - are you going to test it, though, the testing part of  
9 it --

10          MR. WILKINS: Oh, yes; oh, yes.

11          CHAIRMAN ZECH: -- test it thoroughly, so that  
12 the confidence factor will be high?

13          MR. WILKINS: Yes.

14          COMMISSIONER ROGERS: I have a question.

15          CHAIRMAN ZECH: Yes, go ahead.

16          COMMISSIONER ROGERS: As I recall, the  
17 Japanese seem to be moving a little bit more towards  
18 total computer control than we have customarily had in  
19 this country. Do you envision this plant in Japan being  
20 operated to a greater or lesser extent under computer  
21 control versus manual control, than would be the case  
22 for a US plant with the same design?

23          MR. WILKINS: There are a number of control  
24 steps in this plant which we will automate, in the sense  
25 of a start-up sequence, or turbine roll, or a given step

1 in a sequence. But we do not plan to turn the plant  
2 over to a computer. It will be much more of -- where  
3 the operator may now have to turn three knobs and do two  
4 things to make something happen, he would have a button  
5 to push that would make that same thing happen. And it  
6 would be less operator-action, but we don't intend to  
7 turn the plant over to a computer. It will be manually  
8 operated.

9 COMMISSIONER ROGERS: And you would expect  
10 that it would probably be the same then for operation in  
11 the US and in Japan?

12 MR. WILKINS: Yes.

13 CHAIRMAN ZECH: Well, we mentioned a couple of  
14 other things, one was the human factors engineering,  
15 factored in early in the design and the development of  
16 the systems. And my information is that that is being  
17 addressed, also. Could you comment, just very briefly,  
18 on that?

19 MR. WILKINS: Yes, let me just describe the  
20 approach that we are using in that area. One of the  
21 things that we did, after Three Mile Island, was  
22 developed for the boiling water reactor, in fact, for  
23 the operating plants, what we called the symptom-based  
24 emergency operating procedures.

25 CHAIRMAN ZECH: I think we are all familiar

1 with those.

2 MR. WILKINS: Well, what we found is that now  
3 that we have those, they provide a very good recipe for  
4 how to organize the information that is presented to the  
5 operator, because you can now go down through basically  
6 the tasks that the operator has to perform. And say,  
7 okay, what information does he need to do that task,  
8 what does he need to check, and then what is the best  
9 way to provide that information.

10 And that has resulted in quite a different  
11 approach to the presentation of information to the  
12 operator. That has been done partially on operating  
13 plants, as part of the safety parameter display systems  
14 and other retrofits since Three Mile Island.

15 In the ABWR we are, of course, able to  
16 implement that philosophy almost from the beginning.

17 CHAIRMAN ZECH: One other thing we suggested  
18 at the last meeting is that you continue to work very  
19 closely with the ACRS. And it is obviously apparent you  
20 have done that. So, I would encourage you to continue  
21 working with the ACRS, also, as well as the staff.

22 Well, let me just say I am encouraged by what  
23 I have heard today. I commend you again for expanding  
24 the design to include the turbine and radwaste  
25 facilities. And I think the suggestions that we have

1 given you, that you have obviously carried forth, too,  
2 deserve recognition on our part that you have been very  
3 responsive to the suggestions we've made.

4 So, I commend you for what you are doing. And  
5 I ask you to keep up the good work. We think that the  
6 standardization and certification process is the future  
7 of nuclear energy in our country. And certainly what you  
8 have done I think is very responsive to the Commission's  
9 suggestions and direction, and, again, I commend you for  
10 what you have done.

11 COMMISSIONER ROBERTS: A quick question.

12 CHAIRMAN ZECH: Yes.

13 COMMISSIONER ROBERTS: Is the successful and  
14 satisfactory completion of your contract with TEPCO  
15 contingent upon US certification?

16 MR. WILKINS: No, it is not.

17 CHAIRMAN ZECH: Any other questions?

18 COMMISSIONER CARR: Yes.

19 CHAIRMAN ZECH: Go ahead.

20 COMMISSIONER CARR: Would you say this plant  
21 is going to be less complex, or more complex, or about  
22 the same as the current modern BWR?

23 MR. WILKINS: I would say it is going to be  
24 considerably less complex. We have had -- first of all,  
25 this plant has been 100 percent designed since Three

1 Mile Island. So we have been able to take everything we  
2 have learned since Three Mile Island and basically put  
3 it into the design from scratch.

4 Second, we have had utility operators and  
5 maintenance people on the design team in large numbers,  
6 since the beginning. And we have found that they have  
7 very strong views about simplicity. And I think we have  
8 benefited very greatly from that involvement.

9 CHAIRMAN ZECH: Good, I am glad you have done  
10 that. I think we mentioned that last time, too, as far  
11 as involving the operators themselves in the design.  
12 And of course making it simpler is also important, as  
13 much as you can do so and still make it safe and logical  
14 to operate.

15 But I think the operators can give you  
16 suggestions, and the fact that you have worked with  
17 them, I think, also is the proper thing to do.

18 Any other questions from fellow Commissioners?

19 (No response)

20 CHAIRMAN ZECH: All right, thank you very  
21 much. We appreciate it. Give Dr. Wolf our respects,  
22 and tell him we appreciate very much him listening so  
23 carefully to the Commission at the last session.

24 MR. WILKINS: Thank you very much. I am sure  
25 he will be glad to hear that.

1 (Whereupon, the first panel was excused)

2 CHAIRMAN ZECH: Will the staff come forward,  
3 please?

4 Mr. Stello, please begin.

5 MR. STELLO: Thank you, Mr. Chairman.

6 We are, as you will hear this afternoon,  
7 working very hard on dealing with the review of the  
8 ABWR, because it is one of the first steps in the  
9 Commission's strongly held view of the need for  
10 standardization and certification. The schedules that  
11 you have heard, and you will hear again in a moment, we  
12 believe they are real. We have sufficient resources and  
13 are fairly confident that we will be able to abide and  
14 meet the schedules, as you had them projected today.

15 We are doing everything we can to make sure  
16 that nothing will happen to interfere with that. And I  
17 am confident that is the way it will turn out.

18 This is one of several reviews that we have  
19 begun in standardization and is, at the moment, probably  
20 leading and will be forming the cutting edge. We've got  
21 a lot to learn, so there is some reason to be cautious  
22 about going through a certification process. But at the  
23 moment, I have no reason to believe that there is  
24 anything to prevent us from doing this.

25 I will ask Jim Sniezek to give you some

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1 opening comments on where we are, and then we will turn  
2 to Charlie Miller to give the briefing.

3 CHAIRMAN ZECH: Thank you.

4 Mr. Sniezek, you may begin.

5 MR. SNIEZEK: Thank you, Mr. Chairman,  
6 Commission.

7 First of all, I would like to introduce the  
8 people at the table. On my left are Les Rubenstein,  
9 he's the responsible Assistant Director in NRR for this  
10 program; on Vic's right is Charlie Miller, who is the  
11 responsible Branch Chief for this program; and an  
12 important individual way down on the far right is Dino  
13 Scaletti, he is the Project Manager, who is honchoing  
14 the review through, as Vic said, on schedule.

15 Before I turn the briefing over to Charlie  
16 Miller, I would like to make a few preliminary remarks.

17 As we perform the ABWR review, it is necessary  
18 to use severe accident insights for certain of the  
19 chapters. These aspects of the review were closely  
20 coordinated with the Office of Research, to make sure  
21 that we are using the most current information we have  
22 available in-house, the state-of-the-art technology. We  
23 believe by doing this we will eliminate, or at least  
24 substantially reduce, the potential for any impact on  
25 the design of these plants in the future. So, we are

1 doing it right through the review process as we proceed  
2 chapter-by-chapter.

3 In the near future, also, the Commission will  
4 receive 10 CFR Part 52 from the Office of the General  
5 Counsel. It is anticipated that the ABWR will be the  
6 first standardized plant to go through the certification  
7 process under Part 52. Therefore, it is important, we  
8 recognize, to closely coordinate with OGC, to make sure  
9 that the track we are on will track the 10 CFR Part 52  
10 process, once it is promulgated.

11 In pursuing the standardization process, the  
12 staff, as well as the designers, are using the  
13 experience gained from the current operating plants, and  
14 we believe that this will enhance the safety of these  
15 designs. And I believe that is the will of the  
16 Commission.

17 We have identified areas where review goes  
18 beyond that specified in the current standard review  
19 plan. We have also provided the Commission with this  
20 information, as it was identified in the ABWR licensing  
21 review basis referred to by GE in August of 1987, and in  
22 a recent memorandum to the Commission, which was issued  
23 last week, SECY 89-013.

