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NUCLEAR REGULATORY COMMISSION

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(202) 234-4433

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PUBLIC MEETING

Nuclear Regulatory Commission
One White Flint North
Rockville, Maryland

Monday, June 4, 1990

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

COMMISSIONERS PRESENT:

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

STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE:

SAMUEL J. CHILK, Secretary

WILLIAM C. PARLER, General Counsel

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

J.J. TAYLOR, EPRI

W.R. SUGNET, EPRI

W.H. LAYMAN, EPRI

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

9:05 a.m.

CHAIRMAN CARR: Good morning, ladies and gentlemen.

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

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

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

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

Do any of my fellow Commissioners have opening remarks?

If not, who is proceeding first, Mr.

Taylor or Mr. Kintner?

MR. KINTNER: I guess I will.

CHAIRMAN CARR: Ed, go ahead.

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

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

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

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

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

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

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

with strengthening the effort we're embarked on.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

areas as supported by the technical basis.

(Slide) Next slide, please.

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

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

(Slide) Next slide, please.

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

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

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

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

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

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

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

COMMISSIONER REMICK: I understand what you're saying.

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

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

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

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

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

COMMISSIONER REMICK: Fine. Okay.

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

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

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

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

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

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

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

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

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

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

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

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

COMMISSIONER CURTISS: Okay.

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

So, Bill, would you address the next viewgraphs?

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

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

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

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

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

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

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

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

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

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

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

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

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

how you regulate margin?

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

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

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

CHAIRMAN CARR: We want standardized

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

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

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

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

COMMISSIONER CURTISS: I'm still --

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

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

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

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

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

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

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

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

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

COMMISSIONER CURTISS: Right.

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

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

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

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

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

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

carry out.

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

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

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

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

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

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

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

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

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

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

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

CHAIRMAN CARR: Well, I think the

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

In the interest of time, let's proceed.

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

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

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

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

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

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

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

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

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

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

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

CHAIRMAN CARR: I guess my only question

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

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

CHAIRMAN CARR: Okay.

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

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

MR. SUGNET: The lower concentration --

COMMISSIONER REMICK: Means igniters, probably.

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

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

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

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

for any kind of control system.

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

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

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

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

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

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

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

We've specified a large strong

containment, as I described a few minutes ago.

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

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

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

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

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

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

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

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

MR. LAYMAN: It would not be economic.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

COMMISSIONER REMICK: Thank you.

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

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

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

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

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

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

So that completes my discussion of the 15

technical issues. Let me ask John Taylor to summarize.

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

MR. SUGNET: We've had a --

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

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

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

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

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

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

of the PRA and the risk evaluation.

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

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

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

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

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

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

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

Thank you for the time you've given us.

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

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

MR. TAYLOR: Yes.

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

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

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

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

COMMISSIONER REMICK: Yes, I understand. Okay.

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

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

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

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

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

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

tell you when I report to you formally.

COMMISSIONER REMICK: Thank you.

CHAIRMAN CARR: Commissioner Rogers?

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

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

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

The other issues are equally important and

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

COMMISSIONER ROGERS: Okay. Thanks.

CHAIRMAN CARR: Commissioner Curtiss?

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

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

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

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

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

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

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

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

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

COMMISSIONER CURTISS: Okay. All right.

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

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

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

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

MR. LEE: Yes.

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

MR. LEE: Byron Lee from NUMARC.

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

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

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

MR. KINTNER: Absolutely, yes.

CHAIRMAN CARR: I'd be interested in --

MR. KINTNER: I thought we already had.

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

CHAIRMAN CARR: Okay.

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

CHAIRMAN CARR: He'll share it with us.

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

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

Have those copies been sent?

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

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

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

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

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

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

CHAIRMAN CARR: It depends on how we write

it, I guess.

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

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

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

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

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

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

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

MR. SUGNET: Maybe John could talk to --

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

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

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

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

CHAIRMAN CARR: Is that money that's--

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

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

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

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

Commissioner Remick, you had one more questions?

COMMISSIONER REMICK: Does EPRI envision a

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

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

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

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

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

COMMISSIONER REMICK: Thank you.

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

MR. TAYLOR: They've taken a step.

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

COMMISSIONER REMICK: Okay.

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

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

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

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

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

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

Do any of my fellow Commissioners have additional comments?

If not, we stand adjourned.

