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NUCLEAR REGULATORY COMMISSION

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PERIODIC MEETING WITH THE ADVISORY
COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

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PUBLIC MEETING

Nuclear Regulatory Commission
One White Flint North
Rockville, Maryland

Thursday, March 5, 1992

The Commission met in open session, pursuant to notice, at 2:00 p.m., Ivan Selin, Chairman, presiding.

COMMISSIONERS PRESENT:

IVAN SELIN, Chairman of the Commission
KENNETH C. ROGERS, Commissioner
JAMES R. CURTISS, Commissioner
E. GAIL DE PLANQUE, Commissioner

STAFF SEATED AT THE COMMISSION TABLE:

KEN HART, Office of the Secretary

MARTIN MALSCH, Office of the General Counsel

DAVID WARD, Chairman, ACRS

DR. CHESTER SIESS, ACRS

CHARLES WYLIE, ACRS

JAMES CARROLL, ACRS

CARLYLE MICHELSON, ACRS

DR. IVAN CATTON, ACRS

DR. HAROLD LEWIS, ACRS

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

2:00 p.m.

CHAIRMAN SELIN: Doctor Ward, gentlemen, we're pleased to welcome you for the regular scheduled briefing of the Commission by the Advisory Committee on Reactor Safeguards. This Committee provides really many services, but they can be thought of as two, a set of statutory responsibilities in the licensing area and then a whole range of technical advice and technical support which is useful to the Agency at every level from the Commission down to the working level -- there's that phrase again -- the working level within the staff. Those of us who are not at the working level resent that phrase, but we'll accept it in any event.

I understand we have a rather focused program today with three specific topics to be addressed, the design acceptance criteria, the advanced reactor reviews, and then some specific rule changes in 10 CFR Part 50 and 10 CFR Part 100.

We're looking forward to your briefing today. Copies of the letters from the Committee to the Commission on these topics are available at the entrance to this room.

Commissioner Rogers?

The floor is yours, Doctor Ward.

MR. W[illegible]D: Thank you very much, Mr. Chairman.

The first item for discussion will be our February 14th letter on the use of design acceptance criteria during Part 52 reviews. I'll take just a couple minutes and introduce and I think I can very briefly summarize our recommendations. Then I'll go to Charlie Wylie who has some further comments on the letter, and then we'll open it to any questions that you might have on this letter.

First of all, in our letter, the second paragraph of the letter is really the heart of our recommendations, although there are some elaborations later on. But we state that we support the DAC approach for limited applications, but we think there should be some defined limits relating to both the scope and the extent of systems that are to be reviewed and accepted using DAC.

First of all, there should be a good reason for using DAC. One of the reasons is evolving technology and the desire to keep up to date. There may be other reasons, but they should be good reasons.

A second constraint which we think is a very important one is that DAC should be used only

when it's possible to specify practical and technically unambiguous criteria. I think we see both of those constraints as real constraints. They may-- although we agree with the DAC process in general, it may turn out that as applied we won't agree with it if there are attempts to use it beyond what we see as these two important constraints.

That's a summary. There are some other points in the letter which I think are important and Charlie Wylie will discuss those and then we'll open it to questions. Particularly, we had some, I think, important additional comments to the letter and you may wish to invite summaries of those or ask questions about those. But let me go to Charlie now.

MR. WYLIE: All right. Thank you.

Some of the points that the Committee raised in its letter included the staff's need for as-built or as-procured information for making final safety determinations relating to postulated pipe breaks as that information, in our view, should be available from general arrangement drawings and piping layouts which vendors should be able to furnish up front.

The Committee noted that the vendor for the ABWR stated in the original ABWR licensing review

basis that it intended to furnish those drawings. They were going to furnish the general arrangement drawings, piping layouts, electrical layouts, major conduit and cable tray layouts and HVAC layouts. At the present time, they do not plan to furnish those drawings. The Committee considered this and the Committee viewed that it believed that DACs were feasible for the staff to make its safety determination without that information, but by the use of DAC.

The Committee called to your attention in our letter a July 19, 1991 ACRS report, that guidance in the use of PRA which was promised in the severe accident policy statement for dealing with severe accidents had not been developed and it was needed for certification of the design. Another point the Committee made in the letter is stated that the usefulness of a design-specific PRA to address risk insights would be limited by the use of DACs since the validity of the PRA will be uncertain because system and operator performance will have to be assumed for PRA purposes at the time of design certification.

The Committee also cautioned that there's the potential for unforeseen systems interactions that may go undetected by the use of DAC since an actual

design is not available at the time of certification. And the Committee pointed out that where DACs are used, the COL applicant would have to complete the design by implementation of the DACs and that this has the potential or placing the burden of completing the DAC on the COL applicant who may interpret the DACs differently from the original designer.

I think finally the Committee pointed out that the extensive use of DACs has the potential of eroding standardization and the potential for litigation by the use of DACs.

So, I think that's sort of a summary of the points we've made in our letter.

CHAIRMAN SELIN: Doctor Wylie, I'd like to ask you a couple of questions. In fact, let me just put the questions out in general because there's a range of views. None of them is exactly inconsistent with the others, but there's quite a bit of nuance from one extreme to --

MR. WYLIE: And we're not of all the same mind either.

CHAIRMAN SELIN: I wonder if any of you is of the same mind just one at a time because it's a very complex issue and you can feel one way about one point and one about another point.

I really have two questions and then I'd like to just sort of throw the floor open. You're speaking now for the Committee, I understand, from--

MR. WYLIE: That's correct.

CHAIRMAN SELIN: -- the addendum, that you have some additional remarks that might be appropriate and the same with Doctor Lewis.

But I have really two questions. The first is I understand the shortcomings of -- well, I understand some of the shortcomings of trying to do a design assessment when you have to rely on DACs. You don't have a complete design. What's not clear to me is if you had the complete design could you do that much better as safety assessment? And the software side, which I'm much more familiar with, complete design doesn't do you that much more good. You need to have the actual software in hand so you can test it. You can't look at flow charts and source code and see all the traps.

I'm not so familiar -- I'm reasonably familiar with the stress analysis. I'm not so familiar with the interaction work, et cetera. But I would be very interested if you would not just characterize the shortcomings or the risks in doing a safety assessment using DACs, but compare those with

a safety assessment if you had more or less a full design in hand.

The second question that I wanted to ask you is -- it's a related question. That is it's not absolutely clear to me how much your remarks are based on the specific GE example as opposed to some generic concerns about DACs because although the staff and GE have not completely closed, there's a pretty explicit idea about what the staff expects and doesn't expect in the full design. The one area, except for the piping detail, which is not a trivial area, the two areas in which the staff is looking for DACs are both software and electronics areas. One is instrumentation and control and the other is the actual software within the control room itself.

So, in whatever order you wish --

MR. WARD: Okay. Well, I think both Charlie and Carlyle have some comments on that. Charlie, do you want to go first?

MR. WYLIE: Well, let me lead off. I guess -- I appreciate the comment regarding software and how that could not necessarily help you by having a complete design, what have you. But when you start to make the safety determinations as associated with pipe breaks and fires and floods and this kind of

thing, you need the layouts and to know where the equipment is, the safety equipment, and to know where the conduits, cables pass, which areas they pass through, where the ventilating ducts are that could carry smoke and fire and contamination and steam and what have you.

It's just that I personally as a designer, and I spent 35 years in the design business of designing power plants, I just can't see how you can do it with criteria. But you have to look at the physical layout of that plant, where things are located and know what's there.

CHAIRMAN SELIN: That I understand. But let me cut it the other way. Let's say you had what by industry standards would be quite a full design for the beginning of construction. Even Sizewell, which is the most fully designed plant I know if before construction began, isn't -- they don't have every conduit and every cable laid out.

MR. WYLIE: Yes, I understand that, and we weren't asking for that. What we were asking for was the major location of equipment and the major cable tray layouts and the major piping and the major HVAC and to know where equipment is in the plant.

CHAIRMAN SELIN: My understanding is --

I hope somebody will correct me if I'm wrong. My understanding is we do expect that of the design. Not the major plants?

MR. WYLIE: No.

MR. MICHELSON: No, no. By major you're going to get major pumps and heat exchangers, if they're big enough.

CHAIRMAN SELIN: And not the large pipes and --

MR. MICHELSON: No. We have no knowledge of piping in the engineered safety features, for instance. The only piping layout of consequence is inside of containment and main steam and feedwater. That's very abbreviated, but perhaps you could do an analysis from it.

CHAIRMAN SELIN: Jim?

COMMISSIONER CURTISS: Yes. Let me just pursue a point here. I'm not sure I am looking at the additional views and the majority opinion, understand whether you disagree on the standard that ought to be used for DAC or whether you agree on the standard, that is to say we ought to provide all the design information unless as-built information is required to produce that, and disagree on whether you can prepare fire and internal flooding-related information

with or without the as-built.

Let me back up to the first point and look at the additional views first. You -- in the last paragraph of your comments, "It is our view that it is technically feasible to supply this information before certification." Is that the standard that you would use for when to prepare the information versus when to use DAC?

MR. WYLIE: Well, I was referring to the drawings, the layouts, that kind of information when I said that it's technically feasible to supply that kind of information.

COMMISSIONER CURTISS: All right. It would be technically feasible to provide a lot of the information though that the staff is currently looking at DAC for, if I understand their position, which is that DAC should be employed where you have vendor-specific information, as-built or as-procured, site-specific information or evolving technology. Now, in perhaps all four of those areas, it might be technologically feasible, technically feasible to produce the information.

What I'm trying to get a sense of is whether there's a disagreement on the four criteria that the staff has proposed in its SECY paper -- those

four are the ones that the staff would use -- or whether there's a factual disagreement on whether the fire and internal flooding related information requires as-procured detail in order to produce. Your comments here seem to suggest, and going to the preceding paragraph, "Such drawings, layouts and analyses must be prepared without the benefit of as-built or as-procured information." I guess from looking at what you've said and what the staff has proposed, it seems to me it's a reasonable thing to say that if it requires as-procured or as-built information, that would be a candidate for DAC. And then the question is for this kind of information, does it require as-built or as-procured? Does it?

MR. WYLIE: I got lost.

MR. MICHELSON: Let me give it a try while you collect your thoughts on it.

MR. WYLIE: Go ahead.

MR. MICHELSON: What this is building up to, I think, is a basic argument of whether or not you need the as-built information as a basis for DAC and the argument we're presenting here is that no, you can do most of these safety evaluations without knowing what the final permissible nozzle loading is on a valve or a pump, for instance. You don't need that

to lay out piping.

The fact is, as we tried to point out here in a very abbreviated way, you don't start out building a nuclear power plant by buying valves, you start out by laying out piping. First of all, you lay out buildings and then you lay out equipment in the buildings and adjust around and you finally start connecting it up with piping and do some more adjusting, and then you start looking for cable tray locations. All this has to go on before you can ever worry about what the as-procured valve nozzle loadings might even be. The fact is you can do most of this work without having any as-procured information.

Now, if one of the criteria might be that you have to have as-procured to do something, sure, then a DAC may be the only way. But there's very few things that you need for safety evaluations that require as-procured information. Now, there is this problem. You have to use various techniques for determining where the pipes might break. Those techniques have to be based on stress levels at various locations. To some extent, you may have to, before you can select a final break location, like maybe a valve or pump nozzle, you have to know what the permissible loadings are on that device. To that

extent, you may have to postulate a break there during the certification stage and then you'll take care of it in your design. You may later be able to eliminate that break after the nozzle loadings for your valves and pumps come in and you see that it isn't a high stress area. You just don't know.

