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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

514th ACRS FULL COMMITTEE MEETING

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WEDNESDAY,

JULY 7, 2004

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The above-entitled Committee Meeting commenced at 8:30 a.m. in Room T-2B3 of the Nuclear Regulatory Commission, 11545 Rockville Pike, Rockville, Maryland, Dr. Mario V. Bonaca, Committee Chairman, presiding.

COMMITTEE MEMBERS PRESENT:

MARIO V. BONACA, Chairman

GRAHAM B. WALLIS, Vice-Chairman

STEPHEN L. ROSEN, At-Large

F. PETER FORD

THOMAS S. KRESS

DANA A. POWERS

VICTOR H. RANSOM

WILLIAM J. SHACK

JOHN D. SIEBER

NRC STAFF PRESENT:

LEE ABRAMSON

CHARLES ADER

STEVE BAJOREK

SUZANNE BLACK

NILESH CHOKSHI

JOSEPH COLACCINO

DAVID CULLISON

ANDRE DROZO

JOHN FAIR

FRANK GILLESPIE

THOMAS HAFERA

GARY HAMMER

JOHN HANNON

LAUREN HART

ALLEN HISER

B.P JAIN

BILL KEMPER

LESLIE KERR

MARK KOWAL

JOHN G. LAMB

JIM LYONS

MICHAEL MARSHALL

ROY MATTHEW

GEORGE MENCLINSKY

NRC STAFF PRESENT: (CONT.)

JOCELYN MITCHELL

KRIS PARCZEWSKI

LAUREN M. QUINONES-NAVARRO

JOHN SEGALA

DAVID TERAO

BRIAN THOMAS

EDWARD D. THROM

MIKE TSCHILZ

JENNIFER UHLE

JERRY WILSON

I-N-D-E-X

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

8:29 a.m.

CHAIRMAN BONACA: Good morning. The Nuclear Committee meeting will come to order. This is the first day of the 514th meeting of Advisory Committee on Reactor Safeguards. During today's meeting, the Committee will consider the following: final safety evaluation report associated with the AP1000 design certification, draft final generic letter of the potential impact of the pre-blockage on the emergency recirculation during design-basis accidents of PWRs, risk inform in 10 CFR 50.46, acceptance criteria for emergency core cooling systems for light weight nuclear power reactors, differences in regulatory approaches and requirements between U.S. and other countries in preparation of ACRS report.

Dr. John Larkins is the designed Federal Official for the initial portion of the meeting. We have received no written comments or requests to-date for time to make oral statements from members of the public regarding today's sessions. A transcript of portions of the meeting is being kept and it is requested that speakers use one of the microphones, identify themselves and speak with sufficient clarity and volume so that they can be readily heard.

I will begin with some items of current interest. Mr. Leitch who has been with the ACRS for four years will be leaving the committee after his term ends on July 9, 2004. Unfortunately, Graham could not be with us today for personal reason. However we appreciate the outstanding professional and technical commitment provided by Mr. Leitch in reviewing several complex technical matters.

Mr. Leitch's expertise and knowledge have contributed greatly to the Committee and to the mission of the Agency. On behalf of the Committee, I would like to thank him for his outstanding contributions and wish him well in his future endeavors. He will be with us probably in September and we will have an opportunity to say goodbye to him in person.

Also I would like to point out that Ms. Gelina Monroe, she's not here right now, will be receiving her advanced degree in Industrial and Systems Engineering, Human Machine Systems from the North Carolina ANT State University this summer. She will be working for the ACRS until the end of the July.

During this tenure, she will be performing a study on the human factors, human reliability analysis with emphasis on performance shaping factors. She was working for the ACRS in the summer of 2003, as you may remember, and prepared a report on "The Role of Human Factors in Nuclear Power Plants and an overview of NRC requirements of research activities. This report will be provided to the members in the near future.

Also we have Ms. Erin Alexander. She is a student of George Apostolakis at MIT. She will be receiving her B.S. in Nuclear Engineering this year. When she graduates in September, she will be commissioned as an ensign in the Navy and begin working on nuclear reactors. When working for the ACRS as a summer intern, she did research in safety culture and possible performance indictors.

Finally, I would like to point your attention to this package you have in front of you, items of interest. In it, there are a couple of staff requirements memorandums, one to do with issues related to proposal making to risk inform requirements for large-break LOCA and the other one, a staff requirement memorandum resulting from the meeting that we had with the Commission on Wednesday, June 2.

But there are also a number of speeches and additional correspondence that are of interest and under news articles, you see some articles regarding Vermont Yankee safety margins, etc. and those are of particular interest to ACRS because we will be reviewing some of these issues. With that, I think we'll move to the next item on the agenda and that's the final safety evaluation report associated with the AP1000 and Dr. Kress will lead us through that presentation.

MEMBER KRESS: Thank you, Mr. Chairman. The purpose of today's meeting is primarily to hold discussions on the Staff's Final Safety Evaluation Report and to hear about the resolution of all of the issues that are unresolved. Just to comment, this is pretty much ACRS's last shot at AP1000.

So if any members have any lingering unanswered questions, I think now is the time to ask them, now during this meetings anyway. With that as a very brief introduction, I'll call on Ed Cummins of Westinghouse to get us started.

MR. CUMMINS: Thank you very much. Our presenter is Terry Schultz. Thank you.

MR. SCHULTZ: Good morning. I have about eight slides to just give a brief summary of AP1000 and in addition, one of the slides has a little bit more information on some screen design characteristics. I think the last time I talked to the subcommittee we ended with this slide. I'd like to start with it now.

