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NUCLEAR REGULATORY COMMISSION

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PUBLIC MEETING

Nuclear Regulatory Commission
One White Flint North
Rockville, Maryland

Wednesday, January 26, 1994

The Commission met in open session, pursuant to notice, at 10:00 a.m., Ivan Selin, Chairman, presiding.

COMMISSIONERS PRESENT:

IVAN SELIN, Chairman of the Commission
KENNETH C. ROGERS, Commissioner
FORREST J. REMICK, Commissioner
E. GAIL de PLANQUE, Commissioner

STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE:

SAMUEL J. CHILK, Secretary

WILLIAM C. PARLER, General Counsel

S.R. SPECKER, Vice President, GE Nuclear Energy

J.R. QUIRK, Project Manager, ABWR Certification Program, GE

S.A. HUCIK, Manager, ABWR Projects, GE

D.R. WILKINS, General Manager, Nuclear Services and Projects, GE

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

10:05 a.m.

CHAIRMAN SELIN: I'm sorry we're late, Mr. Specker. We'll, of course, give you the time at the end of the presentation to make up.

In any event, we're very pleased to have you here today. The status of the ABWR application for design certification is an important point. We're getting down close to the end and we're interested in your views of just how close, what other issues are out, et cetera. A number of significant issues have been dealt with the first time and in some sense it's a little unfair that your application was the first because you ended up solving both generic and specific problems along the way. But I think it's been -- certainly been a valuable experience for the Commission and the staff and I hope GE has also done okay in this sense.

I would like to reiterate one point that I've made to both GE and Combustion Engineering. At this point there is no order anymore. Well, let's rephrase that. You each have your own airplane, you have your own controller, your own runway and your own gate. So, each of the two applications is on its own schedule. Neither one will affect -- once the generic

issues were addressed almost a year ago, neither one will affect the status of the other one.

I understand the staff will be briefing the Commission this Friday on the overall progress of the design certification review. So, your presentation is particularly timely.

Commissioners, did you have any opening remarks?

COMMISSIONER REMICK: No, thank you.

CHAIRMAN SELIN: Mr. Specker, thank you again for coming. We look forward to your presentation.

DOCTOR SPECKER: Okay. Thank you. It's a pleasure for the GE Nuclear Energy Team to be here again today to brief you on our ABWR programs. I was just told this is our eighth such briefing in this series.

With me today are Doctor Dan Wilkins, who I believe you all know, and Joe Quirk, who is the project manager of ABWR Certification. And a new face at the table is Mr. Steve Hucik who is our recently appointed manager of ABWR Projects. Steve has about 20 years of experience with GE Nuclear Energy, the last 12 of which have been intimately involved with the ABWR in design and project management.

(Slide) Our agenda for today's briefing is shown on the next chart and should be on the screen here. I'll provide just a brief overview of GE's overall ABWR activities. Then Dan Wilkins will discuss the safety improvements of the ABWR and the status of the design certification activities, and Joe Quirk will then review the design certification process issues. If this agenda is satisfactory, we'll move on with a few of my comments then.

Since the beginning of the ABWR, which was in the late 1970s, GE has remained committed to the design, the development, the testing, the licensing and the commercialization of the ABWR in the U.S. and internationally. We pursued this commitment with a lot of persistence and prudence. Our commitment today is stronger than it's ever been before to see it through the commercialization.

In Japan, the ABWR is licensed and under construction at the Kashawazaki site of TEPCO, Tokyo Electric Power. Just as a progress report, I'm pleased to report today that of the two units Kashawazaki 6 is now 52 percent complete. K-7 is about 25 percent complete, and the construction schedule of 51 months is being adhered to and it's right on schedule. I also would like to report in

recent months the Japanese utilities have announced plans for 11 additional BWRs over the next decade. GE is currently involved in preliminary studies on a number of these projects and we expect to have a key role as these move into final design and construction.

I also wanted to update you. As you know, we decided late last year not to submit a bid for two ABWRs for the Lungmen Project in Taiwan. This difficult decision was based on a careful assessment of the potential financial risk and rewards of this project. We simply determined that it was not in the best interest of either GE Nuclear Energy or GE shareowners to participate in this project by submitting a bid. We will approach any other opportunity for the ABWR on a case by case basis, subject to the same rigorous scrutiny of the potential financial risk and rewards. We, GE Nuclear Energy, is very strong financially and we intend to stay that way.

CHAIRMAN SELIN: Well, that's a very interesting topic. We could easily spend the time on that, but we are sort of obligated to stick to our agenda. So, we'll forego asking you questions.

DOCTOR SPECKER: Fine. I thought I should at least comment on it.

Switching now to the U.S., we GE are very committed to preserving the option for nuclear power going into the 21st Century. As a result of that, we have been very active in the overall licensing certification activities and the commercialization activities that follow on.

Just to brief you on this, as you know we're a very active participant in NPOC's strategic plan for building new nuclear plants. We've been intimately involved in the development of the advanced light water reactor utility requirements documents to which the ABWR fully conforms. The ABWR is leading the way in the design certification activity, as you just mentioned, and the ABWR was selected as the evolutionary design for the first-of-a-kind engineering program. Our goal is very straightforward in all this. We intend to have a fully licensed, standardized, proven commercially competitive ABWR ready to go to battle in what we think will be the very competitive electric generation market of the late '90s and the early 21st Century. That's our clear commitment and our clear goal.

To achieve this goal, we're resolved to obtaining an FDA for the ABWR that's free of open issues or conditions and we're committed to working

closely with the industry and the NRC to resolve the last of the design certification process issues so that the path will be clear to proceed in the design certification rulemaking.

Thank you. If there are no questions on those comments, I'll pass it on to Dan Wilkins.

CHAIRMAN SELIN: I do have a question on that, procedural question. That is your views on the relative timing of the final design approval of the design control document, not so much the certification itself.

MR. QUIRK: I'm going to address that later in the presentation.

CHAIRMAN SELIN: Okay. Fine.

DOCTOR SPECKER: Any other questions? Okay. I'll turn it over to Doctor Wilkins.

DOCTOR WILKINS: Okay. As we've mentioned, we believe we're entering the home stretch on the final design approval. I thought it might be worthwhile to take a few minutes this morning and give you some of our GE perspectives on what we've achieved both in the safety area and in the process area to date and then we'll finish up by talking -- Joe Quirk will talk about a relatively small number of remaining issues that we see before us.