The designers just start moving their stress areas around. If you find you've got a high stress area where you don't want it, there's ways of getting rid of it. You can put expansion loops in and whatever and move it around to a new location. So, a lot of tricks.

COMMISSIONER CURTISS: Can I paraphrase what I think I heard? You all -- and correct me if I'm wrong. You don't disagree with the criteria that the staff is using for when DAC ought to be employed. That is to say, we would employ it if the design would require as-built information or as-procured information, plus evolving technology and site-specific. What you're saying, I take it, is that the design can be carried a lot further consistent with those constraints than it currently is.

MR. MICHELSON: Yes. I would envision you'd do perhaps 95 percent of your design before you'd need the as-procured. Maybe that last five

percent does require a DAC. That's my view.

MR. WYLIE: I would agree with that.

MR. MICHELSON: And we're doing it kind of the other way. We're saying that because I don't have the as-built to determine my final break locations, I'm not going to design any of it.

COMMISSIONER CURTISS: Ask one other question maybe of Doctor Ward. I take it the majority position here also reflects the view that the staff's criteria are reasonable, that is to say as-built, as-procured, site-specific or the evolving technology. But would it be fair to say that you believe, to the extent that we understand how it's being applied in the GE ABWR, that the design is being carried as far as it can be consistent with those criteria?

MR. WARD: Well, when you say can be, I think we believe it's consistent with those criteria, yes.

MR. CARROLL: But we also believe it could be carried farther, but we're not sure that that is absolutely necessary.

MR. WARD: Yes. To make a safety determination, yes, right.

CHAIRMAN SELIN: You've got a couple of important points there. First of all, the as-built

and as-procured is really a reflection of a more general principle which is that there are places where the economics aren't consistent with the reduction in risk. Those are considered to be two of them. It's an enormous judgment call to take a look and say, "How much information do we the staff need in order to make the safety consideration? And we the staff should require what we need for that, but no more than we need for that." That's reflected as a surrogate for the as-built or as-procured. But if there's a level of detail that they don't feel they need to require of the vendor in order to make the determination, then they shouldn't be requiring it at that point.

I am impressed in many things in this letter, but one is the patience of Doctor Lewis at this point I wonder if you'd care to take your discussion?

DOCTOR LEWIS: Well, it isn't that I care to, I have to. I'm sort of out of step with my friends on this one because -- partly because it's sort of looking into that when you talked about software. I'm a little more trusting than my friends. Now, in fairness, they've built nuclear power plants and I haven't, so they probably know more than I do.

But I have a feeling that I would rather

see us move toward a more functional and, in a sense, audit oriented licensing procedure. That is, it's not -- in any case, you always end up with an audit. You never check everything. You don't look at a bolt to see whether perhaps it was hollow in the first place or something -- we've had cases of counterfeit bolts. You don't really review the stress analysis for everything. All you review is the fact that somebody has done it.

I'm not as impressed by the need to do it in detail early on, not as impressed as my friends are. In fact, I think that to some extent this preoccupation with detailed information to look at at the beginning has held back the progress of the nuclear power industry. You have been quoted. I don't know if it's accurate or not, but you've been quoted as having been appalled at control rooms.

CHAIRMAN SELIN: It's pretty accurate.

DOCTOR LEWIS: Back in 1974, I was chairing the American Physical Society study and took the crowd, who had never seen a nuclear power plant, up to Diablo Canyon, a place that Jay has heard of before. It was partly built and they walked into the control room. These were people who in 1974 had been around the kinds of control rooms that we have for

high energy accelerators and that sort of thing. And in 1974 they were appalled by this control room and it went into service 15 years later. Not quite, but close enough.

So, there are many things of that category that I would point to in which the technology is going faster than our ability to build nuclear power plants. Now, for these plants, we're talking about things which don't exist, may never exist, but certainly won't exist for awhile. I would push the emphasis in the other direction. We don't build houses that way. You know, we have a uniform building code which gives specifications. We don't have fire regulations which require that before the house is built somebody review the whole thing. We have functional criteria and one assumes that people who oblige themselves to fulfill the functional criteria will actually do it and if they don't they get clobbered. They have to tear the thing down or something. But once you commit to functional criteria, to codes, to things like that, it's better to keep up with the technology and do it a little later.

So, in a certain sense, I'm speaking on a philosophical plane. I'm not ready to go in there and start digging, but I would like to see us push

away from the detail. I'm not so sure we do the detailed evaluations all that well.

CHAIRMAN SELIN: Any way.

DOCTOR LEWIS: We meaning NRC.

CHAIRMAN SELIN: I mean any way.

DOCTOR LEWIS: Yes, any way. Any way, the way it's done now. Once when we -- forgive me, Marty. Once when we had an attorney who was assigned to ACRS, to deal with our problems, we asked him if when we sign off on a license and mention a few items, that means that we've approved everything else that we didn't mention. To our horror, he said yes, that's what it means. Well, that's crazy. You know, we haven't looked at every detail of the design of the thing. But the staff has the same thing. They don't only look at a tiny fraction of the thing. They do it at an audit level and there's a kind of pretense that there has been a complete review.

So, my preference is to face that, to point in the other direction, to point to functional requirements. When you get an airplane license, you commit yourself to put an engine into this box which has a certain thrust, a certain reliability, and comes from a list of approved engines. You can swap them around later. There are lots of things like that in

which you have functional requirements like the move in that direction.

What I see in the Committee's letter is one of the penalties of experience. They are more experienced than I am, I grant it, but that has a penalty with it. You always want to do things the way your experience contributes to your ability to cope. So, I'm an oddball on this one and I confess that I may be wrong.

CHAIRMAN SELIN: But Mr. Michelson's remarks, if I understand them correctly, if you take the airplane analogy, he wants to see where those hydraulic controls are laid out so that if one of them fails they don't take down the second and the third train. He doesn't need to see exactly what the cross section is of the pipe. But your feeling, as Commissioner Curtiss said -- I'm really asking. It sounds like a statement, but I'm asking this. Your feeling is the criteria are okay and the principle is okay, but that you believe that within the criteria and the principle one needs at least in some of these areas somewhat more detail to make the high-level safety --

MR. MICHELSON: It certainly is a judgment call. For instance, I honestly believe that if you

wanted to use the DAC approach that you could build a nuclear power plant with a DAC. I think you can write all the criteria, all the words you need to build a nuclear power plant so you don't have to have any drawings. Well, that's kind of an extreme. I want to see some drawings. Now the question is how many. How far do you think you need to go? Well, if it's an area of evolving technology, clearly you expect to do less design detail and more criteria. If it's an area like piping, which is not evolving technology by any means, I would expect to see rather detailed piping up to the point of where you would need the as-built information to do the final part of the design.

MR. CARROLL: The reason I can't join Carl and Charlie though is that the kinds of things they're concerned about, flooding, compartment pressurization, fire, are things we've all done before, many times. I have real confidence that the vendors know how to do it. I have real confidence the staff knows how to write a meaningful DAC on it. So, although I'd prefer to see that done sooner than later, I really can't argue that DAC is not a feasible way to go in those areas.

COMMISSIONER CURTISS: You'd essentially

add a fifth criterion which is have we proven an ability to do it successfully in the past.

CHAIRMAN SELIN: I would actually prefer to put that somewhat differently, to go -- one is always doing a probabilistic assessment. We're just trying to get the risks down to a certain point. The question -- my view of all these design questions, not just DAC, is that there's a -- whether it's explicit or not, there's a level of risk that one is unwilling to accept and how much more risk one -- how much less risk one would take depends on what it would cost to get the risk even lower and that the economic part is part of this. I mean an assessment has to say, "This system looks like it will be safe and it can be safe if certain promises are kept." And how many places you want to design versus you're willing to accept a promise depends on what your sense is of what the risk is if you accept the promise.

What Doctor Carroll is saying, if I understand correctly, in areas which we have a lot of experience, you don't have to carry out the design in great detail because we know how to do this. Of course, then you take the other extreme and in areas where we don't have any experience at all, we might as well accept the promises because that's where the

technology is most --

MR. CARROLL: Well, I was going to say, the corollary to what I just said is that I guess I'm more concerned about whether we're smart enough to write a DAC on control room design, a meaningful DAC, or a meaningful DAC on digital control and prediction systems.

COMMISSIONER CURTISS: The point that intrigued me, and I certainly think the Chairman's approach is logically consistent, but in listening to the interaction between the staff and the ACRS at the meeting, the staff was very specific in saying that they weren't going to consider cost as a criterion for deciding when to use DAC. That discussion went back and forth between the staff and the ACRS in some extensive detail and it was of interest because we had talked about that at our previous meeting on DAC.

I'll need to take a more careful look at this, but it may be that we don't explicitly consider cost, but we do implicitly through the as-built or as-procured --

CHAIRMAN SELIN: Otherwise you would make them buy the stuff.

COMMISSIONER CURTISS: But we've at least said explicitly costs will not be a consideration in

defining when to use and when not to use DAC, or that's what the staff's proposing.

CHAIRMAN SELIN: I'd like to make one small comment and then I have a question to ask which is a generic question. It's going to sound offensive. I really don't mean it to be that way, but you need to address it.

The generic comment is that it would be foolish for the vendors to allow the utility to take full control of meeting the DAC criteria because then they would lose control of their design. So, there's nothing in the rule that says that it's the vendor who will finish the work and do the test. But we're assuming that given the enormous economic implications that if you're going to sell a dozen of these systems, that the vendor is going to want to maintain the configuration control. We've been going on the assumption that the vendor will at least maintain -- there might be some joint decision, but the vendor will at least maintain some level of control at the time he comes to accept the DAC.

MR. CARROLL: I guess I would disagree with that in some of the areas they're concerned with because traditionally it hasn't been the GEs that have done piping analysis, it's been the Bechtels and the

Stone & Webster.

CHAIRMAN SELIN: Doctor Carroll, you are leading me up to my inadvertently offensive question, which is how much of this conversation is based on the bad old way of doing things that we're trying to get away from and how much is based on the things that we're trying to do? An awful lot of the traditional stuff is what we'd like to not see repeated. You know, have the utility have control on the configuration, have people sort of arbitrarily choose the pumps and the valves, et cetera. I just don't have the background myself to be able to say, "Well, that's a good point, that's a generic point. Oh, no, this is the kind of thing that we're trying to change in Part 52."

MR. MICHELSON: Well, we've had a lot of experience now on older designs that have run into trouble later in life because they had not really analyzed this up front. What we're saying this time is let's analyze it up front so we don't have to chip out concrete and tear out pipes and --

CHAIRMAN SELIN: We all agree on that.

MR. MICHELSON: -- move walls and all that.

CHAIRMAN SELIN: Right.

MR. MICHELSON: So, we ought to know how to do it much better this time. That's what you'd like to see. You'd like to see these designs and you can review them and yes, and say with assurance they're being done better this time. But you can't do that from words. I don't think you can write enough words to make sure because we always had these -- about the same set of words have been in existence for 20 years and we have done some lousy jobs. You can read LERs everyday and find out we're still finding them because there's a lot of things.