Obviously, that's the hopeful conclusion of all the work that we've had going on the last couple of years on AP1000. It starts with the process AP systems design, approach to safety, the use of systems that do not require pumps, diesels, fans to work, one-time realignment of valves, reduced dependence on operator action, design-basis met with the passive systems without use or the need for the active non-safety systems and the meeting of the safety goals again without need for the non-safety systems.

The active non-safety systems are in the plant. They will be used during normal operations, anticipated transients. They have redundancy. Powered by onsite diesels. Reduce the challenges to the passive systems and do participate in the PRA.

The AP1000 passive systems are essentially identical to the AP600 systems in terms of configuration. We have upgraded the capacity because of the increase in power. Passive RHR. Larger pipes. More tubes. Longer tubes to get the eight exchanger capacity to essentially match the power increase.

Core makeup tank volume and the flow rate were increased. The ADS flow capacity was significantly increased with larger pipes and valves. The same with RW's T injection and the containment recirculation. We also did some other things in terms of increasing the recirc water level more than in AP600 to again provide margin and from a design point of view and our safety analysis, we have maintained the margins in the analysis results.

As promised, this is a little bit more than the last time we talked about some of the specific design features that AP1000 incorporates. We provide a robust post-accident, post-recirculation, debris, toleration type design. The initiation of recirc is significantly delayed relative to an operating plant. It's typically like five hours.

For DVI break, it can be as short as a couple of hours which is still more than twice what a typical operating plant has. So there's more time for debris to settle. The flood-up levels are significantly above the top of the screen so floating debris tends to be well above the screen. So it's out of the picture.

The velocities both in the pools and close to the screens and at the screen faces are significantly lower, maybe an order of magnitude lower than operating plants. There's no spray to wash down debris from the upper parts of the containment into the sump so that kind of debris would not get involved in recirculation. The screens are tall and they are located well above the bottom of the floor. So there's a lot of space for debris that gets down to the floor. It's not going to get up and drug up into the screens.

We have provided some protective plates that are right above the screens that extend out to about ten foot or so so that paint or any kind of debris cannot get into the water stream right in front of the screens. It has to be at least that far away which provides a significant chance to have that debris settle.

We have incorporated a sump recirc screen design which has advantages in terms of not increasing area but also tolerating debris. We've cross connected these sump recirc screens so that even in the worst accident location which is typically a break in a DBI valve compartment, both screens are always in service in a recirc situation so we get the advantage of the area of both screens.

We have eliminated by design the

generation of fibrous debris from fiberglass insulation through the use of metal-reflective insulation. And we have provided a high density coating inside containment so that if the coatings do come off, then they will settle especially given our long recirculation times.

So that's all from a design perspective what we've done. We also have two COL items that relate to this issue. One of them requires that the owner/operator provide a cleanliness program so that during shutdowns, he doesn't leave equipment and debris inside containment that could challenge the screens. And the second item is to address anticipated new information specifically resident debris data that doesn't exist right now. Being collected, but we don't have it. And the chemical corrosion precipitant tests that are going to be going on later this year. For the COL, we would have to analyze this data relative to AP1000 to demonstrate that the plant is okay.

MEMBER POWERS: Let me ask a question on a couple of things?

MR. SCHULTZ: Sure.

MEMBER POWERS: What makes your high density coatings high density?

MR. SCHULTZ: We're talking specifically about like epoxies which typically have a density around 90.

MEMBER POWERS: Ninety?

MR. SCHULTZ: Pounds per cubic feet.

MEMBER POWERS: Can you translate that into something civilized?

MR. SCHULTZ: Probably not.

MEMBER POWERS: Water is 64 pounds per cubic feet. Right?

MR. SCHULTZ: Okay. So 50 percent more than water. We're talking about a normal increase to about 100 pounds or a little bit more percentage wise. We've talked to coating manufacturers. I don't know specifically what they would add.

MEMBER POWERS: So you've really never tested to see if these things sink.

MR. SCHULTZ: They obviously will sink with that density. It's a question of how fast.

MEMBER POWERS: A ship is made out of steel with a density of seven and it doesn't sink. I hope it doesn't sink anyway.

MR. SCHULTZ: It depends on --

MEMBER POWERS: It depends on what happens in the ship. Yes. It probably also depends to you on what happens to your coating, too.

MR. SCHULTZ: You would presumably have to -- I can't see the coatings staying suspended. If they had the right shape, they might float like a ship, yes, on the water surface which presents no problem. If they're not shaped like that, they will sink because of the density.

MEMBER POWERS: Suppose they react a little bit with the water and form hydrogen bubbles.

MR. SCHULTZ: They're going to float now.

MEMBER POWERS: They're going to suspend around.

MR. SCHULTZ: It would seem like it would be pretty magical. If you would ask me to design a paint particle that would stay just suspended, I don't think I could ever convince you that that would happen.

VICE CHAIRMAN WALLIS: The problem is that it's a cyclic process. If it does form bubbles, it rises to surface, releases the bubbles, falls, may form some more bubbles, rises and so on. So there is a concern that there are chemical reactions that releases the bubbles. But I think that you assured us that your coatings weren't the type to do this.

MR. SCHULTZ: The coatings are designed to qualify for post-accident conditions. They would be the same coatings that operating plants would use for their qualified coatings that would stay in place in the walls. So the only difference that we're doing is making sure they are little more dense so they tend to sink faster and we are not placing the QA requirements on the application and inspection that operating plants are.