Let me start with a safety perspective. I have noticed I have a number of acronyms in these charts. I'll define them as I go.

(Slide) But if I could have the next chart, please.

Perhaps the most significant change in the ABWR relative to our past plants is the reactor internal pumps, what we call the RIPs. These are really the basis of many of the improvements in the ABWR. They've eliminated large pipes and many valves in the containment and by eliminating large pipes low in the vessel they've enabled us to design the ABWR so that there is no core uncovery for any design basis event. The core always remains covered, which means it doesn't go through the heat-up and cool-down cycle of the earlier designs.

Pipes in the drywell have always been the source of major radiation in the drywell. By eliminating those pipes and putting the pumps right on the vessel we've greatly reduced the radiation fields in the plant. By having ten pumps rather than our previous two pump designs, we can maintain 100 percent power and flow with one pump completely out of service, which is a reliability improvement.

(Slide) If I go to the next chart, the

second major area of improvement is the use of the FMCRDs, fine motion control rod drives, in the ABWR. These have eliminated the scram discharge volume which has been troublesome. At some plants in the past they've eliminated half of the plumbing inside the containment.

They have given us an extra level of diversity in that we can now insert the control rods either with electric motors or hydraulically as in the past designs. Through the design of the fine motion drive, we have designed the housing so that you cannot eject the drive from the vessel and that has enabled us to eliminate that huge grid of shootout steel that we have below the drives in all the current plants so that it's easy to get to the drives. They're readily accessible for maintenance.

And finally, through design improvements in both the drive and the way it's mechanically put together, we've eliminated both the rod drop and the rod ejection accident from the list of things we have to consider.

(Slide) If I go to the next chart on the emergency core cooling systems, we've gone to three complete separate mechanical and electrical divisions, which is a higher level of redundancy than we've had

in past designs. Because of the lack of large pipes low in the vessel, these systems are much smaller than they are on current plants. In spite of the fact they're smaller, they still can keep the core covered for any design basis accident. For all transient events and almost all accident events, we've achieved an N-2 design, which means we can have one system out for service and also be able to have a single failure and meet all the requirements, which has opened the way for major improvements in the technical specifications for the plant in terms of relaxing the burden on the operators and stretching out of some of the equipment out of service times.

We have also in our ECCS designs greatly simplified the operation of the ECCS systems. In our past designs, we've had to have the operator shift realign the system for core cooling or containment cooling or other functions. In the way we've designed these systems, there is much less modes of operation that the operator has to worry about. In effect, we've kept the heat exchangers in the loop all the time so that the cooling function is always there whether or not you're injecting into the vessel.

The fact that we don't uncover the core for any design basis event, we've eliminated the core

spray spargers, which were always kind of a tricky design element and have been the source of maintenance issues in the field, and so they're gone. And we've separated the injection level for the reactor core isolation cooling system and the high-pressure core flooders so that if you don't have a major drop in water level or a major pipe break that the event will be handled by the normal isolation cooling system without activating the safety systems.

COMMISSIONER REMICK: Dan, what's the difference between the N+2 concept and N-2 other than N is defined differently? is there any other --

DOCTOR WILKINS: Same. It's just basically level redundancy.

(Slide) Go to the next chart.

Another area that we're quite proud of the improvements we made is the instrument and control area. We've gone to multiplexed fiber optic cabling networks throughout the plant which has eliminated miles and miles of wire and cable pulling late in the construction process and enabled us to shorten the construction. We've gone for all the safety systems the full digital two out of four logic and for all the control systems we've gone to triplicated self-testing fault tolerant control systems with enough redundancy

that if you have a failure first of all it's announced because of the self-testing feature and there's enough redundancy to change the failed board on-line without getting into a scram situation.

We've made some improvements in the neutron monitor and scram protection system. The automated rod block monitor eliminates the possibility of rod withdrawal errors. And by the manner in which we hook up the control rod drives in the start-up mode, we can move 26 in a gang, which has greatly reduced the start-up time for the plant.

The man-machine interface in the control room is another area that we're quite proud of with the ABWR. It's the first plant that has been designed by us at least with all the lessons of Three Mile Island at the beginning. The emergency procedure guidelines, which were certainly one of the most important lessons learned in improvements that came out of Three Mile Island, have in this plant been reflected into the whole layout and arrangement and choice of displays in the control room, so that the symptom-based approach to operating the plant during an emergency is now not just in the procedures but the displays and controls in the control room have been engineered to go along with those.

COMMISSIONER REMICK: Dan, what's the difference between the rod block monitor in this design in past because I thought the purpose was to eliminate -- is it the number of errors that permitted it or what's the difference because you've had rod block monitors?

DOCTOR WILKINS: Joe, can you --

MR. HUCIK: This one is automated.

DOCTOR WILKINS: It's automated is the main difference.

MR. HUCIK: This one updates as you go, updates so that you can actually follow and not hit the operational transients and the current one tries to go to the safety limits, whereas this one protects against the operational limits and provides a continuous update as you go.

COMMISSIONER REMICK: Okay. So it's basically a refinement of what you've had in the past?

DOCTOR WILKINS: Yes. It continuously keeps track of how far you could move a rod without getting in trouble and then make sure you can't go past that.

COMMISSIONER REMICK: Okay. Thank you.

DOCTOR WILKINS: (Slide) Next chart.

On the ATWS events, we've made another

major step forward in that in addition to having the control rods can go in either electrically or hydraulically, we have retained the standby liquid control system which can inject boron and that is automatic in the ABWR. When we look at station blackout, we now have three diesel generators plus the diversity of a gas turbine generator which gives a backup means of electrical protection against loss of off-site power.

(Slide) Next chart.

Finally in the severe accident area, we have provisions for AC independent water addition to the vessel as a feature that goes well beyond requirements, but we felt was an easy and prudent thing to do in this design. We've also designed, even though our probabilistic risk assessments tell us the probability of core damage in the ABWR is extremely low, down in the 10^{-7} range, we have arbitrarily designed such that if you just assume a core melt without worrying about how it happens, we've designed so that the lower drywell would be flooded and any core debris would land in the water in the lower drywell and provided a containment over pressure protection feature to ensure that you do not have a catastrophic or uncontrolled failure of the

containment.

Those two features combined give us a capability where in the event of a core melt we believe there would be no observable off-site health effects. The dose off-site would be less than 25 rem at a mile, or at a half a mile.