Now, a DAC is not an answer, a design is not an answer when it's on paper. The final answer is building the plant, of course, and having the three dimensional hardware to look at and find out where you're troubles really are. But a lot of this can be caught up front if you do it up front. But you've got to do it in designs, you can't do it in words.

MR. WYLIE: A lot of the -- an extension of the use of the DAC will provide the flexibility for the COL holder to get an AE to complete that design and another COL holder to take that same design and get a different AE with the use of these DACs and complete the design.

CHAIRMAN SELIN: Well, that's true, but

the point that Doctor Carroll makes really is of serious concern to me because if the utility is going to finish up the design and sort of decide how they want to do it, then we're going to end up with non-standardized sub-optimum --

MR. WYLIE: Well, that's my point, is that --

CHAIRMAN SELIN: On the DAC points.

MR. WYLIE: But the DAC would facilitate that.

CHAIRMAN SELIN: Well, it would certainly facilitate it compared to have 100 percent complete design which would be known to be obsolete in a number of areas like the computers and the software. But the other point you raised, Mr. Wylie, we thought about and there's going to be a significant cost in showing that the DAC had been complied with, showing -- put the "with" wherever it belongs in that sentence.

For the second utility or the second customer to sort of casually come up with a different implementation or a different way of complying with the DAC and having to go through that considerable cost rather than to accept the first one where the conformance has already been demonstrated, we expect to be a high threshold and we want it to be a high

threshold. Not an unbearable threshold. If somebody comes up with a 686 chip for their microprocessors and show there's a significant improvement over the 586 chip, you can see I'm expecting that it'd be awhile before --

DOCTOR SIESS: As Mr. Michelson suggested, you can't really tell on some of these things until it's built and that's not in the electronics area. The DAC allows you to have a certified design, but then to make improvements as necessary to correct --

CHAIRMAN SELIN: But it sets a high threshold. The concept is that -- let's take --

DOCTOR SIESS: The question is do you want certified designs or standard designs.

CHAIRMAN SELIN: Well, we would like to standard designs. We require certified designs.

DOCTOR SIESS: Right.

CHAIRMAN SELIN: Let me take the --

DOCTOR SIESS: And you're not getting standard designs with the certification.

CHAIRMAN SELIN: Let me take the PC or the microprocessors as a simple example. With the DAC, you would end up for the instrumentation with really a detailed functional specification of inputs and outputs. Then, the first party who builds the system

would actually finish -- not only finish the design, but they probably wouldn't even come in to get the design accepted but actually build the PCs and the software so they could test them and show that they deliver what the specifications -- that's an expensive process.

Now, if the second fellow comes in and says, "Well, I just don't like Intel chips. I would rather use Motorola chip," he's going to have to repeat a very expensive process. If he accepts the chip and the PC and the software that the first person used, he will incur much lower costs. So, we cannot require him to accept that, but we don't look at the assessment that the DAC is being conformed with as a trivial task. We see that as a pretty high threshold to make the certified systems pretty close to standard. It will have to be quite a good reason to incur the expenses of having a second way of realizing the DAC.

COMMISSIONER CURTISS: That's a concern I have too --

DOCTOR SIESS: What we'd want to know for the NRC staff to require a change after a plant is built, it's operated, you have an incident, you find a system interaction, you find a weakness that you

didn't detect in the implementation of the DAC and now the staff says, "Nope, you've got to go out and change that design." If that were a complete design certified, you have quite a process set up for making that change.

CHAIRMAN SELIN: Right.

DOCTOR SIESS: If it was a DAC design, then you can simply say, "Well, it didn't implement the criteria properly so we can now make a change in the implementation and we don't have to recertify." So, DAC actually could lead to better plants over a period of time. They won't be standard except that the next man that buys one could use 99 percent of the drawings --

CHAIRMAN SELIN: The case you brought, Doctor Siess, would require not only that that plant but all the ones before it be changed if there were a dangerous interaction.

DOCTOR SIESS: If it were not a DAC.

MR. CARROLL: No, no, that the DAC would be part of the rulemaking.

CHAIRMAN SELIN: DACs part of the rulemaking.

DOCTOR SIESS: If it were a DAC, then you could have four plants that all meet the DAC, each one

by a different procedure.

CHAIRMAN SELIN: You're assuming something which may be true, but we think it's not true, namely that the cost of complying with the DAC, although not as high as the cost of getting a new rule, is high enough so that if there are four plants, that it's very likely that each of the four will choose the same way of complying with the DAC.

DOCTOR SIESS: Oh, I think they might and it'd be four plants all with the same weakness. At some point, I think the NRC would step in and say, "No, I want that fixed."

CHAIRMAN SELIN: Right.

COMMISSIONER CURTISS: It seems to me the challenge is to find a way and recognizing that the staff is kind of feeling its way through this right now and maybe getting to some of these questions as they continue to work with GE. The challenge will be to find a way to write a sufficiently flexible DAC that allows for the evolving state-of-the-art and I think that's a proper criterion to employ here and the Chairman has articulated the reasons, particularly in the I&C area for why we ought to have that flexibility. But at the same time is sufficiently tightly drawn, as you say in your letter, very

comprehensive and detailed criteria, that is to say is sufficiently tightly drawn. So, let's say if you have five applicants come in at the same time, that is to say the state-of-the-art is essentially level for each of the five, we'd have a high degree of confidence that the system that is the subject of a DAC would be built the same in every case.

There are a couple of ways you could accomplish that. One way is to, as the Chairman has alluded to, is to provide for some sort of configuration control by the vendor in the context of the certification after the design is developed to flesh out the DAC. Another way, and he's alluded to this as well, is the practical economic considerations that would compel the COL applicant, essentially all five COL applicants, to essentially build the same design.

I'm not sure that the staff has drawn that line or even gotten to that point yet, but those are the considerations, it seems to me, it's important to balance here.

CHAIRMAN SELIN: I would like to throw forward a thought, Mr. Ward. We'd like you to continue to look at this and we would also, consistent with what I believe to be Doctor Lewis' idea, I'd

really like you to take a look at the risk of settling on obsolescent technology as well as the risk of trying something that goes a little bit too far and might have to be adjusted once the DAC compliance test were running because we're talking entirely of one kind of risk, namely that the design is not quite complete enough and then a fault is found in complying with the DAC and one has to go back and redo the design, which is the more important of the two. But it's not a completely one-sided process.

You're really doing two very useful things for us, not just one. You're looking at the concept of the DACs, but you're also looking at the GE submission.

COMMISSIONER CURTISS: Right.

CHAIRMAN SELIN: And perhaps some of this conversation will inform the interaction between the vendor and the staff and maybe help us get a more nearly agreeable implementation of the concept of the GE design and see -- it would help us at your next session or pretty close to the next session if as you follow this evolving staff/GE interaction, it helps you to separate out the conceptual problems from the problems that you may see in that specific design and that specific approach. What I've heard you say is--

the concept is fine, but how it's implemented is going to make a big difference. Having concrete examples makes it much easier to discuss the approach and implementation.

MR. WARD: Okay.

COMMISSIONER CURTISS: Could I ask just one other question about one of the four criterion that we haven't focused on? The staff proposes to use DAC where we have site-specific design information that would be required. I know that wasn't discussed in a lot of detail at the ACRS meeting, but let me just walk through the background of the question that I have.

If you assume under Part 52 that much of the site-specific detail will be addressed in a site permit, except to the extent that site-specific detail arises out of placing a particular design on a given site, what you've got left after the issuance of the site permit are those what we've called interface questions, when you take a design from a particular vendor, put it on the site and you start to take a look at whether it's freshwater or saltwater and so forth.

I guess it's been my impression that those issues are exactly the kind of issues and only the

kind of issues that would come up in the COL proceeding when the applicant comes in and says, "I want to build that design, precertified on my preapproved site." This is the first time, I guess, and I'm going to raise the question with the staff later, but I'd like your reaction. This is the first time where we appear to be looking at use of DAC for site-specific interface design issues.

I guess the question that I have is if you address those interface design questions through DAC, which is to say at the time of the certification, is there anything left at all for the COL proceeding? What am I missing here? What's left --

CHAIRMAN SELIN: You're not supposed to address those interface questions through DAC. That's really what's missing. The theory is that the general design is supposed to come in and say, "This design is good for a seismic design of up to .8 G or 1.1 G." It's supposed to be for a temperature differential of up to 25 degrees if it's salt and some other amount if it's fresh. Then the COL is supposed to take a look and see if that site fits that envelope and if it doesn't fit that envelope then to go back in and see how the design has to be changed to miss it.

There actually has been some evolution

that isn't necessarily right of our role and our discussions on DAC to the way it's gotten implemented in this piece. There really was supposed to be two principles. One was that trying to do the design up front was going to freeze the technology at a point that was undesirable, and the second was that the -- it wasn't stated this way, but it was the further reduction of risk was not commensurate with the increase in cost that the vendor would have to incur in order to meet that. In other words, the risk was already at a low enough point that a certification could be done.

Then that second point has been translated into a couple of specifics which on the faces do not appear to completely catch that second concept.

COMMISSIONER CURTISS: Yes. I may not have a complete understanding of what the staff is proposing with this particular criterion, but I guess the question that I had for you all is whether -- what is it that you understand a site specific DAC as addressing if you assume that the site permit addresses all of the siting issues say for the interface questions. What's left for a site-specific DAC?

MR. MICHELSON: Do you want examples?

COMMISSIONER CURTISS: It would help.

MR. MICHELSON: Sure. A good example is the ultimate heat sink for the plant. It's important to know where it's located, what its relative elevation is, relative to important items in the building that might be flooded. You couldn't isolate a leak from the ultimate heat sink, for instance, if a pipe were to break.

COMMISSIONER CURTISS: And those are questions that you only know when you pick a particular site.

MR. MICHELSON: And that's why Part 52 indicated that not alone do you have to indicate your interface requirements, but you have to give at least a typical design so you can evaluate safety at least for one typical design.

COMMISSIONER CURTISS: I agree with the example. The only question I have is whether procedurally it's envisioned that those issues will be addressed through DAC. Conceivably you could --

MR. MICHELSON: It's proposed so far. We have not gotten the designs from GE on the ultimate heat sink.

COMMISSIONER CURTISS: I'm not sure I know exactly what the staff is proposing, but let me

postulate a situation where if you address all of the interface issues, and I take that as an example. Let's assume you address the site-specific issues through DAC and for the sake of this discussion they are interface questions because all the other siting issues have been addressed at the site permit stage. The question that I have is what remains at that point to be addressed in the COL proceeding, or have we essentially addressed through the design certificate, the site permit and the site-specific DAC.

CHAIRMAN SELIN: I think we need to get back with the staff.

MR. MICHELSON: The difference will be, of course -- keep in mind, the ultimate heat sink that they finally choose for the particular site in that particular COL will not be the typical necessarily and they'll have to do some analysis to show the differences and that will be covered by the COL.

CHAIRMAN SELIN: But the principle is supposed to be -- I think we need to have a little more conversation to make sure of this, but the principle is supposed to be that it's not a site-specific DAC, that there's an envelope in the design and what you do with the COL is to see if the facts fit the envelope or not.

MR. MICHELSON: Precisely.

CHAIRMAN SELIN: And it's not a DAC in that sense. With the seismic characteristics, groundwater characteristics, ultimate heat sink characteristics within these envelopes, this design is accepted. If not, it doesn't say what happens. It says you have to go back and redo the analysis.