MEMBER POWERS: I mean the problem is as I see it is that we have hope and we have analyses, but nobody ever tests these things to see if they, in fact, do what they're supposed to do in the environments that they are going to encounter. My ability to predict what happens with strange, complex chemicals in a strange and complex environment is banishingly small.

Now that's a statement about me and not about you. Yours might be higher, but I don't see the kinds of sophistication that gets applied to polymer materials in radiation environments here where they swell. They do all kinds of weird-ass things.

MR. SCHULTZ: I can't answer or say anything more about the coating materials.

MEMBER ROSEN: Well, let me try on a couple other things on this slide. Why do you say that 140 square feet each is a large surface area? That is the kind of surface area we're currently saying is not large. We thought 1,000 square feet --

MR. SCHULTZ: Well, it's relative to the flow rate. We have like one-tenth the flow rate that operating plants do. So in terms of velocities through the screens, it's like having ten times the area in the operating plants.

MEMBER ROSEN: Why is one-tenth the flow rate?

MR. SCHULTZ: Because we don't have spray pumps. Because we don't have low head safety injection pumps. We do have RNS pumps which are shutdown cooling pumps but because they are designed as a non-safety system we don't put the margins on. We don't have extremely high run-out capabilities that our current plants require for large-break LOCA protection.

It's the combination of not having spray pumps, not having low head safety injection pumps, not having the margins that the operating plants have to put onto those pumps to make sure that they don't degrade and line resistances and all that. So it's kind of a by-product of the passive safety systems that don't require or don't have these extremely high flow rates.

MEMBER ROSEN: All right. Well, at least one would going in presumptions say "140 square feet is not large compared to what we're used to" but I understand your argument. Now let me try on a different one on that same slide.

That COL item will address anticipated new information resident to pre-data and chemical corrosion tests results. But my understanding in some of the subcommittee discussions was that Westinghouse had agreed to do calculations in the same manner as the operating fleet is doing and with the NEI guidance. That will become endorsed by regulatory guide.

To me, that was a full commitment that made me comfortable because of you can take full advantage of the thing, the fact that we have low flow rates and all the rest and no calcium silicate insulation in the containment. All those things will be to the benefit of this design and then you'll probably come out okay. But it was comforting to me to know that Westinghouse intended and was willing to take a commitment to do those calculations on a broader scope of things than just the resident debris data in the chemical stuff. Now I don't see that commitment. I see a narrower commitment.

MR. SCHULTZ: No, you're misunderstanding what I'm saying here. I didn't repeat the whole thing. I can show it to you if you want to. I think the Staff is also intending to show you the exact words of the COL item.

It does point out these two issues specifically so that they're not overlooked. It does also require a performance analysis. I think it references the reg. guide, Rev. 3. I don't think it references NEI, but it's something that the Staff hasn't reviewed any NEI guidance at this point in time so it wasn't something we could reference.

But it does commit to doing a performance analysis and showing that core cooling is adequate and it's specifically not just with these two items but including these two items. So what we mentioned in the subcommittee meeting is in fact what we think the COL item is and what we will do. Yes.

MEMBER ROSEN: Well, okay. That's good. Maybe the Staff could comment on that as well.

MEMBER RANSOM: I have one question on the statements two and four. What are low velocities? How low are they and at those velocities, what are the maximum size particle, I guess, that could be entrained off the floor with that two foot clearance? Are these based on actual engineering calculations or are they just judgment calls?

MR. SCHULTZ: The velocities are calculations.

MEMBER RANSOM: What are the low? What are the maximum velocities?

MR. SCHULTZ: Let's see. I have a backup slide that if I can quickly get to it. Let's see.

VICE CHAIRMAN WALLIS: So the area is not much bigger than a typical --

MR. SCHULTZ: That's right. The real difference is the flow rates. Instead of having 10,000 gallons per minute, we have 1600 gallons per minute. This is the case with RNS pumps and here are the velocities, at the screen phase, at the trash rack, ten foot from the screen and even further. At 20 feet from the screen, it gets a little hypothetical depending on this was assuming a uniform geometry which probably doesn't exist in reality.

VICE CHAIRMAN WALLIS: But these pumps are active systems, but there's a static recirculation, isn't there?

MR. SCHULTZ: We can run various pumps. The operators in fact were told to start them and if the ADS goes off. We don't count them working, but in this case they may the thing a little bit worse. So we look at it to make sure that -- So this left-hand column here is with the active system running with a maximum type flow rate to maximize the screen conditions to make it worse for the screen. This is the backup core cooling system running all by itself with a gravity recirculation. So the flow rate is a bit less. So it's less severe from a screen point of view, not greatly different but somewhat.

MEMBER RANSOM: Do you have calculations to what size of particle would be entrained in this?

MR. SCHULTZ: These kinds of velocities are well below the kind of velocities that would pick up the metal reflective insulation debris. I don't really know what this will move, but my feeling is that if it doesn't pick up metal reflective insulation, you're talking about something that would have to be pretty light weight and of the shape that could be drugged by very low velocities.

And again you have a screen that's -- One of the screen is ten foot high. One of them is 13 foot high. So even if you got stuff up to the bottom of that screen, it's not going to challenge anything unless it plugs most of the screen up. So you're really talking about a --

MEMBER RANSOM: And you have trash racks that prevent larger particles of this reflective metal --

MR. SCHULTZ: It's like a degrading type of metal that's in front of the fine screens, typical type design.

MEMBER RANSOM: What sizes are those? In other words, how big could some of the reflective metal insulation be that reaches these screens?

MR. SCHULTZ: I think metal reflective insulation cannot reach these screens. There is no way they can reach these screens.

MEMBER RANSOM: You mean it can't go down through the trash racks.