24 From the GE briefing, I believe you have heard  
25 that GE and the staff are in general agreement with the

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1 approach being taken on these additional technical  
2 issues.

3 I would now like to turn the briefing over to  
4 Charlie Miller.

5 CHAIRMAN ZECH: Thank you very much.

6 You may begin, Mr. Miller.

7 MR. MILLER: Mr. Chairman, fellow  
8 Commissioners.

9 First slide, please.

10 (Slide)

11 I would like to give you a status report today  
12 of how we stand with our review of design certification  
13 for the advanced boiling water reactor. I would like to  
14 talk about the schedule, I would like to talk about our  
15 desire for the safety enhancements, so that we can meet  
16 the Commission's severe accident policy and  
17 standardization policy.

18 I would also like to talk about severe  
19 accident guidance that we feel we need to get to the  
20 designers as soon as possible. And finally, I would like  
21 to talk about our coordination efforts with the Japanese  
22 government.

23 (Slide)

24 In August 1987, Dr. Murley signed a licensing  
25 review basis, and in that licensing review bases we

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1     tried to set forth the ground rules for the review of  
2     this plant.    The application for design certification  
3     was received in September of 1987.   The approach that is  
4     being used in the review of this plant is to receive  
5     four groups of safety analysis modules.   These started  
6     coming in in September of 1987, and will proceed to come  
7     in through January of 1989.

8                 Since the time of the initial receipt, as GE  
9     has mentioned, they have expanded the scope of the  
10    review to include the balance of plant and the radwaste  
11    systems.   In December, we received the safety analysis  
12    information on the turbine island, which codifies GE's  
13    commitment to give us a complete plant.   And we  
14    anticipate the receipt of the radiological waste system,  
15    which we hope to receive in the coming months.

16                As Mr. Sniezek has said, we are proceeding  
17    with the review schedule as initially set up, and we  
18    have no information that would give us any cause for  
19    alarm at this point.

20                Our review strategy is to try to issue a  
21    safety evaluation for each module.   Our first safety  
22    evaluation will go out in March of this year, and we  
23    will proceed in modular form until January of 1990.   May  
24    I have the next slide, please.

25                (Slide)

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1 By January of 1990, we also expect to have the  
2 turbine island and radwaste systems reviewed. We plan  
3 on taking that information to the ACRS, full committee,  
4 in the Spring of 1990, provide an integrated SER by July  
5 1990, which will be used as the basis for the final  
6 design approval.

7 Once the final design approval has been  
8 obtained, our plans are to begin the rulemaking at that  
9 time. We anticipate at this point that the rulemaking  
10 will take about one year. The rulemaking would end in  
11 about October 1991, and it would culminate in a  
12 certified design, which would be encompassed into the  
13 NRC regulations.

14 (Slide)

15 I would like to say a few more words about the  
16 licensing review basis. The licensing review basis, as  
17 we previously mentioned, was signed in August of 1987,  
18 and at that time the EDO sent a copy to the Commission  
19 for your information. What we tried to achieve in this  
20 licensing review basis was to try to identify those  
21 areas that go beyond the standard review plan, and also  
22 try to address those areas where we have had problems in  
23 the past, in previous experiences with standard reviews.

24 (Slide)

25 At that point in time our current efforts on

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1 severe accident resolution were at an earlier state. We  
2 felt that it was necessary to give General Electric as  
3 much information as we possibly could at that point in  
4 time, so that the review could proceed on schedule.

5 In addition, the licensing review basis gives  
6 our understanding of the General Electric commitments  
7 that will be used during this review. I would like to  
8 highlight a few of these.

9 Severe accident policy requests that a PRA be  
10 done and include both internal and external events.  
11 General Electric has committed to do such a PRA, and we  
12 are anticipating the receipt of that PRA by the end of  
13 this month.

14 10 CFR 50.34(f) also required measures to  
15 accommodate hydrogen generation and the reaction of  
16 equivalent of 100 percent Zirc-water reaction. As  
17 General Electric told you in a briefing earlier today,  
18 they have committed to meet that.

19 The licensing review basis also certifies an  
20 agreement that they will address USIs and GSIs. The PRA  
21 will demonstrate that they have a mean frequency of  
22 occurrence.

23 Next slide, please. Excuse me, I'm getting  
24 ahead of myself.

25 (Slide)

1           To have a mean frequency of occurrence for  
2 off-site doses in excess of 25 rem beyond one-half  
3 radius to be less than once per million reactor years,  
4 considering both internal and external events, and that  
5 a conditional containment probability of less than .1  
6 when weighted over credible core damage sequences will  
7 be met.

8           COMMISSIONER CARR: Are they picking the  
9 external events, or did we pick them?

10           MR. MILLER: They are addressing the external  
11 events that they believe can be quantified at this time  
12 -- things like internal fire damage, tornadoes, seismic.  
13 I think at this point we both are in general agreement  
14 that they've tried to pick events that could be  
15 quantified as best is possible.

16           CHAIRMAN ZECH: All right. Let's proceed.

17           MR. MILLER: Thank you.

18           Also included in the Appendix on a licensing  
19 review basis are some site enveloping parameters. Since  
20 no standard plant can identify a particular site for  
21 which the plant would be built, General Electric has  
22 attempted to try to envelope the sites that would be  
23 acceptable, by providing a set of parameters.

24           Next slide, please.

25           (Slide)

1           As General Electric talked about in some  
2 detail, the staff had met and developed a list of  
3 technical issues that they believe are important to get  
4 out to the designer as early as we possibly could and  
5 which needed early management attention in order to get  
6 that information to them.

7           We met on those issues and provided guidance  
8 to the designers in the fall of this year.

9           Next slide, please.

10          (Slide)

11          As Mr. Sniezek mentioned, SECY-89-013 gave the  
12 details of the information that we provided to the  
13 designers.

14          We believe that this was an important step  
15 because with the guidance that we currently are working  
16 under, which is the Commission's policy, we want to give  
17 the industry as much information as we can so that we  
18 can keep the review on schedule.

19          Next slide, please.

20          CHAIRMAN ZECH: Before you go off that point,  
21 SECY-89-013 was just issued January 19th, 1989 -- that  
22 wasn't very long ago. I appreciate the fact that G.E.  
23 said they had been working with the staff and they  
24 apparently weren't too surprised by this.

25          I guess my only concern is that a paper as

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1 significant as this, Design Requirements Related to the  
2 Evolutionary Advanced Light Water Reactors, it seems to  
3 me that as the Commission needs the papers in time to  
4 read them and digest them and understand them, so do the  
5 vendors.

6 Was there anything in here that you thought  
7 should have surprised the suppliers, the people that  
8 will be interested in this SECY paper?

9 MR. MILLER: We don't believe that there's  
10 anything in there that came as a surprise to the  
11 vendors. We meet with the vendors periodically, and we  
12 try to give them our thinking on any of those subjects  
13 at any given time.

14 In fact, in the case of General Electric, I  
15 think you'll see most of the information in that SECY  
16 paper was provided in the licensing review basis.

17 CHAIRMAN ZECH: Okay. But if there would be  
18 something significant, if there would be anything that  
19 might surprise them, they need as much advance notice as  
20 they can get, that's my point, and I just want to make  
21 sure that you're trying to do that because --

22 MR. MILLER: Yes, we are.

23 CHAIRMAN ZECH: -- if there's anything that  
24 you are to expecting to design in this new advanced  
25 design, they need to know it as soon as possible.

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1 MR. MILLER: Right. That's the intent of what  
2 we did. When I said that it's not a surprise, what I  
3 meant was the formal receipt of the letter was not a  
4 surprise. We indicated to them --

5 CHAIRMAN ZECH: Fine. And the substance of  
6 the letter wasn't surprising to them.

7 MR. RUBENSTEIN: Many of the issues have  
8 evolved from the discussions that grew out of the EPRI  
9 requirements documents and the experience that we've had  
10 in our operating reactors and our review process before.  
11 So, these have been issues that we've discussed over a  
12 long period of time with both the industry and in an  
13 operating reactor sense and in the requirement sense.

14 CHAIRMAN ZECH: My understanding is that's the  
15 case, if I understood the G.E. presentation correctly,  
16 and I think I did, and what you said, too, I understand  
17 that. My only point to the staff is, I hope that you'll  
18 get these requirement type papers and design papers of  
19 such potential impact out and discuss them as soon as  
20 you can because this is the important time to do it,  
21 well up front, so that we don't surprise them at the  
22 end.