One other feature that I should mention is if you put all this together the ABWR is designed to handle any design basis event for 72 hours without operator action. That was one of the objectives of our effort on the passive plant designs and when we looked at the ABWR we found with relatively few additional automation steps we could achieve the same goal in the ABWR and we've, in fact, taken those steps and done that.

So, we look at the ABWR as a major technological and safety step forward from our past. I mentioned core damage frequency in the 10^{-7} range. We believe it will have a capacity factor capability of 85 percent. We look to occupational exposure annually to be below 100 man rem. We look for significant reductions in rad waste volume and we believe that the ABWR is going to be the most economically competitive BWR we've ever had in the market. So, we're quite pleased at this point with

how far we've come with it.

Let me shift and talk a little about the--

COMMISSIONER REMICK: Dan, before you leave that, I assume your core damage frequency of 10^{-7} is for internal initiators only, not including external initiators.

DOCTOR WILKINS: It's --

MR. QUIRK: Let's see. Our commitment is 10^{-6}, including external events and 25 rem in a half mile, both internal and external. Now, Dan said 10^{-7} and I think that's an internal event.

COMMISSIONER REMICK: Yes. Even 10^{-6}, the return frequency on pretty large earthquakes is much smaller than that. I don't know how you can make your claim of 10^{-6} on an external, but we'll pass on that at the moment.

DOCTOR WILKINS: This is designed for a very high seismic region in Japan.

COMMISSIONER REMICK: But your U.S. design is for .5 g, .3 g?

MR. QUIRK: .3 g, yes. Evaluated probabilistically at twice that.

COMMISSIONER REMICK: I just raise a question about that for external initiator list pass.

DOCTOR WILKINS: (Slide) Listed on the

next chart, the next two charts for that matter, are some of the major steps along the road. But as Doctor Specker mentioned, this is our eighth meeting. I'm proud to say I've been at all of them over the years starting back in '86. Major events along the way have been the utility requirements document. Early on in '87 we developed with the staff a licensing review basis which I think served us very well in guiding us through many of the issues that we've dealt with in this program. The standard safety analysis report was in in submittals starting in '87 and continuing up through '89. In the '88, '89 time frame, the Commission requested us to expand the scope of the submittal to include the whole plant. At the early stage of this program we were planning to do the nuclear island only. We took that advice and submitted the whole plant in '89. We were in the question and answer process with the staff through '89, well into '91, and then into amendments which have gone up to very recently. The most recent amendments, what was it 30?

MR. QUIRK: 33.

DOCTOR WILKINS: 33, was an integrated amendment where we took all of the loose ends and open issues that had come out of the review to date and

folded them into a completely new integrated version of the SSAR rather than the original plus amendments that you had to try to piece together.

We worked hard in '93 on the tier 1, the design certification material. In parallel to all of this, of course, the staff was developing what now is going to end up as five major drafts of the safety evaluation report and we believe that we are basically on track with final design approval in May and design certification process beginning after that.

(Slide) If we again -- next slide, please -- look at the certification process a little differently, I think certainly we at GE are proud and I --

CHAIRMAN SELIN: I'm sorry. Say that again. I didn't hear what you said.

DOCTOR WILKINS: I want to look at some of the things we've covered in the certification process in terms of issues that have been dealt with and resolved. I said we at GE are quite pleased with the way these have been resolved. We think as we've gone through the integration of our effort with the utility requirements document, the resolution of the major technical issues, particularly severe accident and in three SECY documents that are mentioned here, the

manner in which we've dealt with the level of detail, the ITAACs, the environmental issues and the rulemaking process to the extent it's been dealt with, our feeling is in all cases that these were difficult, lengthy discussions but we got to good answers and good workable, practical solutions that will make the certification be useful in the future. So, it's been a long, hard struggle, but we're pleased with the outcome.

There are currently 14 open issues in the draft of the final safety evaluation report and Joe Quirk will talk about some of these in a little more detail and give you our perspective. Four of them are still in the staff's hands. Nine of them are in our hands. One of them is before the Commission. We see no reason that all of these shouldn't be fairly easily resolved in the coming weeks or months.

COMMISSIONER REMICK: Dan, I don't think that is literally before the Commission. If I recall, the staff has indicated that they're going to handle-- in the final SER we did have a paper indicating a staff leaning. But if I recall, the Commission was not asked for a decision.

DOCTOR WILKINS: Okay.

COMMISSIONER REMICK: I could be wrong,

but that's how I recall it. So, I don't think it's actually sitting on the Commission's desk at the moment.

MR. QUIRK: That is different than we understand. We were told that there was an internal memo from the staff to the Commission outlining the basis for their requirement of a diverse RPV water level system and that they asked for the Commission endorsement. And along with that, they had a copy of the ACRS letter that heard the GE presentation on why no change was needed beyond that which is in existing operating plants and the ACRS confirmed the GE position in their letter. That package was sent to the Commission for your input and we're very anxious that the Commission promptly resolve this.

COMMISSIONER REMICK: I could be wrong. I remember the draft and it was marked a draft --

MR. QUIRK: Yes, it was. It was.

COMMISSIONER REMICK: -- with indication it was going to be resolved in the FSER. When that came out, I purposely looked at that. It's not addressed in there and I was told it would be addressed in the final, but I could be wrong. Maybe there's something I missed. I could be wrong.

MR. QUIRK: Could we encourage the

Commission to please --

COMMISSIONER REMICK: One way or the other, yes.

MR. QUIRK: Thank you.

DOCTOR WILKINS: So, I guess, just to summarize, I believe we have a design here that's a dramatic step forward in safety. I suspect it is the most thoroughly reviewed design that we have ever brought before the Commission. It has been through the reviews by General Eclectic, Hitachi, Toshiba, TEPCO and MITI in Japan. It has been through extensive review by U.S. utilities and their consultants. Many features of it, particularly the process approach, has been reviewed by the U.S. industry led by NUMARC, the NRC staff and consultants, very extensive ACRS review.

We've been down an eight year road that has pioneered a new regulatory process with, as I said, good solutions to the issues that came along the way. The lead plant is 50 percent built in Japan. It's the lead plant for the first-of-a-kind program here in the U.S. I think there's been a lot of hard work by certainly GE and the staff and we think we're in the home stretch and we'd like to move on and wrap up the FDA on the current schedule and get on with the

certification step.

Joe?

MR. QUIRK: (Slide) Next chart, please.