MR. SCHULTZ: The screens have a plate that extends out ten foot in front. The trash racks are vertical against the wall. Metal reflective insulation debris most likely will be generated during the blowdown. Two to five hours later research starts. That stuff is going to be sitting on the floor.

MEMBER RANSOM: What are the spacings of the trash racks though?

MR. SCHULTZ: The trash racks are a couple inches wide, maybe four or five inches high. It's like grating. It is grating.

MEMBER ROSEN: But to put that in perspective, that's 0.0106 feet per second. This is rather slow.

MR. SCHULTZ: Yes, it is very, very slow.

MEMBER ROSEN: This is like less than one foot a minute. It's hardly moving.

MR. SCHULTZ: Yes.

MEMBER ROSEN: About half a foot a minute. I think about half a foot, six inches, a minute. It's just hardly moving at all is what you're saying.

MR. SCHULTZ: That's right. Yes.

MEMBER KRESS: Okay. We got all that.

MR. SCHULTZ: Okay. Good. Okay. Passive containment cooling. Again same configuration as AP600. We did add a third valve. It's a different kind of a valve. It's a motor-operated valve from the two air-operated valves AP600 has. This was a PRA consideration. It added extra reliability to the water cooling aspect because we had somewhat much less T&H margin on air-only cooling. We adjusted water flow rates in the longer term because of higher decay heat and this, of course, made the tank larger and I'm talking the containment.

MEMBER KRESS: Now on the containment when you analyze the design-basis accidents, you used a very hot day.

MR. SCHULTZ: Yes.

MEMBER KRESS: So that you minimize the ability of this to cool.

MR. SCHULTZ: Yes, it's like 115 degrees, 120 degrees, so it's a very hot day and we assume the cost in temperature.

MEMBER KRESS: That's another one of conservatism.

MR. SCHULTZ: Yes, and the water is hot. The distribution of the water is assumed to poor in terms of coverage of the water on the containment. The heat transfer through the containment on both the inside and the outside is conservatively treated. So there's a lot of conservatism in the heat transfer and there's a lot of testing to back that up also.

Safety margins. Typical PWR plant. AP600 and AP1000. As you can see, the AP600/AP1000 had significantly greater margins than operating plants all the way through the spectrum here. We've maintained or in some cases actually increased margins for AP1000.

Moving on toward beyond design-basis

considerations toward the PRA, one of the things that's important to realize is that the AP1000 has many levels of defense. These levels of defense are made up of primarily passive features, although there are some active feature mitigations.

In some cases, there are combinations of active and passive features. So we're not relying on a single passive feature that is extremely inordinately reliable. We have different passive features. We have active features. The whole network of that gives a lot of not only redundancy but also diversity which then helps understand why the PRA numbers came out well.

MEMBER KRESS: And on the PRA for the non-safety systems, what did you do for the reliability of these compared to the same component that would be a safety related system?

MR. SCHULTZ: For the components themselves, we basically used the same numbers.

MEMBER KRESS: The same numbers.

MR. SCHULTZ: Except we made adjustments for maintenance unavailability. We increased that somewhat because we figured that there weren't tech specs on them. They didn't have to be maintained in service. There is a strong incentive for utilities to maintain almost all of these components in service because they're used normally. So if they're unavailable, you're going to have difficulties running the plant. So there is that strong incentive, but we really took no credit for that. So we start out with the same basic component reliabilities, but we added additional unavailability due to maintenance type activities.

And we think that the AP1000 meets the NRC safety goals with significant margin and low uncertainty, both from a core damage and a large release point of view. Here you can see the numbers both for at power and shutdown conditions. We've calculated those, the core damage and the large release frequencies.

MEMBER KRESS: I notice you're calling this a large release frequency. Does that differentiate from a large only release?

MR. SCHULTZ: In AP1000, we have a few. We assume, for example, if you have an at WITS event that goes to core melt, it's pretty hard to figure out how that event progresses in terms of what fails first, what melts first. So we treat that as an early release.

We pretty much have either an early

release or we don't have a release the way this goes because of the effectiveness of in-vessel retention. Whereas a plant without that kind of design where the core goes on the floor, most likely the containment will fail. It's just a question of when. So they end up with more large, late releases. For that kind of a plant making that distinction is very important. If they just say large release, then almost all core melts are large releases.

MEMBER KRESS: Do you have a success criteria from in-vessel retention that you put into the PRA? When was it successful? When was it not?

MR. SCHULTZ: It's treated -- The formal hydraulic uncertainty is not part of the PRA. Things that are counted are do we depressurize the reactor. Do we have sufficient water at a timely fashion outside of the reactor? I think those are the two main criteria. Of course, containment cooling to support that.

So in terms of talking about probabilities and then of course there are some events where you either bypass the containment and of course you're going to have a release or the ATWS type sequences which also tend to -- We don't worry about in-vessel retention because we don't get there.

MEMBER KRESS: Those two make up most of this release?

MR. SCHULTZ: Yes, bypasses and ATWS.

MEMBER POWERS: Then do I understand it correctly that if you have water in a timely fashion around the vessel you retain it.

MR. SCHULTZ: And the pressure is reduced. Yes.

MEMBER POWERS: And the pressure is reduced.

MR. SCHULTZ: In terms of calculating large release frequencies. Yes.

MEMBER POWERS: And the Staff has reviewed this and accepted it.

MR. SCHULTZ: That's my understanding. Yes.