MR. CARROLL: Historically, of course, all that was envisioned to happen somehow or other long before anybody invented the word "DAC."

COMMISSIONER ROGERS: Of course. Right.

MR. CARROLL: Because that was all in Part 52 originally.

CHAIRMAN SELIN: Well, Part 52 --

MR. MICHELSON: Still is.

CHAIRMAN SELIN: -- had sort of a fudge on it. It said, "Do the necessary level of detail," but it didn't say what happens with the unnecessary level of detail. The DAC is supposed to fill in.

COMMISSIONER ROGERS: Yes, but the whole idea that there would be flexibility to accommodate to a site, specific site, was there before we ever invented the word "DAC" or struggled to come to the use of a concept like DAC, because we totally were thinking in different terms when Part 52 was written.

There was nothing like a DAC concept involved.

CHAIRMAN SELIN: You have neither identified fatal flaws nor sort of unqualified support, but it really depends on the facts. So, why don't we keep -- as the facts evolve, why don't we keep in touch with them and come back and discuss it?

MR. MICHELSON: One thing that you bring up that is important to remember and that is in order to even evaluate roughly the risks involved in the various configurations that you might want to use, you have to do some kind of a PRA. Now, that PRA is very difficult to do if you do it just with flow diagrams because it is the starting point. A simplistic PRA starts with just flow diagrams. But the real risks involved may be buried within the plant. You learn that from laying out the plant, looking at the external events that can effect the system and so forth. You can't do that though without layouts, at least rudimentary layouts and know where your equipment is, know where your cabling and your essential electrical boards are located, things of this sort. That degree of detail in many cases doesn't exist at the present time. It just hasn't been worked out, at least in the SAR that we look at.

DOCTOR LEWIS: Yes, but, Carl, there is

a point which I guess Jay brought up earlier. We don't want to confuse the two different classes of things for which DACs might be appropriate. One class is the sort of thing Jay talked about in which although you don't have the details, you know how to do it. You've done it before. Fire is in that category. It's extremely hard to do fire PRAs. They're never done well. That's because fire generates common mode failures and common mode failures, all sorts of things happen. You cross event trees and you just can't do it very well.

But on the other hand, there's lots of experience building nuclear power plants and other things that the principles protecting against fire, separation and that sort of thing, are reasonably well understood. Not always. People do make mistakes, but there's no way we can protect ourselves against making mistakes.

The other class of things are the things like you mentioned, the software issues, the 586. There are, incidentally, some Mackintosh lovers at the table who I notice winced when you said 586.

CHAIRMAN SELIN: I just don't know the algorithm for the next chip in the Motorola.

DOCTOR LEWIS: I think it is the 686

actually.

MR. CARROLL: What is that, Hal? What's a 586?

DOCTOR LEWIS: But there are Mac lovers--

CHAIRMAN SELIN: The current advanced chip is a 086 in Hal's mind.

DOCTOR LEWIS: Well, this is a balanced committee, so we have to have some mediocre people on it.

CHAIRMAN SELIN: We're not doing Supreme Court conversations.

DOCTOR LEWIS: Right. But in any case, you did mention the issue of the new chips and the software. And the trivial point that you mentioned just in passing that any electronic object is a mapping of an input space against an output space, we're running a series of meetings on the computerization of plants. We had one yesterday which was devoted to control room design and that simple concept is not well embedded into the regulatory structure.

In the real software world when we speak of the validation of software, we speak about confirming that the design mapping of the input versus the output can, in fact, be verified in a formal way.

That isn't what these people mean by validation and verification. They mean something quite different. As Alice said -- it wasn't Alice, it was the Queen said, "Words mean what we say they mean."

But it's going to be impossible to do PRAs on that kind of thing. One will simply have to have confidence, some kind of confidence that in the end there will be sufficient interaction with the knowledgeable community to do things reasonably well. I can give you my personal opinion, which is not a committee opinion, but based on the few meetings we've had so far to look at the computer issues, I would say that as a general matter the vendors and the industry are probably ten years behind the electronics industry and the staff some unknown number of years behind them.

CHAIRMAN SELIN: The big problem with the software really is not whether the modules within the code do what they're supposed to do. That's pretty easy to determine, to try to find common mode failures in software so that it --

DOCTOR LEWIS: Well, and also to find what the output states are when you have failures because the unique thing about -- I don't want to replay the game here, but the unique thing about software is that

errors either of hardware or software are not like errors of valves. They can produce very strange positive actions in parts of the plant that have to do with a different location in space and time than the one you're dealing with.

CHAIRMAN SELIN: You do what I do, Doctor Lewis. You don't know how a power plant works either, so you keep coming up with these software things.

Mr. Ward, I'd like you to do three things, please. The first is just to continue this discussion so as we get more detail from the GE and the CE submissions, you are better able and the staff is better able to distinguish between problems in principle and problems in execution.

The second is as you follow this, I really do think it's important that you look at the opportunity costs and risks as well as the risks in commission.

And the third is please don't be too much affected by the fire and the breaks. The risks in those are serious, but they're bounded, as Mr. Carroll says. We know how to do those and we know -- when that analysis is done, when those designs are done, those reviews could be refined. It's important to do those, but it's at least as important to take a look

and see what kind of problems we're getting into as we go more to software and microprocessors. We're trying to make up for what, in my opinion, is 20 years of lost technology which -- there the loss is not efficiency, it's that operators have to learn how to do crazy things to make up for the fact that control rooms and instrumentation is so poorly designed.

As an observer, I believe we are greatly increasing the risk of operator error because we give people such poor analytical tools to support them. Yet if we go into much better tools where it's easier to train the operators, there we have to really worry about what kinds of common mode failures that we don't so easily picture because we haven't had that experience, what kind of problems are being introduced there.

So, I think -- Commissioner Rogers?

COMMISSIONER ROGERS: Well, just -- yes. I think that the question of narrowing the application of DACs to just the really bare minimum systems that would be acceptable, I think that would be very important to have your thoughts on that. Then, it's really just a follow-on of what we talked about at our last meeting. If you folks could try to find a way of defining what an acceptable DAC is, what

constitutes an acceptable DAC, but only again within the limited scope of those few systems that a DAC would be acceptable in.

Basically, I think we're certainly talking about the electronics and digital systems. The control room and the instrumentation is where the big questions are. I think that's one that everybody is grappling with, without too much success so far. I think the discussions of how to use a PRA and what systems interactions might be important are just indications that we don't really know very much about what an acceptable DAC would consist of at all.

CHAIRMAN SELIN: I had a professor that used to say, "Someplace between DC and light is the right frequency for the amplifier." So, the range may not be all that useful.

But with the fire questions and the hydraulics questions, you're really arguing in terms of degree. How much detail do you need to make this happen? It's very important, but it's clear there is a level of detail which is acceptable and not ridiculous economically and it will take awhile to converge on that. With your help, maybe we'll get there. But with the software and the instrumentation, there are qualitative questions that haven't been

addressed.

Commissioner Curtiss?

COMMISSIONER CURTISS: Yes. I think we've covered all the major points here. I am generally comfortable with the criteria that the staff had proposed, understanding that it will be fleshed out in more detail as we move along, particularly on the questions that have been raised about how far you can go to flesh out the detail consistent with the criteria on mass procured or as-built.

I do have some questions that I'll take up with the staff on how the site-specific DAC would work. But it does seem to me that Commissioner Rogers' comments about ensuring that we've got fairly tight rein on where we're going to use DAC and a well understood set of criteria for when it's going to be employed would be useful to focus on. As you move forward with the GE plant as the lead plant, I think we'll get some more detail and be useful to communicate with us when we reach that point.

CHAIRMAN SELIN: Commissioner de Planque?

COMMISSIONER DE PLANQUE: Nothing.

CHAIRMAN SELIN: Thank you very much for not only your help, but your responsiveness in allowing us to put forward to you a very pressing

issue and try to get your advice on that.

Are you prepared to move on to the advanced reactor --

MR. WARD: Okay. The second item is -- I think we can probably cover a little more briefing and then move on to the third one.

The second item, as we discussed in our letter of January 15th, concerns the Part 50 and Part 100 rule changes, nonseismic rule changes. The staff program, as we understood it, is to correct what's really been almost kind of perhaps a bookkeeping deficiency. It's more important than that. But Part 100 is supposed to establish site criteria. Part 50 establish criteria for the design of plants. But there's been a little mixing of the actual criteria in the two. Specifically in Part 100 there are some things that have grown in particularly the source term that more properly belong in Part 50.

So, the staff is proposing, as we understood, a two part program. We call it a two stage program. I don't think those were really their terms, but that's what we called them in our letter. The first is really not to make any technical changes, but to fix up the bookkeeping and we think that's good. We think they're doing a good job with that.

We don't see any big problems.

A second part would be to make more really substantive changes in what the technical requirements would be in each of these areas. They've singled out a modernization of the source term which will now be part of Part 50. We think they're on a good -- that work is incomplete. There's a particularly part -- I mean part of the -- if you describe the source term as the burden of fission products which is within the containment atmosphere and ready to leak out if a leak occurs, then they've sort of done half of that.

There are two affects there. One is the generation of fission products going out into the containment atmosphere from a damaged core. The second is a depletion of that source term through mechanisms within the containment, plating out, falling out and so forth. They haven't yet done that part. They know they have to, but we didn't have a chance to review the work in that.

But beyond that, we have some, I guess, important concerns about the stage 2 program, as we said in the letter, not so much for what's being done, but for what's not being done. First of all, there seems to be -- the Part 100 site criteria has been changed to -- in stage one. Removed from it were

something that really belongs in Part 50 and added to it are the requirements from an old reg. guide which really are very -- have been very important in defining what the staff finds acceptable in a site. So, the Part 100 has been beefed up with what were really de facto requirements, but previously were in a reg. guide.

However, there's been no attempt to modernize those requirements. That reg. guide was established, I don't know, 25 years ago. We've learned a lot about siting, about accident analysis, about dose calculation and dispersion of fission products. We think there should be some work underway to modernize that and bring it up to date with what we know now about the important affects.

In addition, we think there is a lot more that needs to be done in modernizing, if I use that term again, Part 50. They do have the program to modernize the source term which would be in Part 50, but there's no an explicit effort underway to modernize what I'd call the capability of the containment for containing that source term. The approach they've taken with the source term, it's not a simple thing to do. There's a lot of information about severe accidents and the nature of core melting

and fission product releases, but there isn't any exact solution to the problem of determining what the source term should be.

So, what the staff has done is, I think, taken a reasonable approach. They've looked at the data that are available, at all the information that's available, and used experts and analysis, and they've made some judgments about what an appropriate surrogate is that can be used to define a source term in the way that it can be practically used by designers and enforced by regulators and which fairly, using engineering judgment, represents the body of information that's been developed over the last 20 years about the nature of source terms. So, it's a surrogate.

In the letter we wrote back in May of 1991, we suggested really kind of a parallel activity to that, that the staff should develop a surrogate. It would really be a set of surrogates for -- you might call it -- in the letter we used the term "energy source term." But a set of surrogates which described the challenges to containment which could cause the source term to be released in large quantities if the containment is damaged. So, there isn't any explicit work that's underway in the Part

50 update along those lines.

Now, some of the issues there are being touched on in the document that's been called "son of 90-016" or the key issues document. But we'd like to see a more direct approach taken and have the requirements for the capability of containments to contain the source term defined in Part 50.