This chart shows the intensive ACRS involvement that has occurred. As you can see from this chart, the activity intensified in '92, which was the high water mark for the ACRS meetings. If one breaks down the two year period over '92 and '93, they find that we met with the ACRS on an average of about two meetings per month. That's both subcommittee and full committee and that's quite an ambitious active undertaking. We look forward to receiving a favorable ACRS letter in the near future.

(Slide) Next chart, please.

While Dan's comments were very ringing and gracious as to the progress that's been made on design certification process issues, and I agree wholeheartedly with those, there are however a few -- I'm going to call them loose ends, if you will, items that came up under discussion of the advanced notice of proposed rulemaking during which there was a workshop and input received from industry. In particular, NUMARC commented extensively on the advanced notice of proposed rulemaking. General Electric and other vendors provided comments. In GE's

case, we fully endorsed the NUMARC comments and emphasized a few issues that were still needing to be resolved.

(Slide) I would like to go into the next couple charts. There are four issues I'd like to highlight to you for your attention. Some of these are in the resolution mode and some we would like to urge Commission decision.

As I said, tremendous strides have been made by the industry and the staff in all the design certification process issues. Only a few remain to be discussed.

(Slide) The first such issue is the design certification process issues that impact the FDA. If you could go back to page 14, please. This is the final design approval in design control document separation. Now, industry has proposed that the staff issue the FDA prior to completion of the design control document. Design control document is only needed for rulemaking. Resolution of design control document issues will not effect the completeness of the staff safety review, and separation of these two issues would allow an important milestone to be achieved, namely a conclusion of the staff review and issuance of the

final design approval.

We understand that the staff is considering this position and will soon be forwarding the essence of this position to the Commission for approval. We were delighted in the progress and we look forward to the ultimate resolution of this.

COMMISSIONER REMICK: Joe, I agree with what you said here factually. What is the importance of that? I guess I better understood it when you were considering bidding in the Taiwan case. But what is the importance to your company of what I presume would be a several month delay?

MR. QUIRK: It could be even more than that. But the importance is the achievement of a major program milestone. And for no real good reason not to, other than a subject that was going to be dealt with next. That shouldn't affect attainment of that important goal. So, nothing other than we've been at this a long time, we need to show progress, we need to show completion and for that reason we would like to separate them and deal with them.

COMMISSIONER REMICK: Do you have any position if when the design control document, when it came out did reveal some apparent need for a change to the FDA, do you have any views on that, whether that

should be possible or not possible and how restrictive that change should be, considering Part 52?

MR. QUIRK: You know, I would be surprised if there was an issue. I don't think that's possible and the reason is that the design control document is two parts, tier 1 and tier 2, and tier 1, of course, as you know, includes the certified design description and ITAAC and interfaces and site parameters extracted from the SSAR and packaged. Tier 2 is, in fact, the SSAR minus proprietary information and minus some PRA detailed information. So, it's not a new review that's being done, it's repackaging what's already been approved. So, there should not be changes in the DCD apart from anything that's in the SSAR.

COMMISSIONER REMICK: Okay. Thank you.

MR. QUIRK: Okay. With regard to secondary reference issue, this is the first of three issues that I would like to talk about that impact design certification. I'd like to up front say that this one I believe is in hand. I think we are -- well, I know we are awaiting staff guidance to satisfactorily resolve this and I think it is, therefore, closed. It just hasn't been finalized and documented. If you'd like to go into this anymore, I'd be happy to, but --

COMMISSIONER REMICK: Just explain it a little bit more, just --

MR. QUIRK: Okay.

COMMISSIONER REMICK: -- what the problem is without going into a lot of detail.

MR. QUIRK: Let me try to do that. The design certification rule will reference the DCD. Therefore, the DCD by definition is the primary reference. But as you know, in tier 2 of the DCD there are thousands of secondary references and the question is what is the regulatory requirement embedded in each of those references that must be pulled out and put in the design certification rule. We believe that there should be no secondary references embedded in the design certification rule. Rather, those references contained in tier 1 be embedded. We believe this is consistent with the philosophy of the two tier concept and consistent with Commission guidance.

COMMISSIONER REMICK: Thank you.

MR. QUIRK: And we understand that that's in essence been agreed to by the staff.

The next item affecting design certification is treatment of PRA information. Let me say that we received staff guidance in August that

described what this PRA report would consist of. Now, let me back up a minute. Chapter 19 of our SSAR is the PRA and the severe accident evaluation. It is some four volumes long and includes event trees and fault trees and all the probabilistic voodoo, black magic I call it, that comes about. You can see my biases. Anyway, and a lot of that information is not appropriate to be in the SSAR and the staff recognizes that as well. So, the recipe, if you will, the equation for what tier 2 and the DCD would be, tier 2 would be equal to the SSAR, minus proprietary information, minus the PRA but plus, put back in, a PRA report that summarizes the key PRA features and insights and we agree with that. We have no difficulty with that.

As I mentioned earlier, in August we got some guidance from the staff that further asked for very specific and quantitative information to go back in as well. We believe that that will put a burden on the Part 50.59 change process, that we may be required to run the PRA and determine the effect of that change on probabilistics. If we increased the core damage probability minutely, say from 10^{-12} to 10^{-11}, nevertheless that is an increase in safety and could be considered an unreviewed safety question which

would put us back in a formal process for resolving that.

So, we do not intend to use the PRA in that manner and we don't think anyone should. So, what we would like the staff to do is reach agreement on what constitutes a PRA report, what do you put back in, and we're in the discussion modes of that right now and it's going pretty well. I don't mean to say it's all lost. We just need to keep it on the table, be mindful of it and make sure that it gets concluded in a satisfactory way.

The next item is applicable regulations. On this particular matter, the staff proposes that the design certification rule adopt as applicable regulations various Commission approved staff positions that they have passed on over the years. These are policy positions, if you will, that go beyond the staff's SRP and reg. guides which had been brought to the Commission and approved by the Commission. And our design has been conformed to that position. Features have been added, analysis has been provided demonstrating compliance with the position. So, we're not at odds here in any way, shape or form with regard to complying with the Commission policy. What the issue here is is must all those SECY

documents and Commission policy statements be compiled in an applicable regulation section of the design certification rule? Those positions would have to be redrafted, restated and we're worried about additional interpretations and downstream interpretations that could complicate proceedings. And so we believe that that shouldn't be the case, that the design is correct.

It will be certified as conforming to the Commission policy and it's imbedded in tier 1 and tier 2 and this is rather moot, and we hope that the staff does not continue in this direction to make applicable regulations out of Commission policy statement.