MEMBER KRESS: Maybe the Staff can speak to this, but part of the basis was that they looked at the effect of the stuff penetrating in terms of a fuel cooling interaction to see if it would fail containment and they did a sensitivity study on that. The sensitivity study was sufficiently broad in super heat and total mass and a percent of that mass enters and you still have a pretty low probability containment failure. That's my understanding of the

Staff's basis for accepting it. It was a sensitivity study.

MR. SCHULTZ: And from that point of view, in our PRA, we account if in-vessel retention for mechanistic reasons. We assume that is a containment failure.

MEMBER KRESS: Oh, you go ahead and assume that.

MR. SCHULTZ: Okay. In terms of probabilities and calculating large release frequencies. So if we don't have sufficient water, if we don't get the pressure down, we assume that that will lead to containment failure even though there's been calculations that show that the core leaves the vessel and melts through that it probably won't fail the containment. So there's margin from that point of view.

MEMBER ROSEN: Before you leave that slide, would you say a few words, maybe I missed them, about why you say in your bullet "low uncertainty"?

MR. SCHULTZ: Well, the low uncertainty, there's a couple of aspects there. One of them is the nature of the process systems design. They are very simple and so that if you compare that to an operating plant that has a complicated network of things that have to work including water systems, HVAC, during the PRA of that, there's more uncertainty because of the complexity. Is the plant operated the way it's supposed to be? You have so many things that could go wrong.

The other thing is the post core-melt phenomenalogical issues. We have addressed many of them by design. We have design features in there, control hydrogen both by ignitors and locating of vents from areas where hydrogen can be released. The in-vessel retention, we think has uncertainty in what happens after a core-melt. So it's those kind of things.

MEMBER ROSEN: I understand that qualitatively and would tend to agree with you. Now have you a quantitative deal for it? Did you try that?

MR. SCHULTZ: I can't answer that question. Maybe one of our PRA experts could, but we don't have one here.

MEMBER SHACK: Well, if you believe the calculations, it's fifty in nine, 50 percentile. That differs by a factor of about 30 which is pretty small.

MEMBER POWERS: I mean for -- frequency that's not small.

MEMBER SHACK: That's right.

MEMBER POWERS: Well, your big uncertainties develop there because of -- uncertainties.

MEMBER SHACK: Just to come back, you actually rely on your active systems to handle many of these accidents and it's always this transition from the active control to the passive system. What's the chances for some other operator commissioned there during the time he's trying to handle this by an active system when does he decide to stand back and let the passive systems work?

MR. SCHULTZ: You're right that the active systems are anticipated for a mild event, not a large LOCA or bigger LOCA, but the loss of feed water, loss of outside power, even a tube rupture. The active systems are anticipated, the design, in fact, do come on first and if they work properly, the passive systems are not actuated. So the operator doesn't have to block them or any of that.

If they don't work properly or if the operator adversely intervenes on the active systems and puts them in a mode where they are not doing the right thing, the plant parameters would eventually get to the point where the passive systems are automatically actuated and if necessary, the active systems are blocked. It depends on the type of event whether or not you block the passive systems. But because of the fact we don't need the active systems to work, we don't take credit for them in Chapter 15. The actuation logic is set up so that if the plant conditions degrade to the point where you need the passive systems, we can and do under certain circumstances block operation of the active systems.

Now can the operator defeat that? Yes. He can still do that. We've done a lot in terms of sequencing operation and actuation of active and passive systems. Obviously the operator has to be trained in terms of emergency procedures, post trip, post SI procedures on what he should do, what he shouldn't do, what the key plan in the plant that he should be monitoring. There will be automatic displays to help remind him if he forgets which he should never do. So I think it's extremely unlikely that that kind of thing could happen.

Okay. We have about three slides now on the iodine. This is the question that ACRS raised on not having pH adjustment of water films.

MR. HAMMERSLEY: Good morning. My name is Bob Hammersley and the organic iodine production issue was one of the severe accident issues, no. 6, that was included in the interim letter. The issue related to the acidification or potential acidification of the steam condensate draining down the containment shell leading to increased production of organic iodine. The AP1000 was judged to be able to accommodate uncertainties in iodine production since it meets the safety goals with significant margins which are identified here in terms of the safety goals, both in terms of prompt fatality and latent cancer fatalities.

Also there's an expectation that only a small amount of cesium hydroxide which could be released during the accident would maintain the film pH at a value of seven or greater and should that occur, then there wouldn't be any significant dose impact because the pH would be high enough to avoid the conversion of iodine deposited in these films from cesium iodide releases neutralizing any acid production in these draining films.

MEMBER POWERS: Suppose only a tenth of a percent of the molybdenum inventory was released as molybdic oxide, what would happen to the pH in the film?

MR. HAMMERSLEY: As molybdic oxide?

MEMBER POWERS: Yes.

MR. HAMMERSLEY: Well --

MEMBER POWERS: Trioxide. Molybdic trioxide comes off. Suppose only a tenth of the percent of the inventory.

MR. HAMMERSLEY: It could effect, if there was a hydrolysis reaction, the pH of the solution and perhaps make it lower. I haven't done any of those numbers to know the exact amount.

MEMBER POWERS: Suppose that you have hot steam flowing over stainless steel and you extract a little chromium rod as chromic oxide. I guess my point is it seems very plausible and nobody can tell you that a tenth of percent of cesium released from the fuel won't be cesium hydroxide.

MR. HAMMERSLEY: Right.

MEMBER POWERS: But that begs everything else that gets released from the reactor of which most of it's going to be stuff other than cesium hydroxide and so what does that do to the pH?