23 COMMISSIONER CARR: They'll be less surprised  
24 than the Commission was.

25 CHAIRMAN ZECH: Yes. Well --

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1 COMMISSIONER CARR: I noticed here -- and I  
2 haven't read the paper yet, unfortunately -- but what  
3 are you going to do when the NRR position doesn't  
4 necessarily reflect the Commission's position?

5 MR. STELLO: We will accept the Commission's  
6 position.

7 COMMISSIONER CARR: I know, but it's late to  
8 do that.

9 MR. STELLO: It's interesting, but what can I  
10 do about it?

11 COMMISSIONER CARR: I don't know.

12 MR. STELLO: If the Commission is going to do  
13 something, and I would think it would be incumbent to do  
14 it as quickly as possible --

15 CHAIRMAN ZECH: Well, that's what I mean. So,  
16 we have to get the papers as soon as possible.  
17 Commissioner Carr's point is a big point. He  
18 understands what we are saying.

19 MR. STELLO: Well, remember in yesterday's  
20 briefing -- we're trying to do our best to get them out  
21 as quickly as we can. We have to have the discussion,  
22 the dialogue, to fully develop and understand it, but  
23 these are not new issues, these are issues that have  
24 been floating around and were issues raised as long ago  
25 as two or three years ago, and it's time to fish or cut

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1 bait because the designer has to solidify, you know, on  
2 them.

3 CHAIRMAN ZECH: Well, we understand that. I  
4 think Commissioner Carr has really hit the point really  
5 on the nose when he says that -- you know -- if you're  
6 working that closely with the designers -- we didn't get  
7 it until just a few days ago. If we have any concerns  
8 about it, I recognize that you're going to follow on our  
9 guidance, but we want to participate early on, too.

10 I have had a chance to read the paper very  
11 quickly. I don't have any problem with the law, but we  
12 might have. My only point is, please get it to us as  
13 soon as you can, too.

14 MR. STELLO: Mr. Chairman, I assure you, we  
15 make every effort to try to get these identified, and as  
16 soon as we have them, to get them up to the Commission  
17 as quickly as possible. We are on the cutting edge of a  
18 new process of trying --

19 CHAIRMAN ZECH: I know, but we need it more  
20 than a few days, though, ahead of time, and perhaps if  
21 you're talking with the suppliers and the designers,  
22 maybe we need to get an earlier briefing on at least  
23 what you are thinking about, rather than get the final  
24 paper.

25 In any case, you understand what I mean, and

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1 we appreciate the fact that we are trying to be on the  
2 cutting edge. We're working closely with new  
3 technology. We understand all that. We just want to  
4 make sure that we have a chance to participate to the  
5 extent that we can make some perhaps useful suggestions.  
6 You know that we generally support the staff fully, but  
7 there are times when we do have something that might be  
8 useful to you, and we just want to be in the process as  
9 early as possible. That's my only point. Let's  
10 proceed.

11 MR. MILLER: Next slide, please.

12 (Slide)

13 Our basis for the guidance to the designers  
14 was a standardization policy statement, plus the  
15 anticipation of proposed Part 52.

16 In our letters that we sent to the designers,  
17 we asked that the designs be essentially complete in  
18 detail. This was our attempt to try to add the NRR  
19 position on top of the Commission's position that -- you  
20 know, we recognize that the Commission has asked for  
21 complete designs and, in a certain sense, it's just the  
22 case of trying to hammer that point home again.

23 Next slide, please.

24 (Slide)

25 In addition, we notified the designers that we

1 would give review priority to those designs which are  
2 essentially complete, and that all portions of the  
3 design would be subject to staff review against the  
4 current SRPs and regulations.

5 Next slide, please.

6 (Slide)

7 CHAIRMAN ZECH: Before we go off that point,  
8 let me just make one other point so that the staff won't  
9 misunderstand what I'm trying to say.

10 I think this paper you've given us, this SECY-  
11 89-013, as far as my understanding of it is, it is,  
12 indeed, consistent with the Commission's policy  
13 statement on severe accidents, and also I think it is  
14 consistent with the Commission's desire to make as many  
15 safety enhancements to future plants as we think are  
16 feasible and appropriate.

17 So, I recognize that you have tried to do what  
18 we have asked you to do. My only point is, it would  
19 have been helpful to get it a little sooner. I think  
20 you have done exactly what we want to do. I think, as  
21 far as I understand it, that it is in line with guidance  
22 we've given you, but my only point was that it would  
23 have been useful to have it a little sooner.

24 All right, let's proceed.

25 MR. MILLER: In order to enhance the safety of

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1 future designs, the staff expects to go beyond the SRP  
2 in our review. We think that there are certain areas  
3 where we need to do that. That is probably one of the  
4 biggest reasons for trying to get this information out,  
5 as you said, Mr. Chairman. We want the designers to  
6 know what is expected of them early on.

7 General Electric went through the list of the  
8 items that were included in the letter, some of which  
9 are fire protection, electrical systems, hydrogen  
10 generation. I won't dwell on those unless the  
11 Commission --

12 COMMISSIONER ROBERTS: Well, before you leave,  
13 what's the staff's objective, and how will the safety  
14 goals be taken into consideration? At one point, we had  
15 a paper for Commission decision on how far to go with  
16 requiring safety improvements. Now you say you are  
17 going beyond the standard review plan and beyond our  
18 regulations. How far beyond? What's the objective?  
19 How does the safety goal factor into this?

20 MR. MILLER: I think the safety goal factors  
21 into this, Commissioner Roberts, from the respect that  
22 we want to assure that our future designs meet the  
23 safety goal.

24 MR. STELLO: Let me say, I think what I  
25 believe we've done is to take the advice and the

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1 understanding that we have of where the Commission has  
2 been on this subject, and having to make decisions in  
3 the real world, take those policy guidance and translate  
4 them.

5 If you recall the earlier slide that had  
6 reference to 25 REM, half-mile, 10 to the minus 6. The  
7 Commission has dealt with an issue of significant  
8 release not to exceed a frequency of 10 to the minus 6.  
9 I mean, that's something the Commission has dealt with,  
10 the issue of the containment, less than a 10 percent  
11 chance of a containment problem. This is one of the  
12 issues the Commission has indicated it wishes to deal  
13 with in future designs.

14 We have taken a position to be able to take  
15 the next step, 100 percent metal-water reaction. Those  
16 were issues that were pending and the Commission dealt  
17 with them in its severe accident policy statement, and  
18 we are now translating those and they, indeed, go beyond  
19 the regulations because I think the current regulation,  
20 if my memory serves right, it was a 75 percent metal-  
21 water reaction for those plants to which it applies. I  
22 believe, if my memory serves me right, that's what is  
23 now in the regulation, I think. So, we are beyond it,  
24 and what we have done is taken everything that we  
25 understand the Commission has promulgated in the way of

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1 documents dealing with the subject -- in its policy  
2 statement on safety goals, on severe accidents -- and  
3 reduced those to application for this review.

4 So, while they clearly do go beyond the  
5 regulations for standard review of plants that are in  
6 existence, they are clearly, in my view, consistent with  
7 the policy this Commission has given us.

8 CHAIRMAN ZECH: And I think that's correct. I  
9 agree with the Executive Director for Operations. I  
10 think the Commission has given them that kind of  
11 guidance, and I think they are doing what we have asked  
12 them to do, in my judgment.

13 COMMISSIONER CARR: So, you could rephrase  
14 that as going beyond the SRP and the regulations, but  
15 they will stay within the bounds of the policy  
16 statement.

17 MR. STELLO: Yes, sir.

18 MR. RUBENSTEIN: Yes, sir.

19 COMMISSIONER ROBERTS: That sounds a little  
20 better.

21 MR. STELLO: Yes, sir.

22 COMMISSIONER CARR: I have a little problem  
23 with how far beyond is usual. How many areas was what  
24 was worrying me.

25 MR. STELLO: Only where the Commission has

1 given us the policy and guidance, and it is consistent  
2 with that policy and guidance.

3 COMMISSIONER CARR: Enough said.

4 CHAIRMAN ZECH: All right. Good. Let's  
5 proceed. We've settled that. Stay within our guidance,  
6 that's what we're saying, and I think you have. That's  
7 what I think, you have, and I guess we've agreed that  
8 you have. So, proceed.

9 MR. MILLER: Next slide, please.

10 (Slide)

11 With regard to severe accident guidance, we  
12 feel that it's necessary to get severe accident guidance  
13 solidified as soon as possible in order that we can get  
14 this guidance out to the designers, to keep the reviews  
15 on schedule.