CHAIRMAN SELIN: The staff has told us that they've heard your comments and we'll try to take them into account when you do come back to brief us on these points.

Is there anything else we should do at this point, Commissioner Rogers?

COMMISSIONER ROGERS: No, not on that. I was wondering if -- were you going to say anything about Part 100?

MR. WARD: Well, nothing really beyond what we said in the letter. But there are a number-- I mean the key requirements for the size of the exclusion zone, low population zone really are just, again, surrogates that were developed based on information from the '50s and the '60s. There's a lot of things we know now in 1992. We haven't looked at it in any detail to really make a guess as to whether there are some big advantages in doing this, but we

think the staff should at least look at it to see if there are some improvements that could be made.

COMMISSIONER ROGERS: Well, I was thinking of the question of the dual approaches to ground motion analyses using probabilistic and deterministic approaches. This relates to this open question of the several descriptions of the seismic phenomena that have not been resolved into a single consistent view.

How do you think this can be or should be cleaned up? You've said there that you would favor a probabilistic approach, but you don't object to the staff proposing and publishing a dual approach. Is this, do you think, something useful might come from the comments on that beyond what you yourselves might be able to --

MR. WARD: I think Chet should comment on that.

DOCTOR SIESS: What the staff has proposed, first of all, is bad law. They have a requirement in the regulation that the safe shutdown earthquake ground motion be determined using both probabilistic and deterministic methods, but they have not said anywhere in the regulations or anywhere else what do you do when the results obtained by two different procedures disagree. That is bad

regulation. It's bad codes. It's bad law. I've written building codes for 35 years and we never indicate alternate methods without saying which governs.

CHAIRMAN SELIN: Yes.

DOCTOR SIESS: You just don't do it that way. The industry people think that the only way to go is probabilistic because they'll never meet the challenges at a public hearing by deterministic procedures as long as probabilistic procedures exist. Personally, I don't think they're going to make it either way. They've still got -- the staff has come up with a very ingenious scheme for using the seismic hazard EPRI and Livermore procedures that differ by an order of magnitude on probability and they're to be commended. It's a very ingenious scheme. But it still involves in saying that this site is no worse than half the sites that we've approved, which of course I think Doctor Lewis would agree is the same as saying it's no better than half the sites or it's worse than half the sites we approve. That's going to be a real tricky question to answer when it comes to a hearing as to how do you justify a site that's worse than half the ones out there.

So, I don't know which way to go. But my

basic problem is that requiring two methods that are not going to give the same answer and not telling you what to do about it is going to lead to all sorts of problems. I think there's advantage in using both. The trouble with the probabilistic approach is that we tend to believe that the probability of exceeding the SSE at a site has some relation to the probability that an earthquake will cause an accident. They're not the same thing and I'm not even sure they're related. The probability of damage due to an earthquake is not a function of the probability of the earthquake so much as it is how well the structure was designed, how well the systems were designed, how well they were built, were things anchored down, et cetera. That has nothing to do with the probability of the earthquake.

So, we've got some peculiar thinking going on here, partly with the hope of making it easier to get approvals, but I'm not sure it's going to work.

COMMISSIONER ROGERS: Well, is there any way that you can suggest to find a method that will work?

DOCTOR SIESS: You've got a better chance with a completely deterministic method that nobody can argue with. Maybe it won't be an issue if we have

standard designs good for .3 G and stay away from sites that get up to .27 G. I don't get a whole lot of comfort from knowing that the probability of exceeding .3 G is 10^{-5} at one site and 10^{-6} at another. Once we went to seismic margin studies and got away from our fear of being on the edge of a cliff, those probabilities sort of become much less important and they are highly uncertain.

CHAIRMAN SELIN: One thing that's very attractive in what you say, Doctor Siess, is it's a mistake to assume values that you really don't know and then find out and solve for the consequences. It's much better to find out what value would lead you to come to a different conclusion than to assess --

DOCTOR SIESS: But I would need to go to a site hearing knowing that expert number 6 is out there. Ask the staff. They'll explain it.

CHAIRMAN SELIN: That's what we still have to do.

DOCTOR SIESS: The Livermore method gives vastly different answers, depending on when they deal with experts 1 through 5 or also include expert number 6.

CHAIRMAN SELIN: I suspect the transcript of the last discussion between Lord Rutherford and

Doctor Bohr sounded very much like that.

Mr. Ward, would you like to go on with the next topic?

MR. WARD: Yes. Next you wanted to hear the status of reviews and --

MR. CARROLL: Let me, before you get to that, point out one of the things that is mentioned in our January 15th letter, that those of us that live in conversion prone areas feel strongly about is the fact that there are no meterological requirements in Part 100. We really think that some sites can be simply based on historic meterological considerations. The staff does not propose, as we understand, to do anything about that.

MR. WARD: Next, you asked, as I understood, for some comments on the status of our reviews and any impressions that we have on the evolutionary plants, passive plants, the --

CHAIRMAN SELIN: To be more precise, Mr. Ward, we would like this to be a topic at all the meetings, whatever new you might have to say on these reviews. So, it wasn't so much that it's time for comprehensive pieces, it just was the time to kick off this as a standing topic.

MR. WARD: Yes. All right. I think there

are -- I would like you to hear the views of some of the members on some of these things. So, why don't we just start going with it and we won't have too much time for each one.

But, Carl, you were going to talk about the ABWR.

MR. MICHELSON: Yes. I'd first like to give you a status. I'm not sure where to begin. But perhaps since this is the first time we're giving the status, we'd better go back a little bit. Our serious portion of the review started in 1989. At that time we wrote a letter to you on module 1 of the SSAR and you have that letter and have seen it, I'm sure. Subsequent to the module 1 meeting, we held several subcommittee meetings while we were waiting for the DSER to be reissued because after module 1 they regrouped and decided to do it over again.

So, the DSER was finally submitted in six SECY papers starting in May 24th through October 31st of last year. We received six SECY papers, which you have for information. We have reviewed these six SECY papers with about six days of subcommittee meetings, roughly one for each SECY paper. We have also reviewed a number of other items though related to the ABWR in other subcommittees during this same period

of time, particularly instrumentation and control, for instance, in the PRA.

The various ACRS subcommittee meetings are now completed. We've completed our review. We expect to start preparing our final report tomorrow and this report will come to you at such time as the Committee is finished. Our review thus far has been hampered by some problems. For instance, the incompleteness of the information. The SAR is simply not complete. There are over 300 open items in the SAR. Many of these are major and most of them are because of incomplete information. So, what we have looked at is all we can comment on at the present time.

This gives us a little bit of a problem though because -- because of the incompleteness, that means there's a lot of information to come sometime and to be reviewed fairly soon. We did write one letter after our module 1 letter and that was sent to you in October 23rd of 1991 which we outlined, I think, about seven items of potential concern for which we had thus far seen from our review. Our present report will probably contain a reiteration of these items along with perhaps some others.

We are expecting to receive a final safety evaluation report about August of this year and we

will schedule our review such that it will take about three months after we finally do get the report to write our own report on it.

That's the status of the ABWR at the present time.

COMMISSIONER CURTISS: I noticed here in your write-up the date that you have for receipt of the FSER is listed as October of '92? Is there a discrepancy there?

MR. MICHELSON: It depends on whose write-up you read. I really -- it's my understanding -- my best estimate is that the staff intends to have it issued in August. I don't know where the October date came from.

COMMISSIONER CURTISS: I understood it was to come in August.

MR. MICHELSON: Yes.

COMMISSIONER CURTISS: The question, if it comes in August and understanding that you've been deeply involved in these issues so far and have raised some questions here, can you give us an estimate of what your review will entail from that point on forward, how long?

MR. MICHELSON: Well, given three months in which to do it, that's an opportunity for about two

subcommittee meetings and perhaps two full Committee discussions. Whatever we can cover in that length of time is about what it will take, unless we get into difficulties that indicate we'll just have to have more time.

COMMISSIONER CURTISS: You're comments will be coming to us in November then, from the November meeting?

MR. MICHELSON: The comments should come to you three months after we get the document in our full committee meeting. We accept it at one full committee meeting and hopefully by the third meeting thereafter we have a letter or report.

COMMISSIONER CURTISS: Okay.

MR. WARD: Carl, do you have some general impressions about the review you'd like to --

MR. MICHELSON: Well, impressions on the ABWR would have to be personal at this time, since the Committee hasn't expressed a collective view.

CHAIRMAN SELIN: Well, that's fine.

MR. MICHELSON: My own personal opinion is that the quality of the reviews have vastly increased. I think the staff is asking good questions, the right kind of questions and they're indicating very clearly that they can't reach

conclusions because they just don't have the information. Now, that information will have to either come as real information or it will have to come as a promise, a DAC. I don't know which way that will go.

CHAIRMAN SELIN: I have to point out that none of the criteria for a DAC is whatever we don't know by August of '92 becomes a DAC.

MR. WARD: Supposedly, yes.

MR. MICHELSON: My own view is there's going to be at least ten very large DACs, probably more and depending on how much you consolidate about 20 or 40 different subjects into those ten DACs. If you look at the SAR objectively, the information just isn't there with which to reach final safety determinations. Now, what you're going to have to decide is, well, how much do I need to be final? Maybe we need a new approach to what it takes to make a safety determination from words alone. But your standard review plans just aren't much help. They're based on having real information and guiding a reviewer how to go through real information to reach a conclusion. They have no guidance on how to go through words and reach final safety determination. That's never been developed.

MR. WARD: Jay, do you want to comment on the System 80?

MR. CARROLL: Well, we have had some five meetings with Combustion Engineering on System 80. The most recent was in September of '91. There's been something of a hiatus in that Combustion and the staff are in the midst of RAIs and responses to RAIs. So, we thought we'd, at Combustion's request, lighten up on meetings. We do plan to resume these in the next month or so.

I guess personally I think -- and I serve on the ABWR Subcommittee and I'm chairman of the Combustion one. I personally think that Combustion is doing a considerably better job than GE in supplying information to the staff. The difference, I think, is that they're actually building plants of their design in Korea. It's not exactly System 80+, but it's a very similar plant.

By contrast, General Electric is mixed up in this incestuous partnership with Hitachi and Toshiba and the design being built in Japan is a different design than the ABWR that's being or attempted to be certified in the United States. So, I think that explains it. But I've been much more impressed with the information we're receiving than

the response to questions by Combustion.

CHAIRMAN SELIN: That's good because among other things it proves that the questions can be answered.

MR. CARROLL: Oh, yes.

CHAIRMAN SELIN: It's good to have an existence there.

MR. MICHELSON: Even in the I&C area, the control room, it's much better on Combustion. They've got real designs that you can sit down and think about.

CHAIRMAN SELIN: Mr. Wylie?

MR. WYLIE: Well, I was just going to remark that this DAC thing may have never come up had CE System 80 been the first plant.

COMMISSIONER ROGERS: May not?

MR. WYLIE: May not have come up.

CHAIRMAN SELIN: Well, their approach to the control room will require the DAC.

MR. WYLIE: Well, you'd be surprised at the completeness of their control room design. We reviewed it yesterday. It's very complete.

CHAIRMAN SELIN: Yes, but --

MR. WARD: You also might be not surprised at the date on the technology in the control room.

Those two things go together.

MR. MICHELSON: Technology is quite comparable to what GE is proposing. GE could sit down and design it today if they had to.