COMMISSIONER REMICK: So, if I understand your position, those requirements will be codified in the design certification rulemaking, in that rule. I thought your argument was, but perhaps I misunderstood it, that it should not then also therefore be put into, let's say, a requirement of Part 50. Am I -- you're basically saying something different than I thought.

MR. QUIRK: Maybe I said -- let me try again.

COMMISSIONER REMICK: Okay.

MR. QUIRK: The design has been approved

as meeting the Commission policy statements and that will manifest itself in tier 1 where appropriate and tier 2 where appropriate.

COMMISSIONER REMICK: So it is codified.

MR. QUIRK: So it's codified. The design is right.

COMMISSIONER REMICK: Yes. And you're saying that's the only place --

MR. QUIRK: That's all one needs to worry about.

COMMISSIONER REMICK: I thought that was the argument.

MR. QUIRK: There is an item that I do not have a chart for that we have talked about and I think that it's worth raising here to the Commission, and it's an item referred to as "tier 2 asterisk." Industry refers to it as "tier 2 star." These are items that came out as a result of the staff's safety evaluation. They're not tier 1 items, but they're important tier 2 items and the staff has defined a limited set of these items, like 11 areas, and they will require that these items not be changed without review by the staff, and so it's not tier 1 and it's a little more than tier 2. We're eroding somewhat the simplicity of the two tier structure, however industry

has acquiesced in this instance because it has been defined and limited to just a few.

Where we have a problem on tier 2 star items is in the process to resolve. The staff says that these items cannot be changed using just 50.59, that these items must be reviewed and approved by the staff. That is okay from the industry point of view. The process that is used in closing that out is all that remains to be defined and we would hope that we could get from the staff a review and a letter back saying they have looked at the evaluation performed by the applicant, it is consistent with what they hoped for and it all right, and send a letter back, as opposed to a formal amendment to a license or an exemption or something that may be subject to rulemaking or hearings later on.

CHAIRMAN SELIN: Which you would argue is essentially tier 1.

MR. QUIRK: Yes, exactly. And I apologize for not putting this on a chart. On the way to the meeting we thought that it was important. This issue was identified in the detailed industry comments provided by NUMARC, was also emphasized in GE's comments, and we think to be consistent we should raise it at this time.

(Slide) Please move to the summary chart.

In summary, as Dan walked through, we feel very proud that the ABWR incorporates major technological and safety improvements. We know and we've heard from both the staff and the ACRS members that the review conducted on the ABWR has bee the most thorough and rigorous ever conducted on a plant, period. We believe that statement to be true, and much progress has been made such that we're at the threshold now for issuance of the first FDA under Part 52. We are holder of an FDA under Part 50 and we thought we knew what was involved in achieving an FDA under Part 52. Little did we know what was actually involved. And, as Dan said, it's been a long road. It's been a difficult road, but one in which meaty issues have been dealt with and resolved in an acceptable lasting way, we believe.

There are remaining items, just a few, that need to be done.

Number one, we need to complete the ACRS review and obtain a favorable letter.

We need to complete the Commission's review of the advanced copy of the SER that was sent to them by the staff in December.

We look forward to issuing the final

safety evaluation report and the FDA, and of course initiating then a design certification rulemaking.

We also want to encourage the Commission from comments that we've made today to follow-on with the good start and progress that's been made on the advanced notice of proposed rulemaking. The Commission guidance to the staff earlier was to go through the workshop, factor in comments received and issue the advanced notice of proposed rulemaking in final form. We agree with that direction. We urge that it be done and that it be done in a timely way to enable orderly and easy transition into the certification process.

CHAIRMAN SELIN: Doctor Specker, did you have anything else that you wanted to add?

DOCTOR SPECKER: No. That concludes our presentation.

CHAIRMAN SELIN: Thank you.

Would you, whoever is the appropriate person, sketch out what the implications would be in a technical sense if GE were required to provide an alternative source of pressure vessel water level, an alternative water level measurement?

MR. QUIRK: Yes.

CHAIRMAN SELIN: I mean, I understand the

argument of why you don't think it's necessary, but, if some arbitrary terrible person required you to do it anyway, what would you have to do?

MR. QUIRK: Well, there are a number -- well, the staff has told us that there are some options being developed in Europe. Heated junction thermocouple is one and acoustics is the other. We've looked into that. We believe neither of those are qualified for this application and in fact wouldn't serve the purpose that the staff really wants them to, and I need to just explain that.

The staff agrees that the delta-P water level measurement system in the ABWR and in earlier plants is adequate and safe. They underscore that statement for steady-state conditions. On conditions where there is rapid depressurization, they think there can be some artificial heat-up, for example, or flashing of non-condensibles that could alter the reading and make it erroneous. We've felt we dealt with both those issues. Heat and flashing due to LOCA energy we've dealt with, as well as non-condensible generation upon rapid depressurization. We know of no other issue that could common mode fail the water level.

So the question then is, if you want

anyway to have a diverse system, is there something out there that would deal with this transient situation, and we've looked at the two I've mentioned and feel that they would not in fact do it.

CHAIRMAN SELIN: So, this will be a show stopper then?

MR. QUIRK: No, no. If the Commission said, whatever, we want you to do it, the staff has outlined requirements that this system would have to meet. It does not need to be safety grade. It should be redundant. It does not need to be seismically qualified. A whole list of things that we could work with and incorporate and not at an overriding cost to the plant.

CHAIRMAN SELIN: So there are solutions, plausible solutions to this additional requirement?

MR. QUIRK: There are things that we could do to comply with the staff request. Whether they're solutions or not is argumentative.

COMMISSIONER de PLANQUE: Does the staff say that those solutions meet their requirements?

MR. QUIRK: They really haven't said that.

COMMISSIONER de PLANQUE: They haven't said that. Okay.

CHAIRMAN SELIN: Let me go back to your

statement. You're saying -- well, what are you saying? You're saying that you could comply with the request.

MR. QUIRK: Yes.

CHAIRMAN SELIN: Whether that provides further redundancy or not is subject --

MR. QUIRK: Whether that provides a reliable indication during the conditions of interest.

CHAIRMAN SELIN: Don't read anything into my sentence other than I need to know the answer.

MR. QUIRK: I understand.

CHAIRMAN SELIN: Okay. If the staff required and the Commission supported the staff's position, what would GE do and what would the implications be in terms of cost or time or what have you in your design?