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

CERTIFICATE OF TRANSCRIBER

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

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

PLACE OF MEETING: ROCKVILLE, MARYLAND

DATE OF MEETING: JUNE 4, 1990

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

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EPRI

PRESENTATION TO NRC COMMISSIONERS

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

E. E. Kintner
Chairman, ALWR Utility Steering Committee

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

June 4, 1990

Utility/EPRI

Presentation to NRC Commissioners

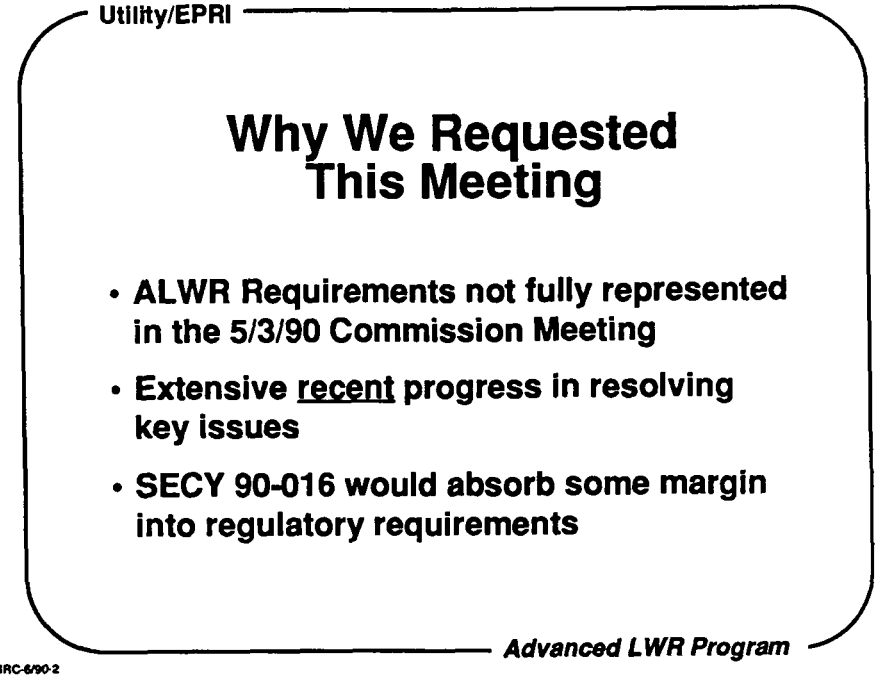
ALWR Program Resolution of Evolutionary Plant Key Regulatory Issues

June 4, 1990

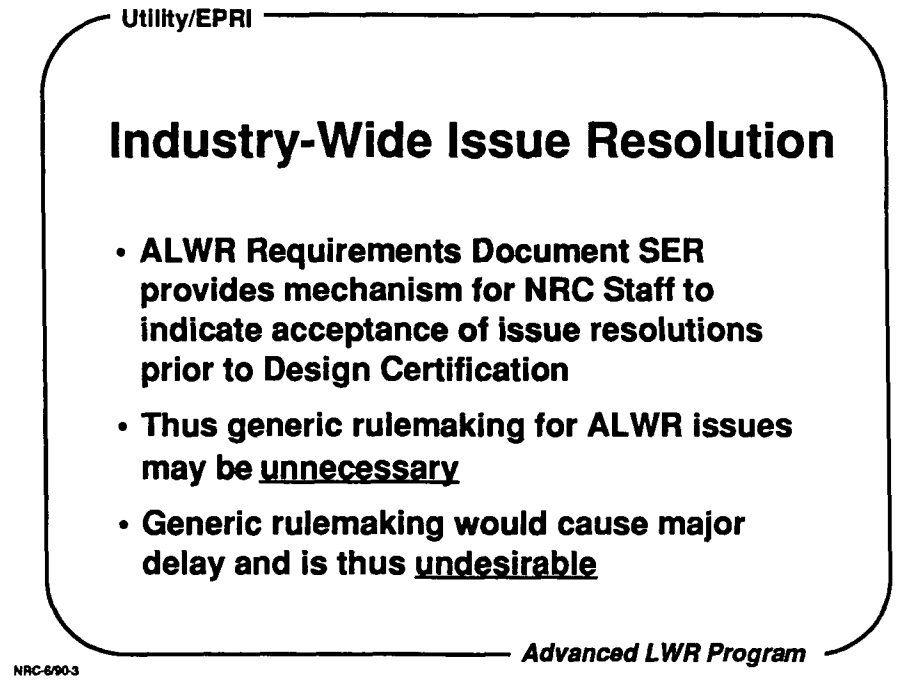
Advanced LWR Program

NRC-6/90-1

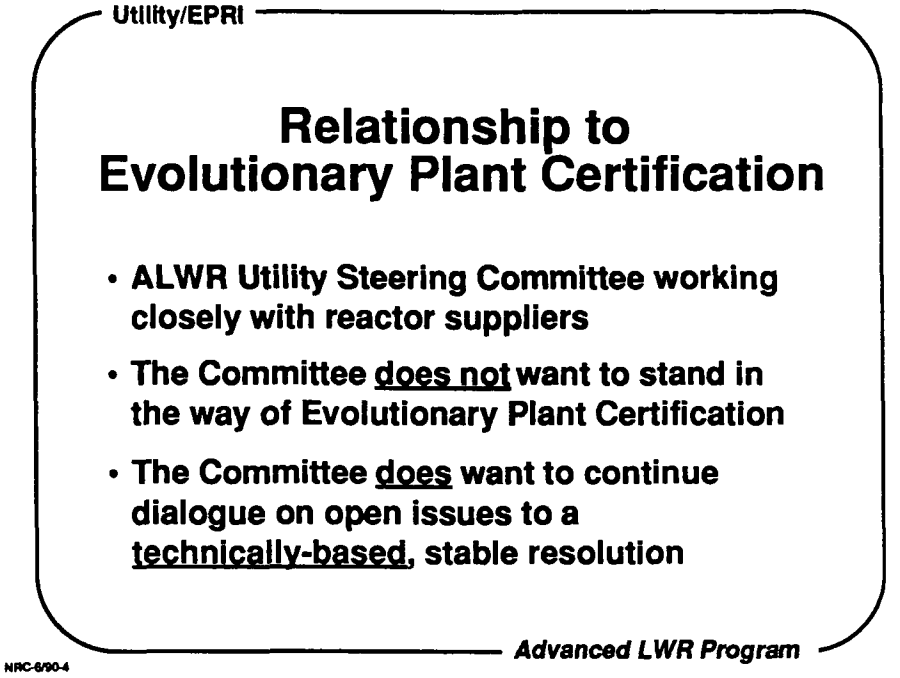
- ALWR Program is a UTILITY-driven Program
- ALWR Utility Requirements are technically based, with major emphasis on simplification and margin
- Industry recognition and support formalized by Nuclear Power Oversight Committee endorsement of ALWR Utility Steering Committee and EPRI ALWR Program
  - The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