MR. CARROLL: I think what may be confusing is yesterday's emphasis was the human factors design of the control room --

CHAIRMAN SELIN: Well, the CE control room is designed very explicitly as far as displays and interfaces. But what's behind the displays is where the DACs come in because the circuit design and the software -- that's what I mean by a functional specification. Detail design of inputs and outputs and equations and relationships between the two, but not the realization of how that will be carried out.

MR. MICHELSON: This is not a significant extrapolation of what they've already been doing.

CHAIRMAN SELIN: I understand that.

MR. MICHELSON: They convinced me that it's not new.

CHAIRMAN SELIN: They're coming in to see us fairly soon, unless they've changed. Their intention was not necessarily to certify the same software and circuits that they have in Korea, but the inputs and the outputs and use Korea as an example

that shows it can be realized. But they might be able to figure out a better way to do that by the time this is built, unless that's different from what they've been telling me about.

MR. CARROLL: And on the area of piping layout, although I think they've sort of pulled their horns in waiting to see how the GE matter evolves. At least at one point they said, "Hey, we're going to do preliminary layouts."

CHAIRMAN SELIN: That's very interesting. Pioneers get a lot of arrows, not always in the chest, sometimes in the back.

Did you want to say anything else about the CE design, Mr. Carroll?

MR. CARROLL: No, I don't believe so.

MR. WARD: How about the basic plants, Jay? Do you want to mention that?

MR. CARROLL: Well, basically I guess we're skipping SP-90. We did comment on that.

CHAIRMAN SELIN: Right.

MR. CARROLL: Okay. On the passive plants, we've been generally briefed on the design of AP-600 and most of our effort so far has been on the issue of the integrated full height, full pressure test facility. During our present meeting, we expect

to be working on a letter on our views on that matter.

Again on the GE ABWR, we've been briefed on the general design and haven't done much more beyond that.

MR. WARD: Ivan, you want to comment on the systems, the full height, full pressure test?

DOCTOR CATTON: Sure. We've had several subcommittee meetings and an uncountable number of presentations at full committee. There's no question but that it's a complicated system in some respects. We tried to address three questions really.

CHAIRMAN SELIN: Is it as complicated as the AP-600?

DOCTOR CATTON: The AP-600.

CHAIRMAN SELIN: Okay.

DOCTOR CATTON: The first question is whether or not the testing is necessary. The second question is, if it is, who should do it? The third question had to do with if the Office of Research is to do the testing, should it be just farmed out to a Japanese facility, namely Rosa IV?

The last question is pretty easy. The answer is no.

The second one, about who should do it, and I'm speaking for myself because I haven't pushed

a letter through the Committee yet. I don't know what will happen in the interim. At least it's my view that it should be a joint program like some of the past programs that NRC has had.

The first question is tough. My own personal view is that we understand enough that we don't need the testing. On the other hand, it depends on who has to be convinced by the result. The NRC staff has made a very good case for the testing. But Westinghouse has also made a good case for not doing the testing. They have a fairly robust program that they plan to go through. But the tools that are being used are what have evolved out of interest in the large break LOCA. As a result, the tools are weak in the regime where they'll have to be used for the AP-600, namely slow flows. There's lots of opportunity for separation between steam and water.

Westinghouse arguments that the more complex part of this whole process is in the low pressure and they plan to do a lot of testing, that's true. I'm just not convinced that without the tests you'll be able to convince the skeptics.

MR. CARROLL: Without the high pressure tests.

DOCTOR CATTON: High pressure. Without

the high pressure testing, there's going to be people who are always doubters. I think if you're in the business of thermal hydraulics, you could be convinced without it. So, it really depends on who the audience is for the final result.

CHAIRMAN SELIN: Doctor Catton, it's occurred to me that that's not the right way to ask the question. Whether testing is required or not strikes me as being too simplistic. Another question is when would it be useful to have the testing? For instance --

DOCTOR CATTON: Well, that's the problem because if you're going to do that testing, you need a minimum of three years. That's so you can build a facility, you have to check it out, you have to operate it, you have to do something with the information you get.

CHAIRMAN SELIN: At the risk of being somewhat conjectural at this point or speculative, I think is probably a better word, have you thought about or would you consider thinking about a different sequence, one in which you have a design that's based on analytical pieces but before full construction were permitted some type of a test would be carried out so that the high cost of building, carrying out the tests

would be delayed until there was some evidence from the market that there was a customer and a willingness to go ahead. Is there a sequence?

Right now we're talking about the testing pretty early in the cycle.

DOCTOR CATTON: Well, it's early in the cycle.

MR. WARD: We've discussed that very thing. It's something like this, as a matter of fact, yes.

CHAIRMAN SELIN: And?

MR. WARD: We're going to write a letter.

CHAIRMAN SELIN: I understand two principles of the ACRS. One is absolute independence and the second is until we see what we write, we don't know what we believe.

MR. WARD: That's right. And even after we see it, we're not sure what we believe.

DOCTOR CATTON: My personal view is you probably could get away without any of the high pressure testing of the kind that a full height integral facility implies. But it takes a different approach than I have seen in the past within the nuclear business.

CHAIRMAN SELIN: Different regulatory

approach or different --

DOCTOR CATTON: No, different approach on the part of the people who are doing the work. More detail, a more careful approach and less dependence on the computer folks. I don't see that and I don't see it happening now.

CHAIRMAN SELIN: Could you be a little more, not explicit, but what would you like to see? I understand what you would like not to see.

DOCTOR CATTON: A much more careful study of what's needed. If you were to do that, you could get a lot of that out of your low-pressure testing. If you don't do that, then you're --

CHAIRMAN SELIN: You mean, scaling up the models that say, if you get --

DOCTOR CATTON: That's correct. That's correct.

CHAIRMAN SELIN: I see. Is there an equivalent to a computerized wind tunnel and could you build a good enough model to scale up in quite a few dimensions, or is it too complex?

DOCTOR CATTON: Well, a wind tunnel is a good example. In the aerospace business, they do just that. They do CFD now and they believe the answers, and within certain limits you can.

CHAIRMAN SELIN: We build a lot more airplanes than we do reactors.

MR. WARD: Yes, but is that a simpler analytical problem?

DOCTOR CATTON: Well, it is. In the case of the airplane, we know what the equations are. In the case of the thermal hydraulics associated with the AP-600 safety systems, we sort of know what they are, but some of them we don't know how to model.

CHAIRMAN SELIN: Yes. I'm not sure that if we were going to our first sort of flexible wing aircraft tomorrow we would be so comfortable with the computerized wind tunnel. We'd probably want some models.

DOCTOR CATTON: That's certainly true.

CHAIRMAN SELIN: That's interesting. I hope you'll be monitoring the presentation. We're going to try something different at the Westinghouse presentation and that's have the staff and the vendor actually talk to each other in front of a large audience, not just have individual presentations but some interaction.

MR. CARROLL: That's exactly what we did on Tuesday.

CHAIRMAN SELIN: Any clues or hints for

us on how to do this?

DOCTOR CATTON: My concern about the Westinghouse approach is I get the feeling they have too much faith in their computer code, and that's kind of worrisome. They seem to think that, because of all the past high-pressure integral facility type work that's been done, that the code has been fully validated for that aspect of the AP-600, and it's not. There's quite a few differences. The only commonality is the high pressure, and it's the faith that worries me.

CHAIRMAN SELIN: Anything else?

DOCTOR CATTON: Well, I don't know if you want to spend any more time with this.

MR. CARROLL: I would like Chet or Bill to make the comment they made this morning for your benefit. I think it's very pertinent.

MR. WARD: About passive plants are supposed to be simpler? What's wrong with this one? Make the point.

DOCTOR SIESS: All I can say, I'm leaving the arena --

CHAIRMAN SELIN: Uh-oh. I don't like a comment that starts out "I won't be around when you have to carry this one out, but --"

DOCTOR SIESS: A real sense of disillusionment. I first heard about -- we didn't call them passive reactors. We called them "inherently safe."

CHAIRMAN SELIN: Inherently safe, right.

DOCTOR SIESS: And this was something that wasn't going to take RELAP and a million dollars worth of research on thermal hydraulics to establish and was going to be obvious to anybody, including my wife -- well, she believes me, so maybe I'd pick a neighbor-- that these things were safe. And now I find that unless somebody can find a way to double gravity we're not sure. And we're going to establish AP-600 as a safe reactor by RELAP?

CHAIRMAN SELIN: By what, did you say?

DOCTOR SIESS: That's one of the programs that came out of the LOFT --

CHAIRMAN SELIN: I see.

DOCTOR SIESS: -- effort and a few other efforts. And I'm just disillusioned that we've made an attempt to get away from the evolutionary.

Now, the engineering way to progress is by evolution. We don't make many engineering breakthroughs by revolutionary processes. Scientific, yes. But, of course, our evolutionary process just

loused things up. We didn't improve plants. We just hung more things on them. We just got them more and more complicated, more and more redundant, more and more something else, so we decided to go away from that.

We've become revolutionary. We'd go to a completely different principle, get away from all the pumps and valves. Instead of adding more pumps and more valves, we'd get rid of them and go to gravity. And now all of a sudden I'm getting disillusioned that maybe gravity isn't that good.

CHAIRMAN SELIN: Gravity is not all that it was cracked up to be?

DOCTOR SIESS: Yes. And what's the answer? Revolution is not working. We could always go back to Point Beach. It wasn't gravity.

MR. CARROLL: Pretty nice 600 megawatt plant.

DOCTOR SIESS: It had active systems. It's cheap. It worked real good. It's still working real good. It's 20 -- it's more than that. So, are we going in the right direction?

But, that's not really your job. Your job is --

CHAIRMAN SELIN: We take that they give

us, basically.

DOCTOR SIESS: The Commission has said "Whatever the industry comes in with we'll review."

CHAIRMAN SELIN: Right.

DOCTOR SIESS: Right?

CHAIRMAN SELIN: That's true, but, you know, if you put yourself in the shoes of the industry, they're trying to figure out how we're going to review it, so the signals that we give out have some impact on what comes in to us.

DOCTOR SIESS: I think they're getting a real signal on AP-600.

DOCTOR KERR: Mr. Ward?

MR. WARD: Yes?

DOCTOR KERR: I don't think anybody's responded to one of the Chairman's questions which I thought was very important, and that is what would the Committee think of a sequential kind of test --

CHAIRMAN SELIN: It's more of a confirmation test than a design test.

DOCTOR SIESS: We did them for years. That's what we did with custom designs.

DOCTOR KERR: We have discussed it some, but we have not written a letter on it. I personally think it was quite reasonable.

MR. WARD: I think there are several members that think that's exactly the thing to do.

COMMISSIONER CURTISS: I would encourage you, I guess, from my own perspective, as you do that, recognize that while that has been done in the past the approach that's taken here has to, if we're proceeding under Part 52, needs to be structured in the context of Part 52 where for an FDA and a design certificate we have to reach final safety decisions. And it seems to me that that dilemma is the one in the context of what the AP-600 poses is the dilemma that we need to grapple with. Is it necessary to do the testing in order to make the final safety determination?

DOCTOR CATTON: Westinghouse feels that not enough has been done to come to that conclusion yet. I think I kind of agree with them.

On the other hand, if you wait and then you have to do it, what happens to the certification date?

COMMISSIONER CURTISS: You can't issue the certification if you can't make the final safety determination.