MR. HAMMERSLEY: I don't know. I don't know what all the species are. Last time we talked we --

MEMBER POWERS: Neither do I. But the thing of it is, stay with the presentation for a little bit and show that it doesn't matter.

MR. HAMMERSLEY: In a sense, we do a sensitivity study where we're concerned about controlling the pH. The point here is simply that given that there is a possibility of some basic materials being released only a small fraction would be needed to neutralize it. We characterize that as more of an expectation that there's going to be countervening chemical species that would interject in terms of the pH, but as the comment was made by Ed, we're not relying on that as a way of controlling the film pH.

There is no explicit mechanism in the AP1000 design that attempts to control the pH of the film draining which I think is the basis of the issue no. 6 question coming up. This is just meant to me our expectation that it's likely that there will be some neutralization of acid that could be produced in these draining films.

Then this is talking to our sensitivity study that we did that given without any cesium hydroxide, the deviate dose criteria are still met which means that at that point we're independent of the potential production or transport of pH affecting chemicals to the film. Whereas, we're now going to consider that the film's pH is not controlled as acidic as it would want to be and look at the consequence of the iodine deposited in it and convert it into elemental iodine and therefore available for organic iodine and look at the dose significance of that.

When we do that, the organic iodine in the containment serves as a source to a value of 0.15 percent. We evaluated impact as high as 0.33 percent and our estimates are actually a little less than that. They might possibly be converted such that the largest impact on the dose would be on the control room dose that shows an increase in the dose above the source term inputs of about 5.6 percent.

MEMBER POWERS: Let me see if I understand these numbers.

MR. HAMMERSLEY: Sure.

MEMBER POWERS: 0.15 percent and 0.33 percent are a percent of the initial core inventory of iodine.

MR. HAMMERSLEY: The percent of the -- Yes, you start in terms of the core inventory and then the source term is at least up to 40 percent of the core inventory in the first two hours of the accident and of that, five percent of the core inventory that's viewed as being released as elemental iodine and three percent of it is viewed as being converted to organic iodine. That's how you get the 0.15 percent.

MEMBER POWERS: Okay. So we have 0.15 percent of the initial core inventory floating around in the containment atmosphere.

MR. HAMMERSLEY: Yes.

MEMBER POWERS: And then you release --

MR. HAMMERSLEY: As an organic.

MEMBER POWERS: As an organic and then you release that and some fraction goes into the control room.

MR. HAMMERSLEY: Right. By containment leakage.

MEMBER POWERS: Now how much iodine is suspended in the containment after that release?

MR. HAMMERSLEY: The amount of iodine suspended, of course, is being dissipated because of deposition mechanisms that are on-going. The source term release is over the first two hours. In other words, released from the primary system to the containment occurs over two hours, but approximately ten hours from initiation of the release, the iodine in containment has been reduced to a negligible amount simply organic or, I should say, aerosol is deposited.

MEMBER POWERS: Yes, the aerosol part is

deposited.

MR. HAMMERSLEY: Right.

MEMBER POWERS: But doesn't, in fact, the organic iodine concentration in the containment just stay the same? No matter how much you leak, it's continuously reforming and that if I had a pump on this containment, I would eventually pump all of the iodine out.

MR. HAMMERSLEY: The source term calculates this 0.15 as the amount and it just allows it to leak during the whole fuel accident sequence as long as it takes. So the dose calculation, yes, it continues to leak, containment leak. For the first 24 hours of accident, it assumed to leak at the maximum and it would have that kind of a composition if you will of organic iodine.

MEMBER POWERS: I guess what I'm driving at is how much of the iodine gets to the great out of doors.

MR. HAMMERSLEY: It gets to the great outdoors?

MEMBER POWERS: Yes.

MR. HAMMERSLEY: Like I said, I don't know. I don't have the interval number in terms of a mass or something available. But the way the dose calculation was done is it leaked at this 0.33 percent for 24 hours, for example, at which point then it's a different leak rate.

MEMBER POWERS: I think I understand.

MR. HAMMERSLEY: Okay. So this slide talks about our expectation in terms of neutralizing the acids. So we looked at a severe accident sequence, this particular one. We looked at the film residence time which is a function of the condensation rate occurring in containment.

We looked at reduction of acids. In this case, we looked at nitric acid and hydrochloric acid. We looked at the deposition of the cesium iodine onto the film and the number we've talked about in terms of the amount cesium hydroxide that would neutralize the film and if it's neutralized, we say that it wouldn't be expected to be a dose impact. As we mentioned, we looked at sensitivity case that without any cesium hydroxide affecting the pH, what would be the impact on a dose and we judge that to be small.

So here we allow that all the iodine transported in containment film is assumed to instantly convert into elemental. The elemental then is partitioned instantaneously into the aqueous and gaseous concentrations based on the water film temperature which maximizes the amount of I_2 in the gas and that's assumed to all be released to the gas phase. Three percent of that is treated to be converted to elemental and that's how we get this to this 0.33 percent. The impact then on the doses is shown here and so this is where we say that significant margin exists so that we can accommodate this kind of an increase in organic iodine concentration produce doses that are still acceptable.

MEMBER POWERS: How did you arrive at the three percent of the elemental iodine in containment atmosphere is going to predict organic iodine?

MR. HAMMERSLEY: We followed the guidance in the regulatory.

MEMBER POWERS: So it's one that imposed on you from the outside.

MR. HAMMERSLEY: Yes. What we wanted to do was to compare the design basis source term spills consequence from an impact on that of not controlling the film pH. So we used, if you will, comparable assumptions or inputs to do that.

MEMBER POWERS: Yes.