16 Currently in NRR, we've held preliminary  
17 discussions and we're continuing to hold discussions so  
18 that we can form our positions and get them up to the  
19 EDO. In this respect, Mr. Chairman, we commit that any  
20 positions that are taken by the staff with regard to  
21 these will be forwarded to the Commission well in  
22 advance of any notification given to the designers.

23 CHAIRMAN ZECH: Fine. Thank you.

24 COMMISSIONER CARR: Do you still plan to go  
25 with the rule in that area, or do you know yet?



1 MR. STELLO: Don't know yet.

2 MR. MILLER: I think I've covered the  
3 information on the next slide. I've made the point that  
4 it's important that we get these issues resolved in a  
5 fairly --

6 CHAIRMAN ZECH: Let me just ask -- I have a  
7 quick question on that issue.

8 MR. MILLER: Yes, sir.

9 CHAIRMAN ZECH: How is research, our research  
10 branch, interfacing into this -- their work, in  
11 providing guidance to the staff as well as to the  
12 vendors?

13 MR. SNIEZEK: Let me address that, Mr.  
14 Chairman. We started out our discussions with the  
15 Office of Research, to sit down to understand from them  
16 where their views are coming from, what they've learned  
17 so far. NRR has our own internal meeting to really hash  
18 around internally, and we go back and meet with the  
19 Office of Research again and come to a joint position,  
20 and then address it to the EDO who is going to bring it  
21 to the Commission.

22 CHAIRMAN ZECH: Fine. Thank you. Let's  
23 proceed.

24 MR. MILLER: Next slide, please.

25 (Slide)

1 I'd like to talk a little bit of our  
2 coordination with the Japanese Government. We've been  
3 coordinating with the Ministry of International Trade  
4 and Industry in Japan, MITI, for the past few years.

5 We've made two visits to Japan, in February  
6 and October of this year, and we're continuing to keep  
7 in close contact with them.

8 Each party has a contact which we work  
9 through. We continue the coordination closely, and we  
10 keep each other apprised of our reviews as we proceed.

11 As General Electric mentioned, two units are  
12 being -- will be constructed at Kashiwazaki site. For  
13 your information, currently there are five BWRs, BWR/5s,  
14 at that site. One, I believe, is in operation, and four  
15 under construction currently.

16 Next slide, please.

17 (Slide)

18 This is some information that I think General  
19 Electric has previously covered. It gives some dates  
20 for the Japanese construction of the plant, and one of  
21 the things to note is that they plan on building this  
22 plant in about five years, from the beginning of  
23 construction to commercial operation.

24 Mr. Chairman, you --

25 CHAIRMAN ZECH: Beginning of construction--

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1 that's not counting all the planning time that's gone in  
2 ahead of time? Beginning of construction --

3 MR. MILLER: No, sir. This is start of  
4 construction to commercial operation.

5 CHAIRMAN ZECH: There's no reason a plant  
6 can't be built in five years, is there?

7 MR. MILLER: There's no reason why it can't.

8 MR. STELLO: There is sufficient information  
9 and experience to suggest that it, in fact, can be, and  
10 has been -- and even in the United States, I might add.  
11 We have done it at St. Lucie. I think it was less than  
12 60. I think it was 48 months.

13 COMMISSIONER CARR: But that would lead you to  
14 believe there's a lot of long-lead orders in front of  
15 that 60-month period.

16 MR. STELLO: Oh, yes. Well, this design and  
17 review has been going on now for several years.

18 CHAIRMAN ZECH: Planning and design review  
19 time is all very important, but once you start building,  
20 you ought to be able to build it in five years.

21 MR. STELLO: Yes.

22 CHAIRMAN ZECH: All right. Let's continue.

23 MR. MILLER: The final point I was going to  
24 make, Mr. Chairman, you touched on with General  
25 Electric, and that's concerning the design differences

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1 between the US and Japanese design. I think General  
2 Electric touched on some of these. The L-shaped turbine  
3 island as opposed in-line; separate control room versus  
4 that we're having a single control room since we're  
5 single units in the United States.

6 That information is being supplied to us at  
7 your request, by General Electric. We've got some of  
8 the information, we're continuing to get more. That  
9 concludes my presentation.

10 MR. STELLO: And we are finished, Mr.  
11 Chairman.

12 CHAIRMAN ZECH: All right. Thank you very  
13 much. Questions from my fellow Commissioners?  
14 Commissioner Roberts?

15 COMMISSIONER ROBERTS: No.

16 CHAIRMAN ZECH: Commissioner Carr?

17 COMMISSIONER CARR: I owe you an apology. I  
18 did read your paper, I just didn't know what the number  
19 was on it.

20 The only -- I had a question on page 2 when  
21 you talk about evolutionary ALWRs. Why did you put  
22 "evolutionary" in there? I assume you're going to have  
23 the same kind of fire protection no matter what kind of  
24 ALWR comes along.

25 MR. STELLO: You remember the Commission's

1 advanced reactor policy statement asked designers to sit  
2 back with a clean slate and see what you could do.  
3 Under those conditions, I believe, for those kinds of  
4 advanced reactors, you could really look at some  
5 significant changes and innovations, where you have  
6 total, complete isolation and separation. And I would  
7 think that that would allow an approach for fire  
8 protection that would be somewhat, and in many respects,  
9 significantly different, and that's the reason for --

10 COMMISSIONER CARR: But you don't mean to  
11 prevent them from doing that in this case, if they want  
12 to.

13 MR. STELLO: Oh, no, no, but in this case this  
14 design is not one that I would put in the category of an  
15 advanced reactor such as an advanced HTGR or the reduced  
16 PRISM or 600 megawatt designs that are being considered,  
17 which are well beyond in terms of the advancing  
18 technology with these designers.

19 COMMISSIONER CARR: I thought that the ALWR  
20 was the advanced reactor, I guess.

21 MR. STELLO: Well, then, I ask you to find  
22 another word for the ones coming beyond that.

23 COMMISSIONER CARR: And your statement says  
24 "Other design requirements for future ALWRs may arise  
25 during the development of the final acceptance criteria

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1 related to this issue", and I worry about giving them a  
2 moving target in that area of fire there. You are  
3 saying -- you are kind of reserving something there, and  
4 I don't know what it is. That's on page 3, at the top  
5 of the page, talking about diesels and gas turbines --

6 MR. SNIEZEK: Right. What that refers to is  
7 identifies certain issues so far. These are the ones  
8 that we had in mind. As we get further into the review,  
9 there may be other issues that get identified. We don't  
10 know what they are yet.

11 COMMISSIONER CARR: That's what worries me,  
12 but it didn't seem to worry them.

13 MR. SNIEZEK: It's a fact of life. If you  
14 identify it, you identify it, and we'll have to deal  
15 with it when that happens.

16 COMMISSIONER CARR: On page 4 where you have  
17 operating bases earthquake. It says "The staff will  
18 take this issue under consideration as part of the  
19 design certification process". So, you'll have that  
20 done in accordance with your schedule then, huh?

21 MR. SNIEZEK: Yes, sir.

22 COMMISSIONER CARR: And at the bottom of the  
23 physical security thing it says "This discussion should  
24 include an identification of design features that  
25 decrease reliance on physical security programs for

1 sabotage protection". And I said "For instance" to  
2 that, but I heard him say something about quadrants or  
3 --

4 MR. SNIEZEK: Yes.

5 MR. MILLER: We feel that if the plants could  
6 be designed up front, some of the features that you are  
7 designing for the prevention of fires can also be used  
8 in a design prevention of damage due to physical  
9 security problems. If it's in a quadrant, you'd have  
10 one train knocked out, but you'd have another train in a  
11 separate quadrant that wouldn't be affected, and you  
12 could safely shut down the plant.

13 MR. SNIEZEK: We envision that -- simplicity  
14 was a question before -- there could be probably fewer  
15 doors, fewer locks, fewer guards, fewer keys. If it's  
16 designed to consider its physical security at the front  
17 end of the process.

18 MR. RUBENSTEIN: In principle, the fire area  
19 and a vital area have a certain symmetry. Both would--  
20 one could be violated and still have the capability in  
21 another fire area or another vital area bringing the  
22 plant to a safe shutdown.

23 COMMISSIONER CARR: So, the thrust is not so  
24 much against protection from sabotage as it is continued  
25 safety with sabotage occurring. I had some -- you're

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1 going to design this thing so that people couldn't  
2 sabotage it.