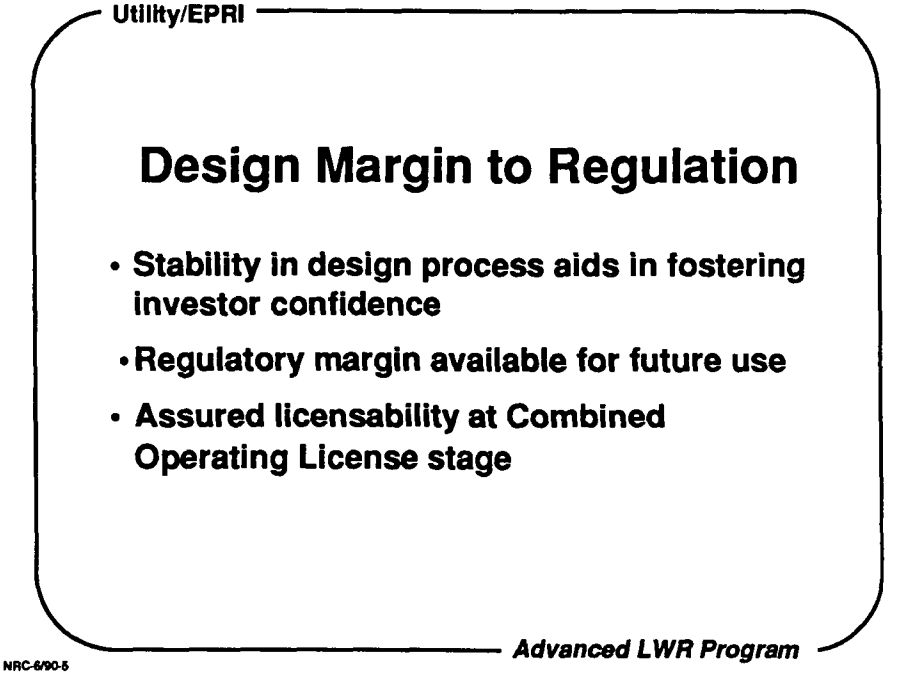
- Current ALWR Requirements for several important issues were not fully represented in the 5/3/90 Commission Meeting
  - lack of technical dialogue between Staff and ALWR Program (Chapter 5 DSER took 27 months; process discussions major contributor to delay)
  - Staff review did not completely account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



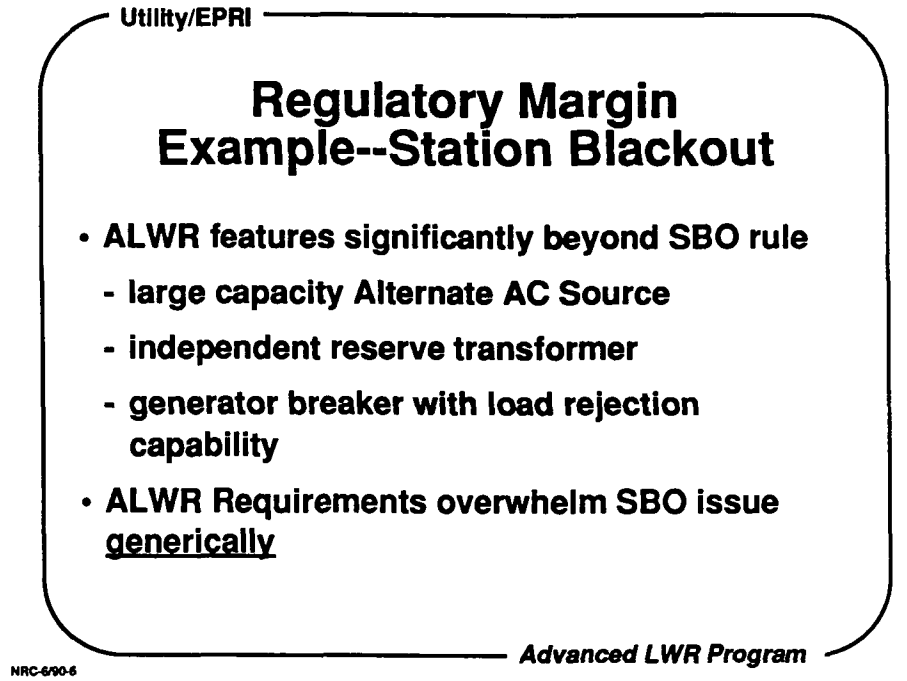
- Regulatory stability not assured if issue resolution is on application by application basis.
- ALWR Requirements provide sufficient basis for generic resolution. Where PWR/BWR distinctions are necessary, Requirements provide that detail
- This mechanism could supplant case by case resolution for some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