MR. HAMMERSLEY: I think that's the end of that subject. Yes. I think Ron wants to comment on the last slide here.

MR. VIJUK: Yes. Our last slide just says we've been maintaining the schedule with the Staff and we hope to continue maintaining the schedule.

MEMBER KRESS: On your organic iodine, a question again. Do you have a pH control in your sump?

MR. HAMMERSLEY: Yes, there is a design using trisodium phosphate to control the pH of the sump. So waters collected post accident are maintained at a pH of seven or greater.

MEMBER POWERS: In the sump soil lined?

MR. HAMMERSLEY: Sump soil lined?

MEMBER POWERS: Yes.

MR. HAMMERSLEY: Stainless steel.

MEMBER SIEBER: I take it these are baskets of TSP there.

MR. HAMMERSLEY: Yes, it's a crystal material in baskets that become submerged post accident by the water that accumulates in the containment.

MEMBER SIEBER: Okay. So there are some on the floor.

MEMBER KRESS: But none of that would affect the film.

MR. HAMMERSLEY: This isn't near the

floor.

MEMBER KRESS: But none of that would affect the film or the airborne part.

MR. HAMMERSLEY: No.

MEMBER KRESS: But it would control the sump.

MR. HAMMERSLEY: That's right.

MR. CUMMINS: Just a clarification. Sometimes we use the word "sump" and they mean different things. The sump behind the screen is all stainless steel, but that's a small part of the flooded volume. The flooded volume, if you consider that the sump, has stainless steel, painted concrete, painted steel, various different things because it fills up to the containment quite high.

MEMBER POWERS: And you've looked at things like calcium hydroxide leaking and things like that nature because you don't turn all of your trisodium phosphate into rocks.

MR. CUMMINS: I'll defer to Terry on that.

PARTICIPANT: Could you repeat the question please?

MEMBER POWERS: Well, you've looked at things like leaching calcium hydroxide out of the concrete surfaces to make sure that you don't start precipitating out calcium phosphate, salts.

PARTICIPANT: I don't believe here there are any uncovered concrete surfaces there or either covered with a steel plate or covered with a painted surface. And so we're going to inspect those surfaces and make sure they don't become uncovered.

MR. SCHULTZ: I think the only -- This is Terry Schultz. I think the only concrete surfaces are floors so it's hard to imagine the thick epoxy on the floor somehow falling off.

MEMBER POWERS: How much calcium does it take before you start precipitating out calcium phosphates?

MR. SCHULTZ: I don't know the answer to that.

VICE CHAIRMAN WALLIS: This whole sump is a big chemical experiment.

MEMBER POWERS: No, there's no experiment there. We are relying totally on analysis here.

VICE CHAIRMAN WALLIS: I know, but it will be an experiment if it ever gets called into use. They might check out the analysis.

MEMBER POWERS: Your definition of experiment is different from mine.

MEMBER ROSEN: I hope the current work the

Staff is doing on integrated chemical effects testing will cover those subjects. I mean there really is supposed to be some testing going on to see what the current operating fleet. We haven't seen the program yet, but we are going to look at that in another context.

MEMBER POWERS: And this is to make me sure that these issues that I can never raise again once I sign them on the dotted line.

MEMBER ROSEN: Dana, no one is going to ever tell you you can't raise another issue. They would be fruitless to do that.

MEMBER KRESS: With that, I guess we will now turn to the Staff's presentation on the FSER and FDA. John Segala, I think, is our speaker.

MR. SEGALA: Yes, good morning. My name is John Segala. I'm the lead project manager for the AP1000 design certification review. The purpose of this presentation is to provide an overview of our review, to provide a current status of the project, discuss major milestones and go over two of the ACRS Center broader issues that at the future plant design meeting, those would be the organic iodine issue and the containment sump.

Previous milestones, Westinghouse. We

completed our pre-application review in March 2002. March 28, 2002, Westinghouse submitted their application. June 25th, we accepted it for docketing. On June 16th, we issued the draft safety evaluation report with 174 open items. On May 18th, we provided responses to your interim letter issues. On May 25th, we sent you an advanced copy of our final safety evaluation report.

This slide just gives you an overview of the meetings that we've had to support AP1000. It's a total of 19 meetings including today. Touched all the subcommittee meetings as well as the full committee meetings. The remaining schedule milestones is July 17th, that's our projected date of when we would like to have your final letter by. August 6th, we're going to get division director concurrence. August 13th, OGC, no legal objection. August 30th, EDO memo to the Commission attaching the FSER and the FDA and then we issue the FSER and FDA on September 13th and the final design approval on December 2005.

MEMBER KRESS: Is this like an ordinary rule that has to go out for public comment?

MR. SEGALA: Yes.

MEMBER KRESS: That's the difference in those two times.

MR. SEGALA: Yes.

MEMBER KRESS: Okay.

MR. SEGALA: And we had committed to when we issued the FSER and FDA that we're going to look at reassessing the December 2005 to see if we could do that any quicker. This slide just gives you an overview. There are 90 reviewers and project managers that worked on the AP1000 review. It's just to give you an idea.

VICE CHAIRMAN WALLIS: This includes the managers as well.

MR. SEGALA: No.

VICE CHAIRMAN WALLIS: Because it seems to me there are some names that aren't there. Is there another page that's just as big that contains all the managers?

MR. SEGALA: The managers don't get billed to Westinghouse.

VICE CHAIRMAN WALLIS: So we don't know who they are.

MR. SEGALA: But we had a lot of supervisors that put in a lot of effort.

MEMBER POWERS: Sounds like an oversight.