MR. QUIRK: We would -- in terms of cost, we think it would be manageable and we could proceed and do it. In terms of time, it would depend on what the staff would require. We think that we could commit to meet the requirements and show a simplified diagram of how we would do that with a brief textual description that would describe the functionality and rapidly get approval of that and then require detailing that design at the COL application stage.

We think that would be a rapid way to proceed.

CHAIRMAN SELIN: Okay. Thank you.

COMMISSIONER REMICK: Do you think it's technically justified?

MR. QUIRK: Absolutely not. No, we do not.

COMMISSIONER REMICK: While we're on that subject, I'd like an update on the discussion of whether before the Commission or not. The best information I've received from the senior staff is it's before the Commission only in the form as an open item in the FSER and the fact we've received the ACRS letter, which we have. But the staff apparently has not pulled that together with specific request for the Commission for a decision and the staff will do that promptly. That's the word I get from the reaches of the auditorium.

CHAIRMAN SELIN: Okay. Commissioner Rogers?

COMMISSIONER ROGERS: Well, no. I thought this was a very interesting briefing. I don't have any technical questions, but I wonder if you could comment or would care to comment on what you've seen the role of the Commission, the Commissioners as the Commission, in moving this ahead. Five years or so

ago when the Commission really stepped in, I think, to the process because we felt we did not know what was happening and were concerned about policy issues that might be somehow or other inadvertently overlooked because they were embedded in technical matters, there was some unhappiness about the Commission's action at that time, particularly from General Electric. I wonder in retrospect whether you see the Commission's decision to be more actively and proactively involved with this review process as positive, negative or neutral?

DOCTOR SPECKER: Dan, you do want to --

CHAIRMAN SELIN: If you want to separate between Commissioners still serving and --

DOCTOR SPECKER: We'll let our historian here comment.

DOCTOR WILKINS: Well, I think when we set out on this program in '86, I believe, and Joe, correct me if I'm wrong, that our target for the FDA at that time was like September of '90.

MR. QUIRK: Yes, sir.

DOCTOR WILKINS: So, it's now early '94 and so certainly the process from our perspective has gone much slower.

COMMISSIONER ROGERS: Yes, but you didn't

have Part 52 when you laid that out. So, you have to take that into account, that it was a big change.

DOCTOR WILKINS: We didn't have Part 52, but we did anticipate it.

I think though I'll go back to my earlier comments. We are quite pleased with the resolutions that have occurred on the policy issues and how long it's taken us to get there is kind of behind us at this point. I think the result that we see coming out of this is going to be a high quality certification and it's going to be a certification that I think will establish the effectiveness and workability of Part 52. So, we're quite pleased with the outcome and then I guess therefore with the process that has led to it, assuming that we have an FDA in May and a timely certification after that.

CHAIRMAN SELIN: Let me ask you a follow-up question a little more towards the future. Are there things in the process as it stands today as it will affect the small boiling water reactor that you have problems with or do you think we sort of have it pretty much consistent with law where it ought to be at this point?

DOCTOR WILKINS: I would say that this has paved the trail very nicely for the small boiling

water reactor and other than the technical issue of passive safety and how that goes through, I think everything else we have done here ought to apply directly.

CHAIRMAN SELIN: Sorry.

COMMISSIONER ROGERS: No, that's fine.

CHAIRMAN SELIN: Commissioner Remick?

COMMISSIONER REMICK: Yes. Along that line, I'd just say it's been a learning process for all of us. A new part of our regulation, a very important one. I think we've stumbled along the way and vendors have stumbled along the way, but I've been very pleased with the fact that people have worked closely and I think the Commission has tried to resolve the issue. So, I agree very much with what you've said, but it is a new process. It's different than the Japanese process, which is closer to what we used to do. I think it's an improved process. I agree. I think your design is a much improved design with the things that you've gone over.

One thing that I'd like to clarify why I raised the question about 10^{-7}, I'm not a seismic expert. I don't claim to be a PRA expert, but I have on a number of occasions asked our seismic expert what is the probable frequency of an SSE in parts of the

United States that you envelope in your design? The answer is somewhere probably around 10^{-3}, 10^{-4} per year. If you get up to maybe a couple times the SSE, probably 10^{-4} or 10^{-5}. So, if it is possible to get an earthquake of several times the SSE, in that range, I honestly don't know how people can claim if they include seismic how you can guarantee that the core damage frequency is less than that.

I've taken this message not only in the United States but in other countries where vendors seem to be, each one, pushing a number lower than the other and trying to get people to explain when you put out numbers do you mean internal or external initiators or both or what, just so we at least know what's being -- so that's the purpose of my comment. I don't claim to be an expert. I'm not questioning your numbers, but I must admit in my mind there always is a question when I see numbers like that, particularly if they include external initiators in countries where seismic frequencies are relatively high and your envelope incorporates some parts of the United States where there's reasonable expectation of earthquakes. That's the basis for it.

If you have anything further on that after the meeting and want to supplement it, I would greatly

appreciate it, just for clarification.

I thank you very much for the briefing. I think it's been very helpful and timely.

CHAIRMAN SELIN: Commissioner de Planque?

COMMISSIONER de PLANQUE: Yes. I have just one question on the issue of approving the FDA before the DCD. I think I heard you said you wouldn't expect that to affect or feed back into the SSAR. If that turned out not to be the case or the staff saw that a change needed to be made there, do you see a problem with that?

MR. QUIRK: No, I do not. If it's to an extreme, of course. If it's a very limited area and something that came up, no problem.

COMMISSIONER de PLANQUE: Okay. I have no further questions. I found the briefing extremely helpful. Thank you very much.

CHAIRMAN SELIN: Thank you. So have I. We've been waiting for this presentation for a long time. The Commission will obligate itself to address the issues before it or better to be imminently before us and get them settled. We also, now that the main safety issues are well behind us, we are also desirous of getting on with the certification both on the procedural issues that Mr. Quirk raised and on the one

technical issue which either is or isn't or is about to be before the Commission, depending on your definition of that.

Thank you very much, Doctor Specker.

DOCTOR SPECKER: Thank you.

(Whereupon, at 11:04 a.m., the above-entitled matter was included.)

CERTIFICATE OF TRANSCRIBER

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

TITLE OF MEETING: BRIEFING BY GE ON STATUS OF ABWR APPLICATION FOR DESIGN CERTIFICATION

PLACE OF MEETING: ROCKVILLE, MARYLAND

DATE OF MEETING: JANUARY 26, 1994

were 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.