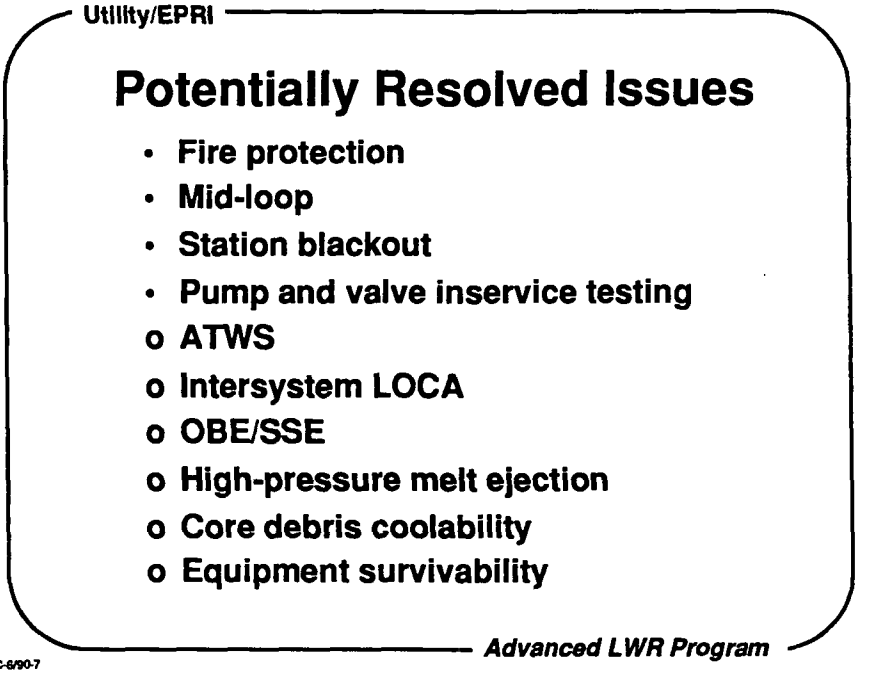
- The ALWR Utility Steering Committee is working closely with reactor suppliers on implementation of the ALWR Requirements to develop designs that meet the perceived need of the utilities for safe, reliable and economic ALWRs
- The Committee does not want technical dialogue on the Requirements Document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



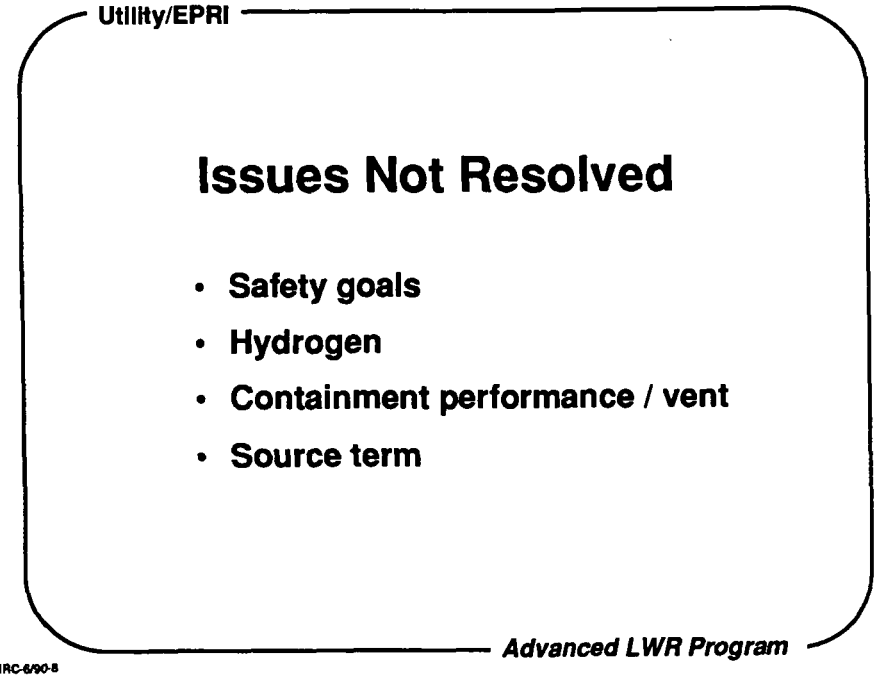
- Margin helps insure stability in design process through Certification for a particular design, helping to foster utility management and investor confidence
- Assured licensability at Combined Operating License stage
- Regulatory margin continues to be available for future use
  - Deal with new technical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