3 MR. STELLO: No, it clearly does -- it is--  
4 it is a feature which makes sabotage less likely. It is  
5 a mission --

6 COMMISSIONER CARR: It is less effective.

7 MR. STELLO: Well, successful sabotage less  
8 likely.

9 COMMISSIONER CARR: Okay.

10 MR. STELLO: They may be able to damage a  
11 piece of equipment, but not inflict damage on the plant.

12 COMMISSIONER CARR: Okay.

13 CHAIRMAN ZECH: Commissioner Rogers?

14 COMMISSIONER ROGERS: Yes. At the very end of  
15 this process, you have left 14 months for issuing the  
16 final design approval. Do you expect, and I imagine you  
17 do, public hearings on this matter? Since there are a  
18 number of new technical details here, what is -- have  
19 you asked GC their opinion as to how realistic that 14-  
20 month period is in terms of being able to move  
21 expeditiously through it, with public hearings and all  
22 the possibilities that open up when you are in that  
23 process?

24 MR. MILLER: Acknowledge the fact,  
25 Commissioner, that there are a lot of uncertainties in



1 this. The 14 months is our best estimate at this time.  
2 Some people are more optimistic, some people are more  
3 pessimistic.

4 MR. STELLO: It can be done within that time  
5 frame, following our procedures, using some allowance  
6 that it will take more time -- I think a hearing from  
7 beginning to end, from start to finish, 11 months?

8 MR. MURRAY: Well, Mr. Chairman, it depends on  
9 the issues that are -- that may be raised, and we can't  
10 always predict with any certainty what those issues  
11 might be, looking down the road.

12 COMMISSIONER CARR: The quicker you complete  
13 the designs, the less likely there are to be issues.

14 MR. SNIEZEK: I think what's very important is  
15 the Part 52 process that's to be coming forward. It  
16 depends on what type of hearing is conducted and the  
17 recommendation coming from OGC to the Commission, Part  
18 52 and how it's structured, what type of hearing it  
19 requires will be very important in the timing process at  
20 the end.

21 CHAIRMAN ZECH: Well, that's coming to the  
22 Commission very soon, I believe, is it not?

23 MR. MURRAY: Yes, it is, and it's on schedule.  
24 I think the schedule is for next month.

25 CHAIRMAN ZECH: All right.

1 COMMISSIONER ROGERS: Well, it would just seem  
2 that with everything else going along well, if it is all  
3 going on schedule -- certainly, GE says their  
4 submissions are on schedule -- if we can keep our  
5 responses on schedule and we hit that 14-month period,  
6 it would be very well to have anticipated as much as  
7 possible, of what might happen and to see that we can  
8 also complete it within the 14 months.

9 COMMISSIONER CARR: It's probably going to  
10 need you to certify the design without a site. Sites  
11 are what bring people to court.

12 CHAIRMAN ZECH: Commissioner Curtiss?

13 COMMISSIONER CURTISS: I just have one quick  
14 question on the SECY paper. I haven't reviewed it  
15 thoroughly, but over on page 4, the reference at the  
16 very tail end to source terms. Could you expand a  
17 little bit on what the current knowledge is and why, in  
18 your judgment, at this point it appears that the TID  
19 that we use is not consistent with current knowledge?

20 MR. STELLO: Go ahead.

21 MR. RUBENSTEIN: It goes to the same kind of a  
22 thing that GE spoke of before about giving them credit  
23 for decontamination factor, and looking at a non--  
24 looking a little more mechanistically at the source  
25 term. And this is one of the optimization subjects that

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1 EPRI has proposed. We do have members of the staff  
2 available who could talk details.

3 COMMISSIONER CURTISS: Is that a function of  
4 the changes in the design, or is that a function of our  
5 more recent knowledge of --

6 MR. RUBENSTEIN: Knowledge.

7 MR. STELLO: TID 14844. That document is  
8 dated I think 1950s, and we have clearly, over the years  
9 now, through our experience in research, gained an  
10 enormous amount of knowledge about source term and  
11 fission product behavior, and it's applying that  
12 knowledge, that information, to really understanding  
13 rather than this arbitrary mechanistic way of evaluating  
14 the fission product release.

15 COMMISSIONER CURTISS: If the knowledge is  
16 independent of the design question, or largely  
17 independent, would it also be true that the TID that we  
18 use is overly conservative? I assume that's what we're  
19 talking about here, or not just the ALWRs before the  
20 existing plants as well?

21 MR. STELLO: Yes, and NUREG 1150, and when we  
22 -- and there go schedules it again -- but whenever we  
23 get to finishing that and bringing that to the  
24 Commission, NUREG 1150 represents the simulation of all  
25 of that knowledge and various accident environments and

1 what their consequences might be. If you will, 1150  
2 represents today's understanding and application of  
3 source term as we now know it.

4 COMMISSIONER CURTISS: That was my next  
5 question. Does 1150 provide essentially the database  
6 for this statement?

7 MR. STELLO: Well, the data that was used in  
8 1150 is what provides a basis for this statement.

9 COMMISSIONER CURTISS: All right. And then--

10 MR. STELLO: The source term data itself.

11 COMMISSIONER CURTISS: All right. Finally,  
12 would it be fair to conclude from this that based upon  
13 this more current knowledge that we have, that the--  
14 that knowledge -- and in large part it's 1150 -- is such  
15 that we could draw generic conclusions from that as  
16 opposed to plant-specific conclusions, and perhaps based  
17 upon that knowledge, address the source term issue not  
18 just for the ALWRs but for existing plants, in a generic  
19 way, or is that reading too much into what this  
20 statement says?

21 MR. STELLO: Well, forgetting this statement,  
22 that's generally consistent with the approach that we  
23 provided you -- and I forgot the SECY paper that dealt  
24 with 1150 that outlined what the kinds of uses of 1150  
25 ought to be, and it deals with that very question.

1 COMMISSIONER CURTISS: We talked at that  
2 meeting, as I recall, about the extent to which we'd  
3 rely on the absolute values that come out of 1150, and  
4 what I'm trying to get at here is --

5 MR. STELLO: You're talking about the  
6 fundamental technology and understanding, and that's  
7 what we talked about in terms of uses of 1150 technology  
8 as well as its application.

9 MR. SNIEZEK: I think, Commissioner Curtiss,  
10 though, you raise a good point, and that is the  
11 important role that research plays, our interface with  
12 research on these issues, to make sure we have the  
13 current knowledge of what's going on in reactor  
14 technology, as we go forward with the ABWR program.

15 COMMISSIONER CURTISS: It seemed to me that  
16 just from this reference, it was somewhat cryptic. It  
17 wasn't clear whether it was the advance in the design  
18 that permitted you to reach a conclusion with respect to  
19 the existing TID we use, or whether it was the data that  
20 we've acquired independent of the design.

21 MR. SNIEZEK: It's the data.

22 COMMISSIONER CURTISS: All right. Thank you.

23 CHAIRMAN ZECH: Well, we know that the OGC  
24 work on Part 52 is coming, concerning standardization  
25 and pre-selected sites and taking the combined

1 construction permit and operating license as far as we  
2 can go within our own authority. That's what we have  
3 coming to us, I think, in the end of February, and that  
4 will be very important because, as we hear today, we're  
5 talking about certification. General Electric Company  
6 and others are working towards standardized design,  
7 making what would appear to be significant progress.

8 The other part of the action if we're ever  
9 going to build plants in five years, though, is, in my  
10 judgment, to be able to have the licensing process such  
11 that it's more stable and more predictable. A very  
12 important part of that is, in my view, to combine the  
13 operating license and construction permit, and that's  
14 what we're trying to do within our own authority.

15 We also know that -- at least I'm told -- that  
16 we can only go so far, and that means that Congressional  
17 action may be necessary in order to go all the way, so  
18 that we can do it all up front.

19 If we have a good standardized design that we  
20 can certify and all be confident in, and it's an  
21 essentially complete design up front, and then if we can  
22 have a licensing process such that the site and the  
23 design can be brought together up front again, before  
24 construction begins, and have all those discussions,  
25 hearings, whatever has to be done in accordance with the

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1 law, up front, then when we start constructing you can  
2 construct the plant in five years -- there's no question  
3 in my mind that that can be done -- but those things are  
4 very important actions.

5 So, what we're talking about here today, in my  
6 judgment, is very important in the sense we're talking  
7 about the future of nuclear power in our country, and  
8 will it be feasible? Will it be something that  
9 utilities will feel they can invest in? And if we have  
10 a completed design that they can have confidence in, and  
11 if we have a licensing process such that they can see  
12 predictability and stability into it, then you can make  
13 cost estimates and planning estimates for construction  
14 work that should be able to be meaningful, and you  
15 should be able to do it, in my view, in five years.

16 We don't have such a program at present. I  
17 think what we're taking -- the action we're taking here  
18 with industry and with Nuclear Regulatory Commission is  
19 very important. We may need -- and I think most of us  
20 believe we do need -- to get the final support, we need  
21 Congressional action on that combined operating license  
22 and construction permit, but we're going to go as far as  
23 we can with Part 52 so, OGC, we look forward to your  
24 paper coming to us.