Carol Lynch

Reporter's name: Peter Lynch

GE Nuclear Energy

Advanced Reactor Programs

Presented to
Nuclear Regulatory Commission

S. R. Specker, Vice-President & General Manager
D. R. Wilkins, General Manager, Nuclear Services and Projects
S. A. Hucik, Manager, ABWR Projects
J. F. Quirk, Project Manager, ABWR Certification

January 26, 1994

COMMISSION BRIEFING
WEDNESDAY, JANUARY 26, 1994

AGENDA

10 Min.	Introduction	S. R. Specker
30 Min.	ABWR Features and Certification Activities • ABWR Safety Improvements • ABWR Certification Status	D. R. Wilkins
15 Min.	Design Certification Process Issues	J. F. Quirk
5 Min.	Summary	

ABWR
Safety Improvements

RIPs

- ***Eliminated large pipes, valves***
- ***No core uncovery LOCAs***
- ***Reduced radiation***
- ***100% flow with one pump out***

ABWR
Safety Improvements (Continued)

FMCRDs

- Eliminated scram discharge volume, 1/2 containment plumbing
- Two ways to insert drives
- Drive support eliminates shootout steel
- Rod drop, rod ejection accident eliminated

ABWR
Safety Improvements (Continued)

ECCS

- *3 separate mechanical and electrical divisions*
- *1/3 less piping and valves*
- *N-2 for transients*
- *Nearly N-2 for accidents*
- *Simplified number of modes*
- *Eliminated core spray spargers*
- *RCIC and HPCF initiation levels separated*

ABWR
Safety Improvements (Continued)

I&C

- *Multiplexer fiber optics*
- *Digital 2/4 for safety, voting mid of 3 for control*
- *Fixed wide range neutron monitor*
- *Period based scram protection*
- *ARBM eliminates rod withdrawal error*
- *Ganged rods (up to 26) in startup mode*
- *Advanced MMI*

ABWR
Safety Improvements (Continued)

ATWS

- Automatic for SLCS and other operator actions (RIP runback, FW runback)

Station Blackout

- 3 diesel generators
- Gas turbine generator

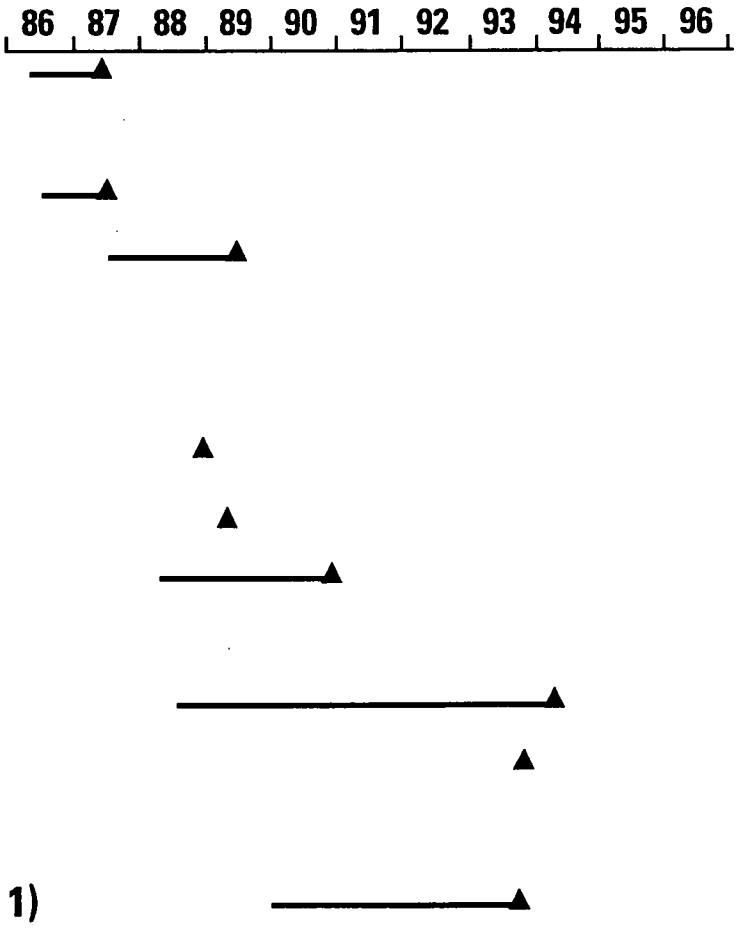
ABWR
Safety Improvements (Continued)

Severe Accident Features

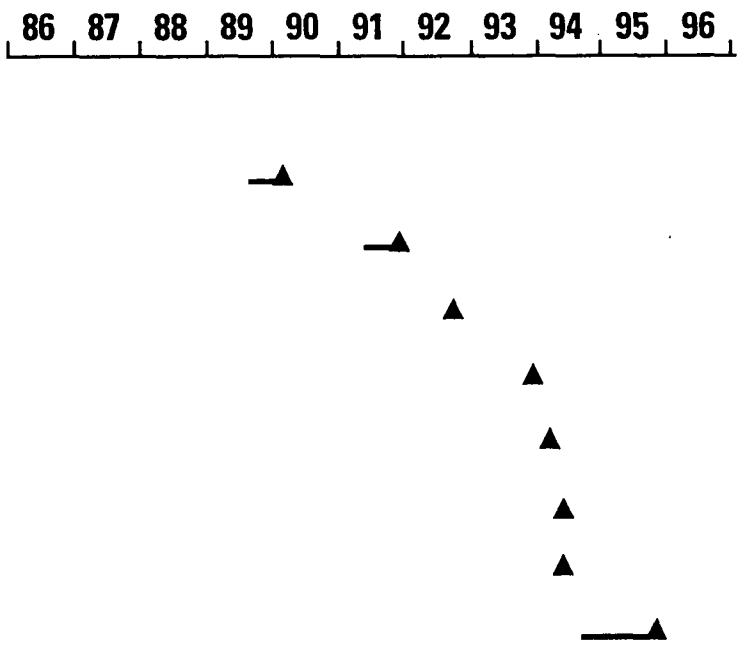
- *AC independent water addition*
- *Lower drywell flooder*
- *Containment overpressure protection*

ABWR INCORPORATES MAJOR TECHNOLOGICAL AND SAFETY IMPROVEMENTS

Summary of ABWR Certification



Summary of ABWR Certification (Continued)