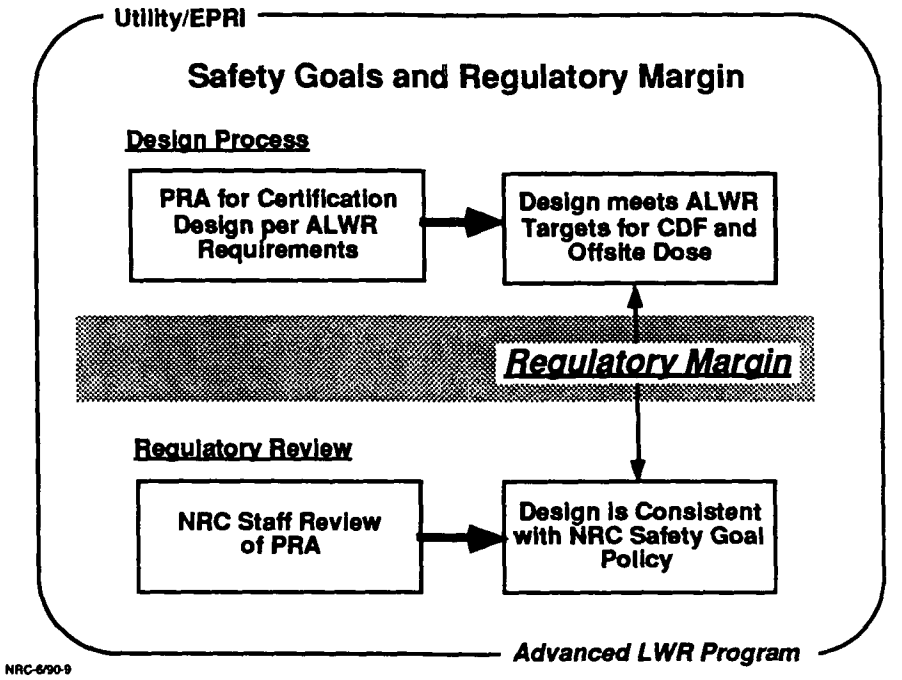
- ALWR Requirements go significantly beyond SBO rule:
  - large capacity Alternate AC Source (AAC) (powers non-safety loads on loss of offsite power; capable of backing up safety loads if needed)
  - independent reserve transformer
  - generator breaker with load rejection capability
  - three tier distribution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



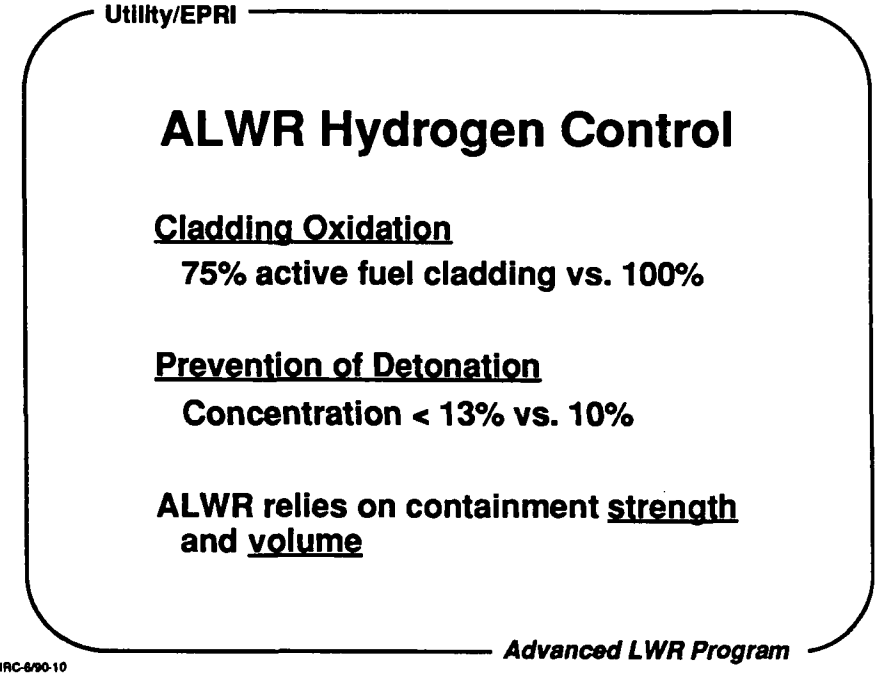
- The technical basis for resolution of these issues has been developed over the last two years and ALWR Requirements and NRC Staff positions are converging
- Further technical dialogue has taken place over the last two weeks on these issues
- Issues marked " • " are considered resolved, pending confirmation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