DOCTOR CATTON: And we asked Westinghouse that question and they said that they were willing to

take the risk. They were confident enough.

DOCTOR KERR: But there is one thing that hasn't been mentioned here, and that is not only are we learning how to build standard or certified plants. We also are learning how to make the process work. It seems to me it's fallacious to assume that at this point we know exactly how to make Part 52 work.

CHAIRMAN SELIN: That's right. I mean, Part 52 has certain milestones, but you have to start with the development process and then say how does Part 52 meet the process, not the other way around.

DOCTOR KERR: If we don't keep it flexible enough so that as we learn we can incorporate possible improvements, it seems to me it's almost doomed to fail.

COMMISSIONER CURTISS: I'm not suggesting it's impossible to do. There are some alternatives. But it seems to me that if the --

CHAIRMAN SELIN: Has to be within the context.

COMMISSIONER CURTISS: -- testing is required in order to make the final safety decision, the final safety determination, Part 52 is clear on that point.

Now there are alternatives. We still have

the notion of a PDA out there and in fact we issued the PDA recently on the large Westinghouse plant. All I'm encouraging you to do is, as you look at the alternatives, particularly based upon what we've done in the past, take into account the procedural framework of Part 52 and how you fit it into that framework.

CHAIRMAN SELIN: To be fair, it's really Westinghouse's responsibility, not yours, to look at a different flow of events, how that ties to their development process and how it ties to Part 52.

But, nevertheless, you've a very, very influential set of people and if you make a judgment something is necessary or is not necessary it's important that you look at enough different events. It is necessary in what sense? Is it necessary early or late? Is it kind of a confirmation to a design or is it prerequisite to a design? Questions like that.

MR. WARD: Well, you know, I guess the way we look at it, all that's necessary, if we're not satisfied with the information that's developed without the high-pressure tests, all we really care about is that the high-pressure tests be carried out before the plant is operated.

Now, whether Westinghouse or whoever wants

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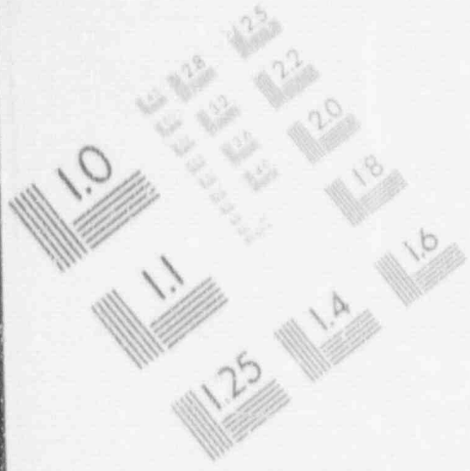
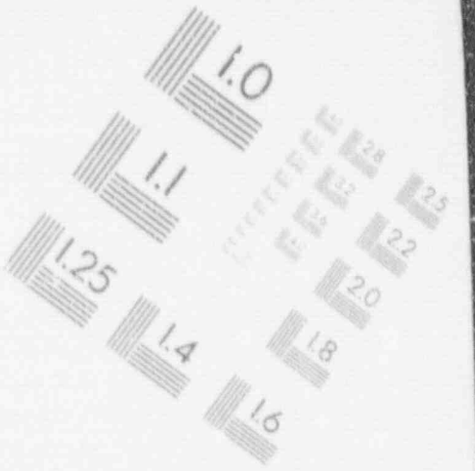
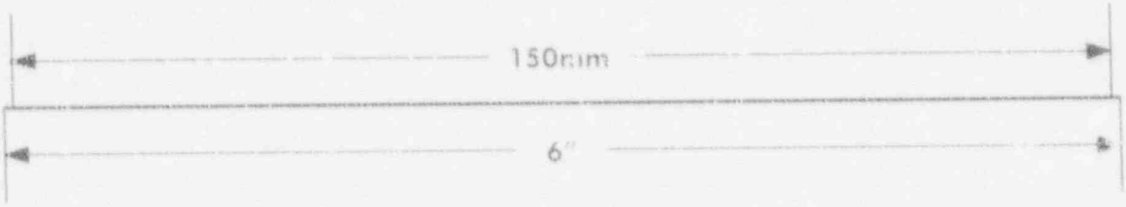
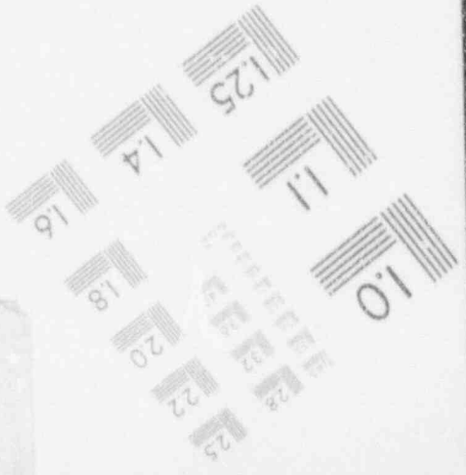
IMAGE EVALUATION
TEST TARGET (MT-3)









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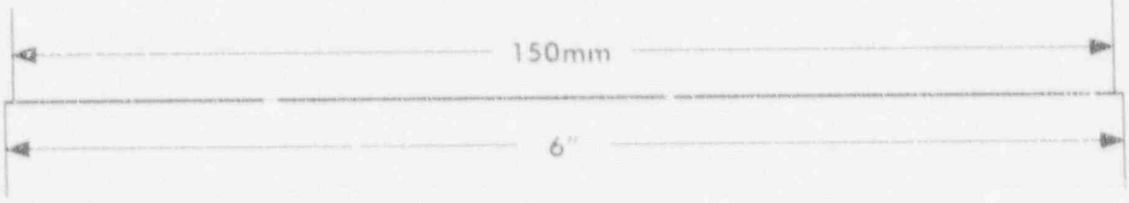

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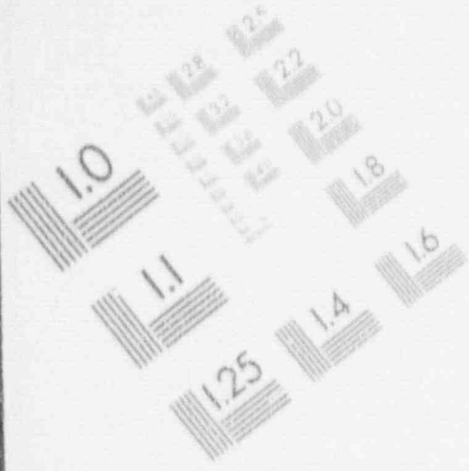

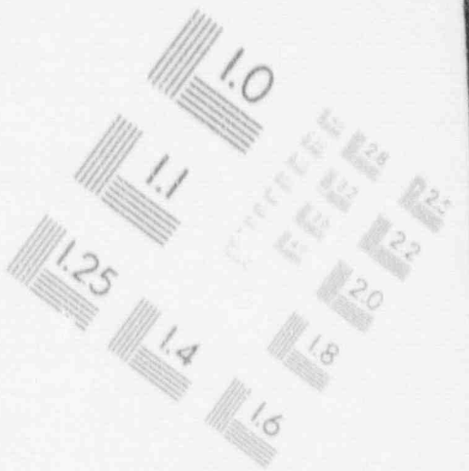

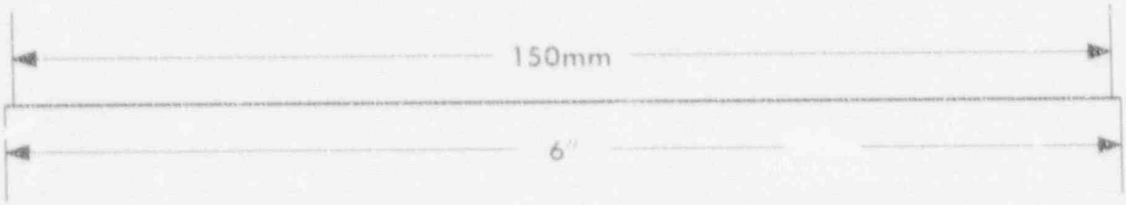

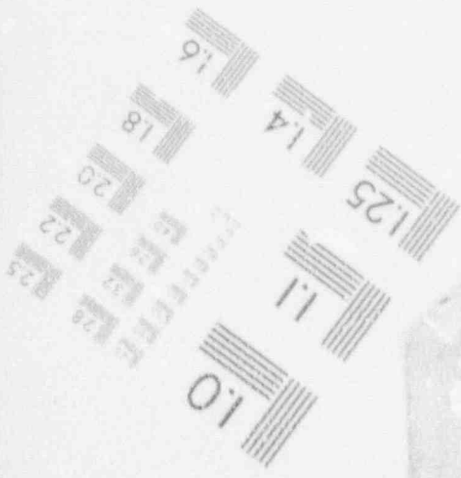

to participate in that sort of a plan, you know, there's a business risk there. You've got problems with the certification and regulation process. You could look like you've got egg on your face if at the end things don't turn out well with that test. But if there's a high probability, if everyone feels -- Westinghouse in particular feels there's a high probability their design would pass this final test, that's --

CHAIRMAN SELIN: Again, one could see a conversation between the Agency and the vendor saying, "As far as it goes, we're very pleased with the analysis. We don't see any fatal problems, but we can't do the certification until we have some concrete results." And then the vendor would have to decide whether that's enough confidence, whether they have enough interest from the market to carry it to the next point. So, there are ways of adapting the process in a business sense to our piece.

I'm trying to picture the -- you know, we have nothing but piston airplanes. Somebody's come in with a jet engine design and here we're trying to come up with a regulatory procedure. The question is can we get from here to there? And you need a lot of testing before you move to a new technology, even

though it's intrinsically safer and simpler. The first one is a big milestone.

MR. WARD: You could even regard this test as a sort of ITAAC in the sense that it's rather grander --

CHAIRMAN SELIN: It's a confirmation, that's right.

MR. WARD: -- than most of the other, yes.

I think there's some concern and I think your staff expressed that there's other concern that, while this approach makes a lot of sense, the reality could be that you'd come to the point where there is a major investment in the plant. Let's say it was already built. You ran the high-pressure tests and you decided that there were some flaws in the design that should be corrected, or at least that's the way somebody looked at it. Somebody else would look at it a different way. There wouldn't be a clean decision and there would then be a lot of pressure to go ahead, let's say, and accept the plant as built without --

CHAIRMAN SELIN: Well, there's where I come back to Commissioner Curtiss' point, which is that this has to be considered in the framework of 52 and we can be fairly flexible about what kind of

discussions there are about the current incomplete--the estimates of where the analysis is leading.

But, no, you know, until the staff is satisfied and until the ACRS is satisfied, there's no certification of the design. That's got to be clear.

DOCTOR CATTON: Well, their submittal is not due until the 26th of June. That's still several months into the future. It's probably going to take a year or so to grind through that, so you're talking 18 months before you can really decide.

CHAIRMAN SELIN: And then you have, you know, how fast is the market pressing? How long does it take to build the facility? What kind of decisions--

DOCTOR CATTON: That's right.

CHAIRMAN SELIN: Commissioner Rogers?

COMMISSIONER ROGERS: Oh, just a couple of things on the advanced reactors.

Do you really feel -- I take it you do, but just some questions about the schedule of reviews. We've only seen nine pilot ITAACs so far out of 130 and I just wonder how realistic it is to, in your opinion -- the staff feels that they can meet the schedule, but do you feel that you'll have ample opportunity to look at whatever you feel is necessary

to look at and still meet that schedule with such a small number of ITAACs completed so far?