25 And let me just say today, thank you to the GE

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1 representatives for a very fine presentation. We  
2 commend you for the work you've taken. I'd also like to  
3 commend the staff for the action they're taking and the  
4 very important endeavor that crosses all of our  
5 disciplines, not only the regulatory work but research  
6 and other areas.

7 And, so, I think that the staff has done an  
8 excellent job in also bringing together the severe  
9 accident policy statement that overrides some of the  
10 things we've talked about, and using the Commission  
11 guidance as we've given the staff. So, I think this is  
12 a very important initiative, and I hope that we can  
13 continue to see the progress. We'd all like to see it  
14 happen before 1991, I guess, but the realism of the  
15 process is that it probably can't happen much before  
16 that, but I hope we can make steady, continuous progress  
17 in that direction.

18 So, again, I commend GE and the staff for the  
19 work they are taking in this direction, and I ask you to  
20 continue, march on. We're making some progress. It's  
21 slow, perhaps, but it's progress, in my view, and it's  
22 very important progress for the future of nuclear energy  
23 in our country.

24 Any other comments from my fellow  
25 Commissioners?

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1           COMMISSIONER CURTISS: I guess I have maybe  
2 one request. I'm kind of in the process of getting  
3 educated on this, and maybe it would be helpful for me  
4 -- and that's in response to a couple of comments here  
5 -- if, as the discussion of various issues evolves, I  
6 think it would be helpful to have a periodic status  
7 report from the staff as issues that are in this paper  
8 that continue to be discussed and progress is being  
9 made, just a status report on that activity would be  
10 helpful for me.

11           CHAIRMAN ZECH: Well, I'll take that aboard,  
12 and I think we have had, but perhaps we can discuss it,  
13 but you're right. The things that we see in the paper  
14 perhaps can be broken down and made separate briefings,  
15 in separate briefings for the Commission, and I'll talk  
16 with Mr. Stello about that. I think we've done that,  
17 but there -- maybe we can do better. We'll take a look  
18 at it.

19           All right. Anything else, anybody?

20           (No response.)

21           Thank you very much. We stand adjourned.

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

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CERTIFICATE OF TRANSCRIBER

This is to certify that the attached events  
of a meeting of the U.S. Nuclear Regulatory Commission  
entitled:

TITLE OF MEETING: BRIEFING ON THE PROGRESS OF GE ADVANCED  
BWR STANDARD PLANT REVIEW  
PLACE OF MEETING: ROCKVILLE, MARYLAND  
DATE OF MEETING: JANUARY 24, 1989

was transcribed by me. I further certify that said  
transcription is accurate and complete, to the best  
of my ability, and that the transcript is a true and  
accurate record of the foregoing events.

Phyllis Young  
PHYLLIS YOUNG

1/24/89

SCHEDULING NOTES

TITLE: BRIEFING ON THE PROGRESS OF GE ADVANCED BWR STANDARD  
PLANT REVIEW

SCHEDULED: 2:30 P.M., TUESDAY, JANUARY 24, 1989 (OPEN)

DURATION: APPROX 1-1/2 HRS

PARTICIPANTS: GE 30 MINS

- DAN WILKINS  
GENERAL MANAGER ABWR PROGRAM
- PATRICK MARRIOTT, MANAGER  
LICENSING AND CONSULTING SERVICES
- JOE QUIRK, MANAGER  
ABWR CERTIFICATION

NRC 30 MINS

- JAMES SNIEZEK
- CHARLES MILLER
- LESTER RUBENSTEIN
- DINO SCALETTI

# **ABWR Certification Program Progress Report**

**Presented to  
Nuclear Regulatory Commission**

**January 24, 1989**

**Rockville, Maryland**

**GE Nuclear Energy**

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## **Advanced BWR (ABWR)**

- **1350 MWe**
- **Internal forced circulation**
- **World-class design by International Team**
  - **Best proven features**
- **Development complete - \$ 250 M**
- **U. S. certification underway**
  - **First U. S. standard plant**
  - **Cooperative DOE/EPRI/GE effort**
  - **Demonstrate standard plant licensing process**
  - **Complete 1991**

## **ABWR In Japan**

- **ABWR is next generation standard BWR for Japan**
- **Lead plants committed by Tokyo Electric Power Co.**
  - **Kashiwazaki 6 & 7**
  - **Licensing application** **1988**
  - **K-6 commercial operation** **1996**
  - **K-7 commercial operation** **1998**
- **GE/Hitachi/Toshiba joint venture**
  - **GE to supply nuclear steam supply, fuel, and turbine generators**
- **U. S./Japanese regulatory interaction**

# ABWR Certification Program

## Scope and Schedule

### Nuclear Island

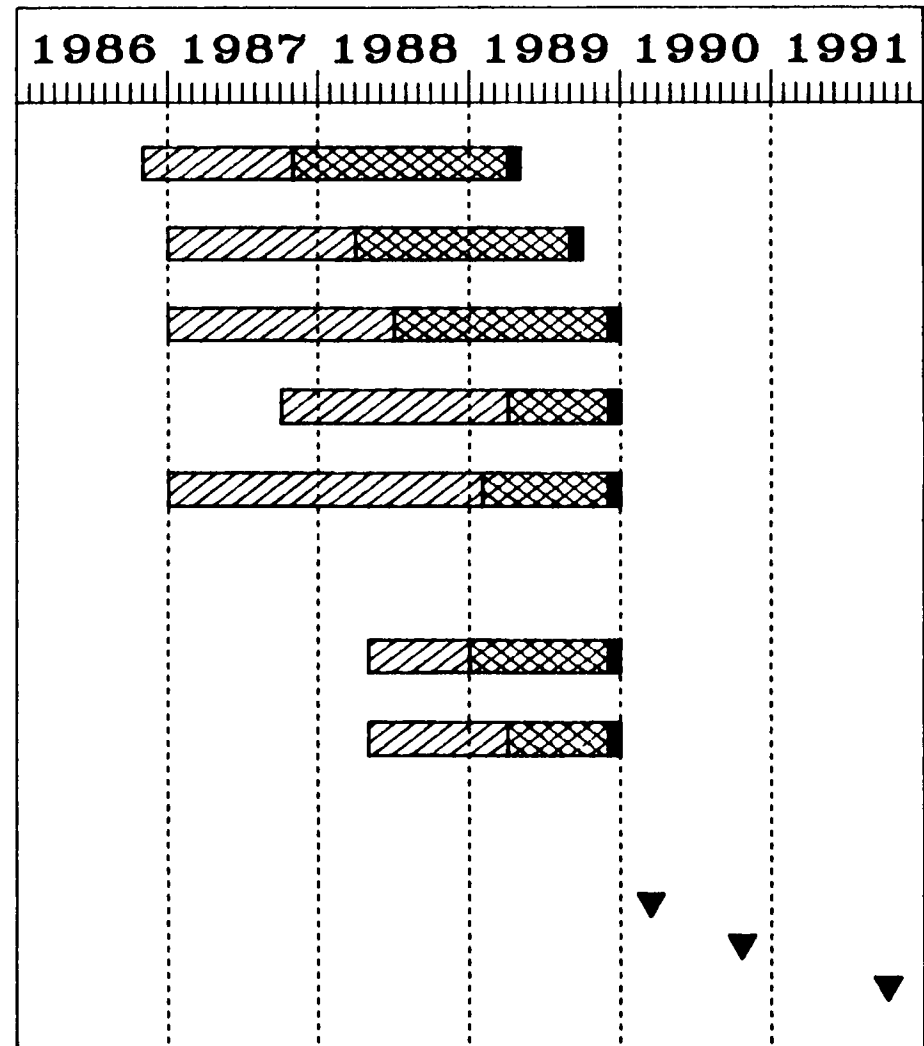
- Reactor & Safety Systems  
- Chapters 4, 5, 6 & 15
- Plant Arrangement  
- Chapters 1, 2 & 3
- I&C, Auxiliary Systems & QA  
- Ch's 7-9, 11-14, 17
- Tech Specs & Emerg. Proc.  
- Chapters 16 & 18
- Severe Accidents  
- Chapter 19

### Remainder of Plant

- Turbine Island  
- Ch. 10, Parts of other Chs
- Radwaste Facility  
- Ch. 11, Parts of other Chs

### Key Milestones

- Final SER Issued
- FDA Issued
- Certification Issued



SSAR Prep.



NRC/ACRS Rev.