- SAFETY EVALUATION REPORT
  - — PDSER
  - — DSER
  - — DFSER
  - — ADVANCED COPY OF SER
  - —FSER*
- FDA*
- DCD SUBMITTAL
- DESIGN CERTIFICATION*

** per SECY-93-097*

Certification Process Status

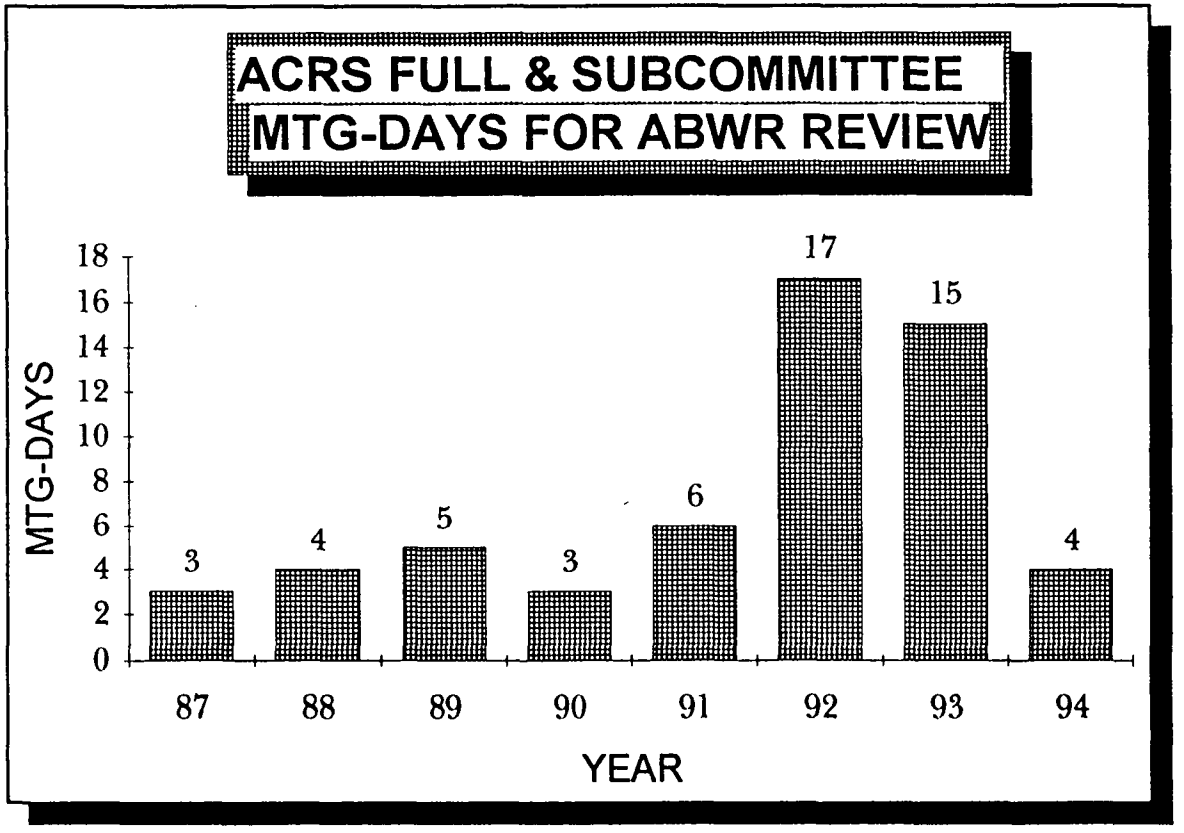
- **ABWR design certification and ALWR requirements are well integrated**
- **NRC review essentially complete**
- **All major technical issues resolved (SECY-89-153, SECY-90-016 and SECY-93-087)**
- **10 CFR Part 52 first time process issues resolved**
  - — Level of detail
  - — ITAAC - inspections , tests, analyses, and acceptance criteria
  - — Environmental (NEPA) considerations
  - — Rulemaking procedures

Certification Process Status (Continued)

- **Advanced copy of FSER issued: 14 open items identified**

  — 4 issues undergoing Staff action
  — 9 issues GE preparing response in January 1994
  — 1 issue (RPV water level instrumentation) pending Commission decision

NOW AT THRESHOLD OF FDA ISSUANCE



SIGNIFICANT ACRS REVIEW ACCOMPLISHED

Design Certification Process Issues Impacting FDA

FDA/DCD SEPARATION

- **Proposal for staff issuance of FDA prior to completion of DCD approval process**
  - — Resolution of DCD format issues will not affect content and completeness of safety review and findings supporting approval of FDA
  - — DCD relates only to DC Rulemaking
  - — Separation of two issuances would allow design review process to be completed within a time frame consistent with NRC-approved schedules
  - — Understand that staff supports separating FDA and DCD issuance

INDUSTRY URGES COMMISSION TO ENDORSE SEPARATING FDA AND DCD ISSUANCE

Process Issues Impacting Design Certification

SECONDARY REFERENCES

- **Preliminary Staff guidance on DCD treatment of SSAR secondary references caused serious Industry concerns regarding practicality and schedule impacts**

- **Further interaction has clarified Staff and Industry understanding**

AWAITING NEW STAFF GUIDANCE TO SATISFACTORILY RESOLVE MATTER

Process Issues Impacting Design Certification (Continued)

TREATMENT OF PRA INFORMATION

- ***Staff proposes DCD include PRA details, including probabilities***

  — Would make 50.59 evaluations burdensome and divert licensee and staff resources from more important operating issues to handling of license amendments or exemption requests for trivial increases in PRA probabilities

ONLY IMPORTANT DESIGN INSIGHTS FROM PRA SHOULD BE INCLUDED IN DCD AND SUBJECT TO 50.59 REVIEW PRIOR TO CHANGE

Process Issues Impacting Design Certification (Continued)

APPLICABLE REGULATIONS

- **Staff proposes DC rule adopt as "applicable regulations" various Commission-approved staff positions on severe accidents and other technical issues**
  - — Industry believes that Commission-approved staff positions will be embodied in Tier 1 and Tier 2 DC rule requirements

THIS PROPOSAL SHOULD NOT BE ADOPTED BY COMMISION

SUMMARY

- **ABWR incorporates major technological and safety improvements**
- **Much progress made . . . @ threshold of first FDA under Part 52**
- **Remaining actions**
  - — ACRS letter
  - — Commission review of advanced copy of SER
  - — FSER and FDA issuance
  - — Early commission action on ANPR process issues needed to maintain schedules for initiating ALWR rulemakings