MR. WARD: I'll pass.

Jay?

MR. CARROLL: Well, I guess I've looked at-- I don't know what the number is, probably the same nine you have, and I guess my reaction was there was a lot of work to be done there and I understood this was the -- had gone through an iterative process. This was what GE proposed, the staff commented on, back to GE and back to the staff. That's what I thought I was looking at and I thought they were -- the ones I looked at were extremely superficial and needed an awful lot more work.

COMMISSIONER ROGERS: The ITAACs themselves?

MR. CARROLL: Yes.

And I think you felt the same way, didn't you, Carl?

MR. MICHELSON: That's essentially right.

MR. WARD: Well, ACRS won't be reviewing these ITAACs in detail.

COMMISSIONER ROGERS: Yes, right.

MR. WARD: We don't have the capability to do that. We want to look at the process and we'll

probably do some sampling, but that's the extent of it, so --

MR. MICHELSON: DAC is a much bigger problem than the ITAAC, probably, in terms of review, and I don't know -- there's no indication of whether we review each DAC or whether we just look at the progress --

COMMISSIONER ROGERS: Well, but presumably there's not going to be that many DACs, but there's 130 ITAACs that we've got --

CHAIRMAN SELIN: Mr. Michelson is saying if there's going to be a lot of DACs, they may be all tied up and called one DAC.

MR. MICHELSON: There could be one DAC for the whole plant, if you want.

CHAIRMAN SELIN: No, sir. No, sir.

COMMISSIONER ROGERS: Well, I wonder if you are together with the staff on that view of the current nine ITAACs?

MR. CARROLL: I don't recall any interaction with the staff since I saw those. I think I saw them about the time of last month's ACRS meeting.

MR. MICHELSON: We've not received them for any kind of a formal consideration. They would

be incorporated as a part of the FSER and then we would perhaps look at them at that time. I just don't know where -- what to expect.

COMMISSIONER ROGERS: Would you be adverse to at least taking a look at a couple of those in some detail just to see? Because, it's my impression that there's at least one of them that they feel is essentially done and, if you feel very uncomfortable about that, I think we ought to get that right out on the table because --

MR. MICHELSON: Which one do you --

COMMISSIONER ROGERS: The liquid control system, standby liquid control system, I believe is the one. I know that's the one that they showed me and I assume that's the one that they had in greatest detail.

MR. MICHELSON: Why do we need a DAC for that?

COMMISSIONER ROGERS: No, no, ITAAC.

MR. MICHELSON: I'm sorry. I haven't got a design for the system, so the ITAAC gets a little more difficult to review without a design.

COMMISSIONER ROGERS: Well, it's the whole concept of how that is constructed and what is essential in it, and they feel that they've zeroed in

on that. And if you don't think that's acceptable, then I think we ought to get that right out because my impression is the staff feels very comfortable that on that one they're where they think they ought to be. And if you don't feel that way, I think that ought to be registered promptly.

MR. MICHELSON: Yes. We haven't reviewed it, just looked -- we have several of these we just looked at.

COMMISSIONER ROGERS: Well, I'd ask you, if you could do that, I think it would be very helpful to us to know.

I don't have anything else really on the other presentations today. I thought the meeting was very valuable and I always enjoy meeting with you and hearing what you have to say. However, I'd like to bring up a slightly unpleasant subject, and that is your February 14th letter on trends in core melt probability, because it troubles me.

I have to tell you that the question and the difficulty that I have is that you've agreed with the staff that there seems to be a trend, an improving trend in decreasing core melt probability and that more work needs to be done to see just how that might have some about in various ways and what one can learn

from the data that support that conclusion. And then you went on to say that what's far less clear is the cause of the trend and then you make some comments about what might or might not have contributed to that.

And my problem is this. One is, it seems to me that it's an absolutely futile exercise to say what is the cause. It's a very complicated -- that number represents the average for all the plants in the country and there's all kinds of things that have gone on over the years. And indeed, industry initiatives have been very important. INPO has been very important. But I must say that the kind of suggestion that regulatory improvements may have in fact held up this or delayed it gives me a great deal of trouble, and I'll tell you why.

I've had the opportunity over the last four years to visit every site in this country that has an operating nuclear power plant. I've spent a full day at each of those sites. And on most of those visits I've had meetings one on one, just me and the other person, with about six of the staff members -- and not the top brass of the company, but the working people in the plant, supervisor of maintenance, supervisor of operations, the plant manager, control

room senior shift supervisor, people like that. And I would say at almost every one of those visits, not all of them, somebody at someplace in those just conversations between the two of us has said, "Thank God for the NRC, because, if you hadn't been on the job and pushing, many of the improvements that we've seen around here just simply would not have taken place."

Now, I find that totally at odds with the notion that somehow this all would have happened better and faster if there hadn't been any regulatory initiatives. And maybe that's what you're saying and maybe that's not what you're saying, but certainly that's what one could read into that letter. And I have to tell you that I have a lot of trouble with that, because it doesn't seem to fit the facts as I see them when I visit the plants around the country.

In fact, regulatory initiatives have not always been positive. We can see lots of absurdities that have come about in various situations. But when you put them all together, it's without any doubt in my mind that it has been a very positive contribution to improving the quality and safety of the operating plants in this country and I really feel that suggesting otherwise leaves me to question why. What

is to be gained by placing that doubt on the table?

CHAIRMAN SELIN: Mr. Ward, I'm going to play a really dirty trick on you, which is we want you to understand that this concern on whether there's something behind that paragraph or is it merely keeping things open is in the Commission, but we don't want to really get into that subject at this point. It's way out of the scope of this meeting right now. We do have to follow up on that letter. Well, not the letter, but the project at some point.

I mean, if there's a quick response or some short remark you'd like to make about it, that's fine.

DOCTOR LEWIS: Can I take the flack on this one a little bit? Because, first of all, I don't think we said that the regulatory effort has held up safety. What we were reacting to -- and this is my personal view -- what we were reacting to was that the draft staff report took the entire credit for the regulatory improvement.

The second point is, I personally am not so convinced that the improvement is what it is alleged to be because there are remaining conflicts about the actual level of risk in the late '70s and early '80s. They're dominated in the staff

presentation by three major accidents, TMI, Brown's Ferry, and Davis-Besse, and they're dominated by the calculation of conditional core melt probability at that time. I've looked into one of them rather carefully since we wrote that letter and on the Brown's Ferry one there remains a factor of 100 difference between the staff belief of what the conditional core melt probability was and what other people have said it was, so we have somebody looking into that now. But, if you take away those three bars, then there's no statistical evidence that there's been an improvement.

So I think that we put into the letter, and it's a committee statement, that the assumption is that the S program has been up to the state of the art, but that remains to be seen and we simply didn't take a view on that.

CHAIRMAN SELIN: That's fine, Doctor Lewis, but the paragraph doesn't -- I mean, it says much closer to what Commissioner Rogers said.

DOCTOR LEWIS: No, I understand. I'm now coming, if I may, to this. So, we were reacting to taking all the credit. In terms of everybody's feeling that it's important, that the regulatory process is important, I share it. Of course it's

important. But on the question of whether it has a net positive or a negative effect, it turns out that there's no way, as you said yourself, to demonstrate it.

And in fact, after Three Mile Island, there were the 200 odd items in the action plan that were forced, all of which were honestly believed by honest people to be beneficial, but I believe in no case was there any analysis to show that it was true. It's a matter of faith and I do think it's our responsibility to try to distinguish faith from what the facts are.

And it's also true, as it said in the letter, that there are natural trends toward improvement in any industry. If you look at automobile accidents per passenger mile, they've been going down steadily for 20 or 30 -- I don't want to start quoting things from a well-known book, but it's all in there. And you know there is a natural improvement tendency, so --

MR. WARD: Yes, but, Hal, whether those are natural or whether those are due to specific areas in several areas is -- I guess can be argued, right?

CHAIRMAN SELIN: If you'll excuse me for intervening at this point, since we're about a half

an hour over our time --

DOCTOR LEWIS: I'm only saying it's an open question.

CHAIRMAN SELIN: I asked you to do that. It's very helpful for us.

I'd like to make a general comment of which this is one. There's a small number of topics in which your continuing interest is of great value to the Agency. They include the DAC issue, these probabilities about what's really happening. You know, you've heard me say it before, but cause and effect is a lot to hope for. Correlation I would be happy with in this business. Commissioner Rogers and I both reacted to that last paragraph because it sort of stood out as not just an open-minded but a very skeptical statement.

But, putting that aside, continue to look at both the old probabilities and new probabilities. Make sure we don't mix up conditional probabilities and a posteriori probabilities. Make sure we say these things right. I mean, what we're saying is the probability that there be at least one core melt as opposed to the a posteriori probability of a core melt. I mean, there's a lot of stuff that -- that's an important analysis and your continued help and

attention would be appreciated.

Commissioners?

I have a couple of general comments I'd like to make. Well, really three.

The first is that lots of things happen and the whole idea of looking at a universe and looking at a year after the fact instead of before the fact is that we don't have a model. We don't really have cause and effect, but we're trying to look for trends to see if they are really just flukes or if there's a general piece and we really do appreciate your help and would appreciate your continued looking at this. This is a perfect place for a highly professional outside group to look, because there are methodology questions as well as experimental questions. If it were all empirical, it's hard for a group that meets even as often as you do -- but relatively infrequently compared to the staff -- to produce a tremendous amount of help. But when there are questions of methodology and concept mixed in with it, you can be extraordinarily helpful and this is one of those points.

The second is, as I've told Mr. Ward, I'm concerned about how to get the best benefit out of what the Committee does. I don't claim to have the

whole answer, but one of the most useful things for me and I hope for the Commission is to have a continuing level of attention coming back to a few of these main issues and main themes over and over again where we can get the benefit of your cumulative looks and follow-up analyses, rather than a whole lot of one shot small pieces. And these three questions, the advanced reactors, the DAC, if you will, with is a rather novel late arriving concept for the Part 52, and then this overall, the role of regulation and sort of what's been happening in the safety of the industry, those are certainly candidates to get your recurring attention. It doesn't mean that at every session they have to be discussed, but to have a series, a sequence of status reports on those.

Then the third is an admonition, not for the Committee but for the group in general. This is supposed to be, and I hope and I think it has been, an open interchange. People say things that -- I don't think we say things we don't mean, but we're speculating. We're trying to get questions and it would be a mistake to go out afterwards and say, "Oh, the Chairman thinks this. Commissioner X thinks that."

I mean, don't try to read too much into

the questions in terms of a state of mind. They're more probing to find out what's behind what you're saying. I for one have no idea what I think about these issues until I go back and reflect on these, so it would be a mistake to -- you know, it's sort of like Supreme Court watchers, "Justice Scalia asked this question, therefore here's how he's going to vote." Who knows where we'll come out on some of these questions.

I'd like to thank you once again for your continued support. We look forward to not just these formal meetings, but a range of informal interactions as well.

MR. WARD: Very good. Thank you.

(Whereupon, at 3:59 p.m., the above-entitled matter was adjourned.)

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

TITLE OF MEETING: PERIODIC MEETING WITH THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

PLACE OF MEETING: ROCKVILLE, MARYLAND

DATE OF MEETING: MARCH 5, 1992

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