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



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



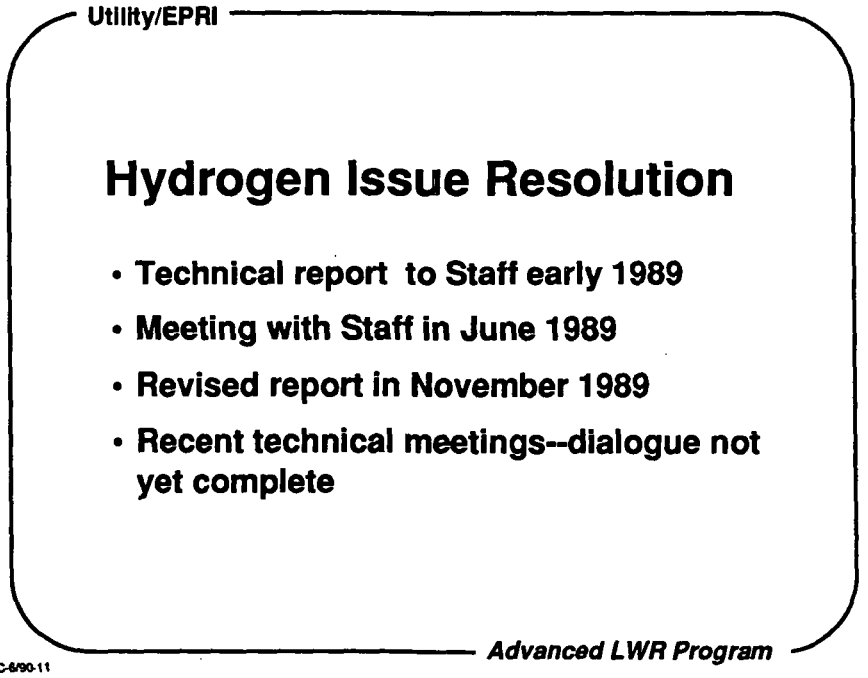
Cladding Oxidation

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

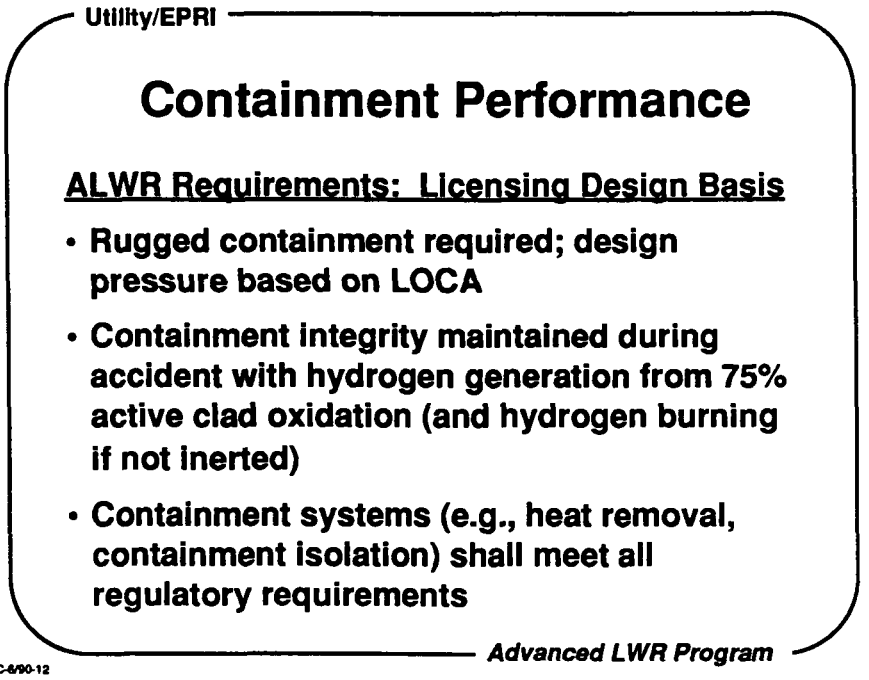
Prevention of Detonation

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

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

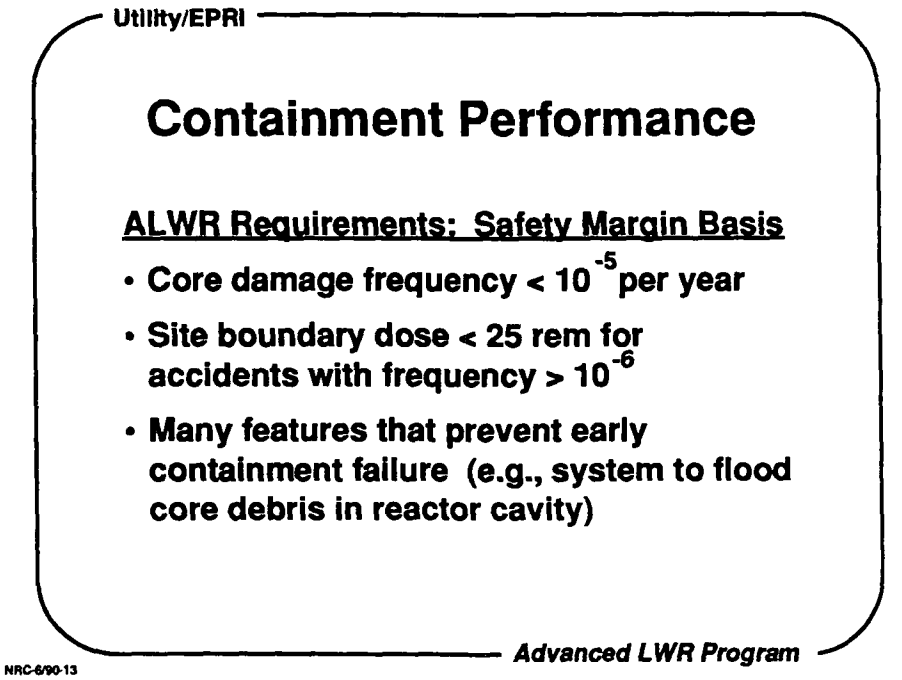


- Technical report to Staff early 1989
- Meeting June 1989 indicated some additional Staff concerns
- Additional analysis cases in revised report in November 1989
- Technical meeting planned for April 1990 aborted due to logistics problems on industry side
- Technical meeting held May 30. As a followup,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