Draft SER

# **Scope of ABWR SSAR**

- **Nuclear Island (original scope)**

**Reactor building**

- Nuclear steam supply sys.
- Primary containment
- Secondary containment
- Emer. core cooling sys.
- Res. heat removal sys.
- Emer. diesel generators
- Fuel handling equipment

**Control building**

- Control room
- Control building HVAC
- Essential batteries and power supply
- Reactor building closed cooling water

**Service building**

- Access control
- Technical support center
- Service building HVAC

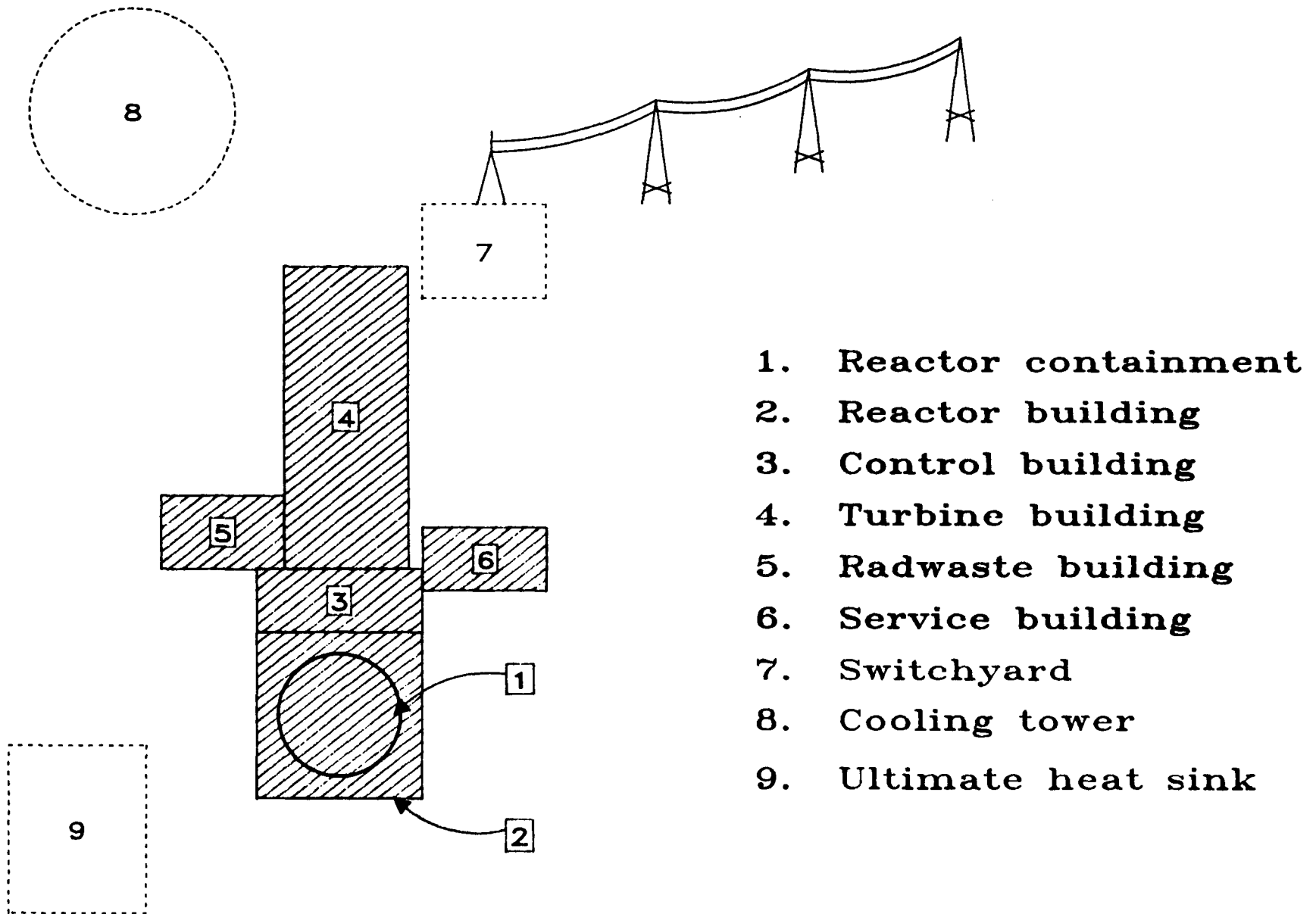
- **Remainder of plant (recent scope addition)**

- Turbine island
- Radwaste facility

**Essentially total plant**



# SCOPE OF ABWR SSAR



# **Status of Certification Program**

## **Licensing Review Bases**

- **Issued by NRC Staff** **8/7/87**

## **SSAR Status**

- **SSAR chapters submitted**
  - **Reactor and safety systems:  
Chapters 4, 5, 6 and 15** **9/29/87**
  - **Plant arrangement and criteria:  
Chapters 1, 2 and 3** **3/29/88**
  - **I & C, auxiliary system and QA:  
Chapters 7-9, 11-14, and 17** **6/29/88**
  - **Turbine island:  
Chapter 10** **12/30/88**

## **Status of Certification Program (continued)**

- **Next scheduled SSAR chapter submittals**
  - **Severe accidents, PRA:  
Chapter 19** **1/31/89**
  - **Tech. Specs., radwaste facility  
Chapters 11, 16 and 18** **3/31/89**

## **Commission Briefings and ACRS Meetings**

- **Commission Briefings**
  - **September 1986**
  - **April 1987**
  - **January 1988**
- **ACRS Full Committee meetings**
  - **January 1987**
  - **March 1987**
  - **January 1988**

## **Commission Briefings and ACRS Meetings**

**(continued)**

- **ACRS Subcommittee meetings**
  - **January 1987**
  - **June 1988**
  - **November 1988**

## **Comparison of ABWR Design With Potential Review Subjects for Standard Plant Designs**

<b><u>Subject</u></b>	<b><u>ABWR Status</u></b>
<b>1. 60 year plant life</b>	
<ul style="list-style-type: none"><li>● Applicant responsibility to identify components and systems affected</li></ul>	<ul style="list-style-type: none"><li>● ABWR will comply</li></ul>
<ul style="list-style-type: none"><li>● Information and programs to support design life</li></ul>	<ul style="list-style-type: none"><li>● ABWR will comply</li></ul>
<ul style="list-style-type: none"><li>● Current regulation limits license term to 40 year life</li></ul>	<ul style="list-style-type: none"><li>● GE agrees with need for regulatory change</li></ul>
<b>2. Fire protection</b>	
<ul style="list-style-type: none"><li>● Replace 20 foot separation with safe shutdown capability given a complete loss of any fire area</li></ul>	<ul style="list-style-type: none"><li>● ABWR will comply</li></ul>

## Comparison (continued)

<u>Subject</u>	<u>ABWR Status</u>
3. Technical Specifications	
● Proposed technical specifications submitted no later than FDA application	● ABWR will comply
● Proposed Tech Specs representative of design will be included in certification process	● GE agrees
● Applicants identify design features necessary for testing and maintenance during operation without challenging safety systems	● ABWR will comply

## Comparison (continued)

<u>Subject</u>	<u>ABWR Status</u>
4. Testing and Maintenance	
● Provide a program to assure design reliability consistent with the PRA	● Under discussion
5. Industry use of MAAP	
● Review of MAAP code is unnecessary since staff can apply its STCP codes	● GE accepts
6. Station blackout and electrical system	
● Diverse power sources to ensure safe shutdown of the reactor	● ABWR requires diesel-generators of at least two manufactures



## Comparison (continued)

<u>Subject</u>	<u>ABWR Status</u>
<b>7. Leak Before Break</b>	
<ul style="list-style-type: none"><li>● Leak before break can be considered where justified</li><li>● Address issues of material embrittlement of vessel and vessel supports</li></ul>	<ul style="list-style-type: none"><li>● Methodology and acceptance criteria provided in SSAR</li><li>● Addressed in SSAR</li></ul>
<b>8. Source Terms</b>	
<ul style="list-style-type: none"><li>● Establish realistic source terms, with EPRI input, to be uniformly applied to future ALWRs</li></ul>	<ul style="list-style-type: none"><li>● ABWR based on more realistic source terms</li></ul>

## Comparison (continued)

<u>Subject</u>	<u>ABWR Status</u>
9. Physical Security	
● Address sabotage in all future ALWR applications	● ABWR will comply
● Provide information to demonstrate the existence of adequate physical barriers to protect vital areas per 10 CFR 75.55(d)	● ABWR will comply
● Identify access control points to all vital areas per 10 CFR 75.55(d)	● ABWR will comply