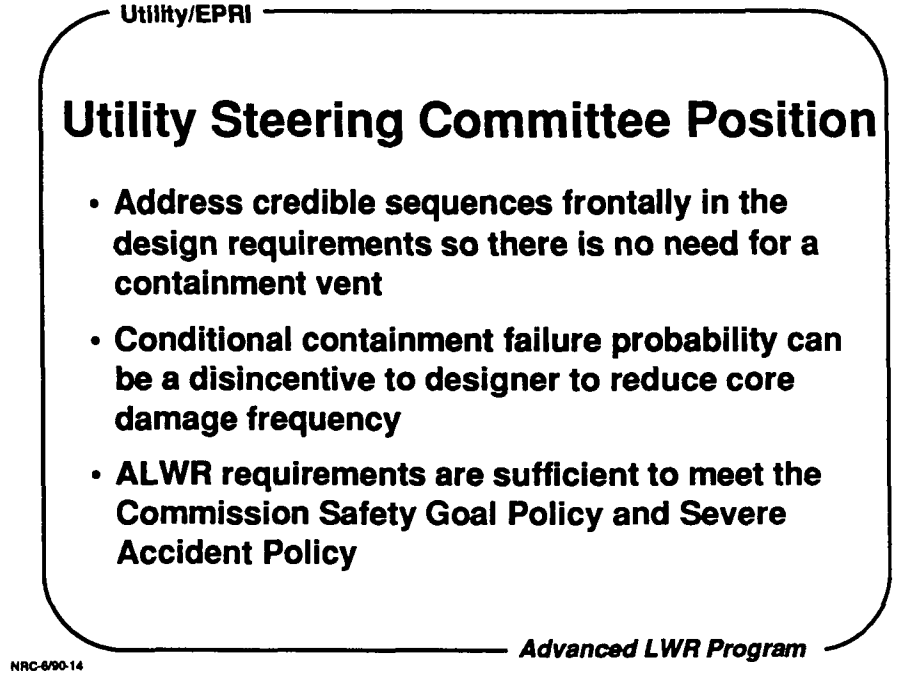
Licensing Design Basis -- The following summarize the principal design basis requirements for containment:

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

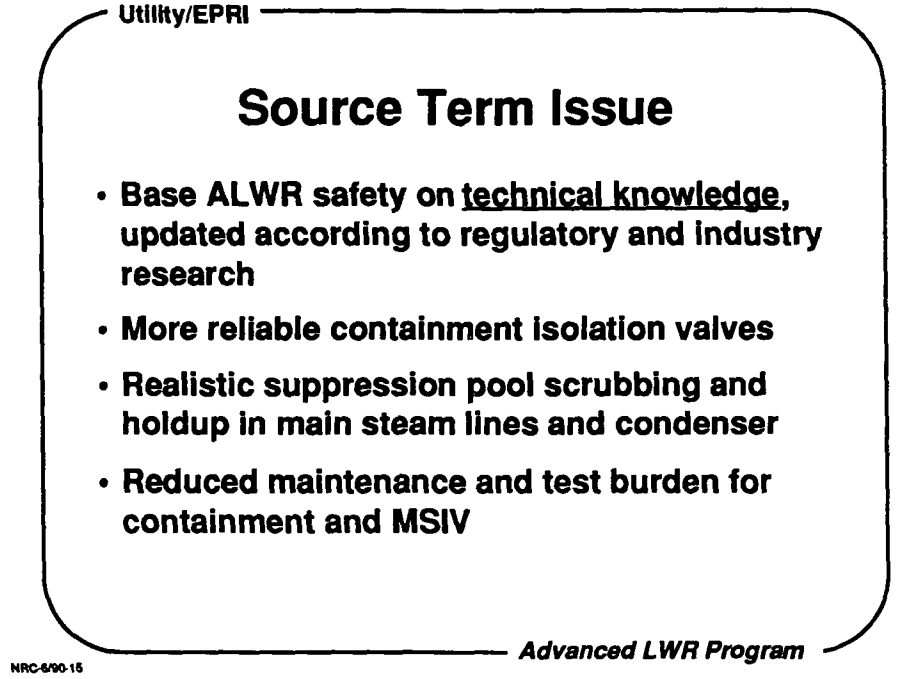


Examples of specific requirements for severe accident issues:

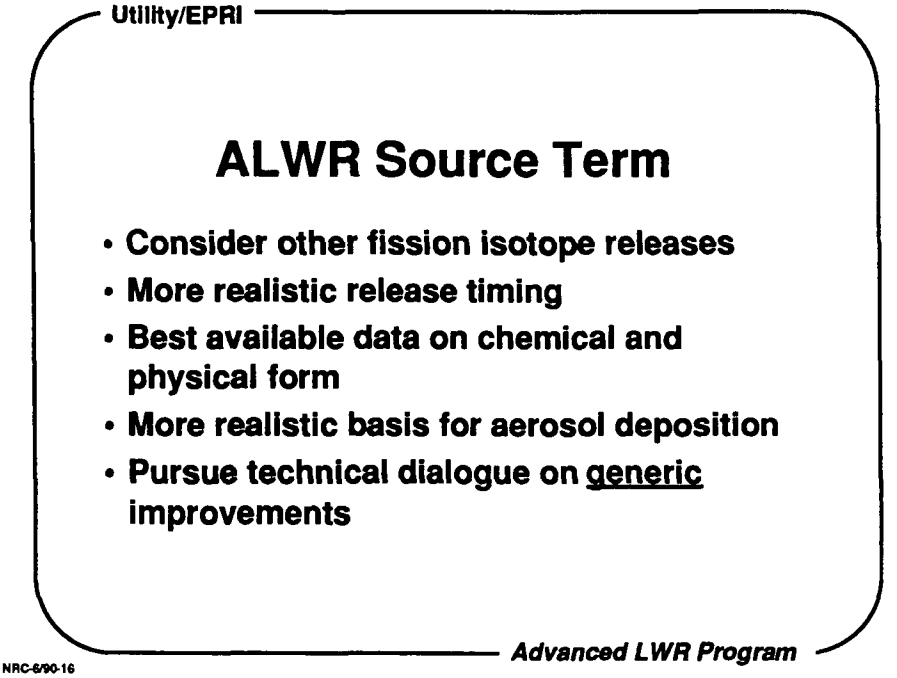
- Prolonged station blackout made even less likely by combustion turbine
- Improved containment heat removal capability
- Use higher pressure interfacing systems to prevent intersystem LOCA
- Cavity/lower drywell spreading area and flooding capability to cool core debris
- PWR containment size/strength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



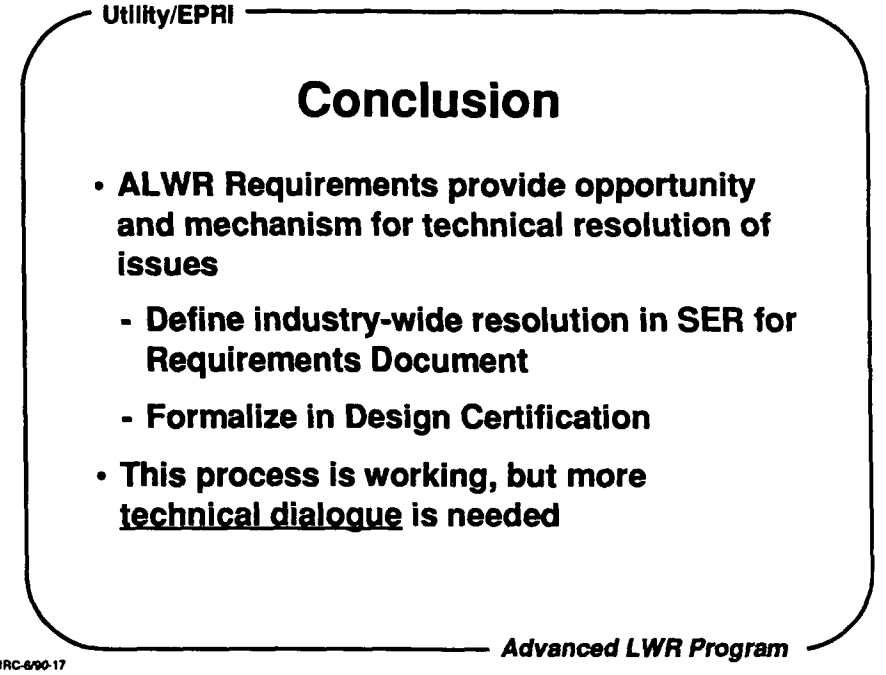
- The ALWR Requirements are sufficient to meet the Commission Safety Goal Policy and Severe Accident Policy in that they provide a rugged containment with margin and a higher standard of severe accident safety performance than prior designs
- The Committee considers that any identified issue regarding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



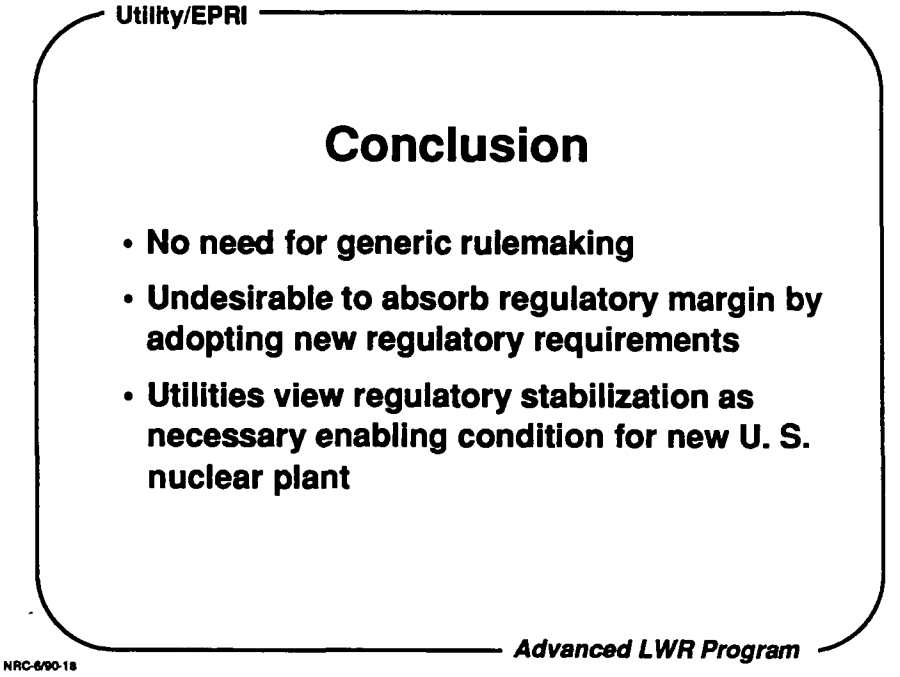
- TID 14844 was developed in 1962 as a "point of departure"
- Incorporate source term knowledge gained from research over the past three decades
- Desire for ALWR safety to be based on technical facts as opposed to non-mechanistic assumptions which may not be physically realistic
- Basis for more rational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



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



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



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