## **Comparison (continued)**

<b><u>Subject</u></b>	<b><u>ABWR Status</u></b>
<b>10. OBE/Dynamic Analysis Methods</b>	
<ul style="list-style-type: none"><li>● NRC staff agrees OBE should not control the design of safety systems</li><li>● NRC staff will take this issue under consideration as part of certification process</li></ul>	<ul style="list-style-type: none"><li>● GE agrees</li><li>● GE encourages this action</li></ul>
<b>11. Type C Containment Leakage</b>	
<ul style="list-style-type: none"><li>● Containment leakage is acknowledged by NRC staff as being a function of containment pressure</li></ul>	<ul style="list-style-type: none"><li>● ABWR will comply</li></ul>
<b>12. Hydrogen Generation</b>	
<ul style="list-style-type: none"><li>● 10 CFR 50.34(f) related to issue of 100% metal-water reaction will be invoked</li></ul>	<ul style="list-style-type: none"><li>● ABWR will comply</li></ul>

## **ABWR Summary**

- **Scope expanded to essentially total plant**
- **ABWR certification on track**

BRIEFING  
ADVANCED BOILING WATER REACTOR  
(ABWR)

- °ABWR DESIGN CERTIFICATION SCHEDULE
- °LICENSING REVIEW BASES
- °ALWR SAFETY ENHANCEMENTS
- °GUIDANCE FOR ALWR DESIGNERS FOR  
DESIGN CERTIFICATION
- °ALWR SEVERE ACCIDENT GUIDANCE
- °COORDINATION WITH THE JAPANESE  
GOVERNMENT

CONTACT: C. MILLER, 2-1118  
VG-1

### ABWR DESIGN CERTIFICATION SCHEDULE

- ° LICENSING REVIEW BASES - AUGUST 1987
- ° APPLICATION FOR DESIGN CERTIFICATION
  - ° FOUR GROUPS SSAR MODULES -  
SEPTEMBER 1987/JANUARY 1989
  - ° TURBINE ISLAND - DECEMBER 1988 (BOP)
  - ° RADIOLOGICAL WASTE SYSTEM -  
MARCH 1989 (BOP)
- ° STAFF'S REVIEW SCHEDULE
  - ° ONE SER FOR EACH GROUP OF SSAR  
MODULES - MARCH 1989/JANUARY 1990

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(CONTINUED)

- °TURBINE ISLAND AND RADWASTE SYSTEM  
SER - JANUARY 1990
- °FINAL ACRS FC MEETING - APRIL 1990
- °INTEGRATED SER - JULY 1990
- °FINAL DESIGN APPROVAL - JULY 1990
- °RULEMAKING BEGINS - AUGUST 1990
- °RULEMAKING ENDS - OCTOBER 1991

VG-3

LICENSING REVIEW BASES  
(LRB)

° AN AGREEMENT BETWEEN NRC AND GENERAL  
ELECTRIC COMPANY WHICH PROVIDES  
SUPPLEMENTARY GUIDANCE ON REGULATORY  
ISSUES AND IN AREAS WHICH ARE EITHER  
NOT ADDRESSED, OR NOT ADDRESSED IN  
DETAIL, BY THE STANDARD REVIEW PLAN  
(SRP) AUGUST 19, 1987 MEMO EDO TO  
COMMISSION

VG-4



(CONTINUED)

°EXAMPLES:

°SEVERE ACCIDENT ACCEPTANCE CRITERIA  
REQUIRES INTERNAL AND EXTERNAL  
EVENTS PRA

°MEASURES TO ACCOMMODATE HYDROGEN  
GENERATED FROM THE REACTION OF  
THE EQUIVALENT OF 100% OF THE  
ZIRCONIUM IN THE ACTIVE FUEL  
CLAD

VG-5

(CONTINUED)

- °MEAN FREQUENCY OF OCCURRENCE OF  
OFFSITE DOSES IN EXCESS OF 25 REM  
BEYOND A ONE HALF MILE RADIUS IS  
TO BE LESS THAN ONCE PER MILLION  
REACTOR YEARS CONSIDERING BOTH  
INTERNAL AND EXTERNAL EVENTS
- °A CONTAINMENT CONDITIONAL FAILURE  
PROBABILITY OF LESS THAN ONE IN  
TEN WHEN WEIGHTED OVER CREDIBLE  
CORE DAMAGE SEQUENCES

VG-6

### ALWR SAFETY ENHANCEMENTS

- °NRR STAFF DEVELOPED A LIST OF TECHNICAL ISSUES THEY BELIEVED IMPORTANT TO THE REVIEWS OF ALWRs AND WHICH NEEDED EARLY MANAGEMENT ATTENTION
- °NRR HAS MET TO DISCUSS THE CONSEQUENCE AND RESOLUTION OF THOSE ISSUES

(CONTINUED)

°FOLLOWING THOSE MEETINGS LETTERS WERE SENT TO WESTINGHOUSE, COMBUSTION ENGINEERING, GENERAL ELECTRIC AND THE ELECTRIC POWER RESEARCH INSTITUTE TO INFORM THEM OF STAFF POSITIONS ON A NUMBER OF ISSUES WHERE AN NRR POSITION HAS BEEN REACHED. THESE ISSUES HAVE BEEN IDENTIFIED TO THE COMMISSION

VG-8

GUIDANCE FOR ALWR DESIGNERS  
FOR DESIGN CERTIFICATION

- °BASIS FOR GUIDANCE
  - °STANDARDIZATION POLICY STATEMENT
  - °PROPOSED 10 CFR PART 52
- °SCOPE OF DESIGN
  - °THE STAFF EXPECTS ALL DESIGNS TO BE  
ESSENTIALLY COMPLETE IN LEVEL OF  
DESIGN AND DESIGN DETAIL

(CONTINUED)

- °STAFF RESOURCE PRIORITY GIVEN TO  
APPLICATIONS FOR CERTIFICATION OF  
ESSENTIALLY COMPLETE DESIGNS
- °SCOPE OF STAFF REVIEW
- °ALL PORTIONS OF THE DESIGN WILL BE  
SUBJECT TO STAFF REVIEW AGAINST  
THE CURRENT SRP AND REGULATIONS

VG-10

(CONTINUED)

- ° IN ORDER TO ENHANCE SAFETY OF FUTURE DESIGNS THE STAFF EXPECTS TO GO BEYOND THE SRP AND REGULATIONS DURING THE COURSE OF THE DESIGN CERTIFICATION REVIEWS
- ° STAFF HAS INFORMED DESIGNERS THAT AREAS SUCH AS FIRE PROTECTION, ELECTRICAL SYSTEMS, AND HYDROGEN GENERATION WOULD REQUIRE GREATER CONSIDERATION THAN IN PAST DESIGNS

VG-11

## ALWR SEVERE ACCIDENT GUIDANCE

- ° NECESSARY TO COMPLETE DESIGN  
CERTIFICATION REVIEWS
- ° NRR HAS HELD PRELIMINARY DISCUSSIONS  
ON CERTAIN ISSUES RELATING TO THE  
CONSIDERATION OF SEVERE ACCIDENTS  
FACING THE EVOLUTIONARY ALWRs.  
NRR WILL BE MEETING AGAIN IN THE  
NEAR FUTURE TO ESTABLISH ITS  
POSITION ON THESE ISSUES

VG-12



(CONTINUED)

°IT IS IMPORTANT THAT THESE ISSUES BE  
RESOLVED ON A SCHEDULE THAT WILL  
ALLOW THE DESIGN CERTIFICATION  
REVIEWS TO PROCEED ON SCHEDULE

VG-13

## COORDINATION WITH JAPANESE GOVERNMENT

- ° MINISTRY OF INTERNATIONAL TRADE AND  
INDUSTRY (MITI)
  - ° TWO VISIT - FEBRUARY AND  
OCTOBER 1988
- ° TWO UNITS OF THE ABWR DESIGN TO BE  
CONSTRUCTED IN JAPAN
  - ° KASHIWAZAKI/KARIWA SITE
  - ° FIVE BWR/5S IN OPERATION OR UNDER  
CONSTRUCTION

(CONTINUED)

- ° CONSTRUCTION PERMIT - LATE 1990/  
EARLY 1991
- ° UNIT 1 OPERATION MID 1996
- ° UNIT 2 OPERATION MID 1998
- ° SCHEDULE CONSTRUCTION TIME  
APPROXIMATELY 60 MONTHS EACH
- ° THE U.S. DESIGN WILL BE THE SAME AS  
JAPAN'S DESIGN EXCEPT WHERE U.S.  
REGULATIONS REQUIRE DIFFERENCES

VG-15