MEMBER ROSEN: Have you figured out what to do with all these people after you finish this job?

MR. SEGALA: They have plenty of work to do.

PARTICIPANT: Yeah, the ESPWR.

MR. SEGALA: They have license renewal. They have lots of things to do.

MEMBER KRESS: Those people weren't full time.

MR. SEGALA: They were not dedicated. This gives you a list of the contractors we had working on the AP1000 and the areas that they helped us on.

The next slide is a list. We issued 742 RAIs and this gives you a breakdown of the different areas the RAIs covered.

In the DSER, we issued 174 open items as compared to 1300 for AP600. Again, this gives a breakdown of where we are. After we issued the DSER, we issued five additional new open items. There were four materials items that came out of the future plant meeting in Pittsburgh and then we had one on the sump which we'll discuss.

The next slide gives an overview over time of how we closed out the open items. It took about 10 months to close the 174 open items. On May 19th is when Westinghouse issues Rev. 11 of the DCD and that allowed us to close out the confirmatory items that still needed to be looked at.

In your interim letter, you identified seven issues which we discussed at the last full committee meeting on June 3rd and we also discussed at the future plant design subcommittee on June 25th. Based on the future plant meeting, they wanted us to give additional presentations on the sump screen performance and organic iodine production.

In your interim letter, you identified the AP1000's robust design to prevent screen blockage and that you recommend an ITAAC to insure compliance with GSI 191 and as we pointed out before, we have an ITAAC but the ITAAC doesn't insure compliance with the GSI. I'll talk some more about that.

In conclusion to start off with, the Staff believes that it's a robust design which is less susceptible to debris blocking of the screens and we believe we have a regulatory process to handle any significant adverse findings that come out of the continuing resolution of 191.

In the DSER, there were six open items related to debris loading of the IRWST screens and the recirculation screens. I think four of them are related to that item and we have one open item on debris through the reactor coolant system break and then we had an open item, this was one of the new open items, which was when Rev. 3 of Reg. Guide 182 was issued. We asked Westinghouse about the chemical effects.

This slide's going to be similar to what Westinghouse presented. They have a folded screen design of 140 square feet each. There's a cross connection between the two recirculation screens. They have tall screens. One is 10 foot. One is 13 foot. The bottoms of the screens are two feet above the floor.

There's a horizontal plate above the sumps screens to keep debris from falling in. The screens are protected by a trash rack and they have low transport velocities and pull and low flow velocities at the screen surface. They have no safety related sprays. The sprays are only used for beyond design basis events so that they won't wash debris into the sump. They use metal reflective insulation in the LOCA blowdown damage zones. They use 20 inside pipe diameters for those areas that have intervening objects and 45 pipe diameters for those areas that don't.

VICE CHAIRMAN WALLIS: That's the zone of influence.

MR. SEGALA: Yeah.

VICE CHAIRMAN WALLIS: So they use 45 for that zone of influence.

MR. SEGALA: The ones that don't have intervening objects. They use high density coatings inside containment made of inorganic zinc.

MEMBER POWERS: The previous speaker and I discussed a little bit on the question of high density and whether it was indeed going to sink in the water or not given that the water is dosed and chemically reactive. Did you look at that?

MR. SEGALA: I don't believe that we looked into that.

MEMBER POWERS: What criteria do you use in doing this review of the applicant coming in and saying, "I've done an analysis and I've come to this conclusion, but I don't have any external data to back up my analysis. I've just done the best I can analyzing it"? At what point do you say, "That's great, but I'm know something about, say in this case, epoxies, polymers, that in strange environment they do things like swell and they form gases in other environments and things like that and I need some assurance that this idea is correct." Or is there some criterion or is that just one of those engineering judgment sort of things?

MR. SEGALA: I think it would fall into engineering judgment, but this is just one criterion that the Staff looked at in determining the acceptability. You have to weigh everything, the whole design, and when you look at the coatings, they are a higher density than the water.

VICE CHAIRMAN WALLIS: What is engineering judgment? Is that simply I refuse to consider the possibility of gas formation and therefore I'll ignore it or is it I have some basis for understanding whether or not gas forms and it's based upon evidence? What is this engineering judgment that's used?

MR. SEGALA: I don't have the particular reviewer here right now. They're going to be giving a presentation next for you on GSI 191.

MEMBER KRESS: One of the concerns is this is not necessarily an AP1000 issue and it's being worked by the Staff on a generic basis for operating plants. It seems to me like this is a generic question in how they deal with it and the final resolution is important to us and it's an issue we would like to, I think, not qualify as a confirmatory question for operating plants as well AP1000. The

AP1000 is more or less putting this type of question off to the COL stage where they have to do an assessment following whatever guidance they are given by the Staff. Our concern is how will the Staff deal with this in the guidance and I'm sure that's not your problem. It's somebody else's problem.

MR. SEGALA: Let me finish the presentation. I think I'll at least discuss how we plan to address that issue.

MEMBER POWERS: Well, the problem I have on a larger basis is you go through this disk they gave me. It's the one on those odd times in the last month when I've actually been around a computer since I was not given the hard copy that I said would be useful. When you look at it, you can't look at everything. So you pick out things that you know a little bit about and you pick out one that's a current issue here and you say, "Well, they ought do real good about this" and you go through and you can't tell what interrogation has been done on this.

This is a relatively obscure issue. I'm not surprised somebody thought that this stuff is more dense than other stuff so it must sink, but it raises the issue of how to handle things that are significant. You pick this one out that there ought to be some developing understanding. In fact, Steve tells us "Hang on. There will be developing understanding on this" but we don't raise a lot of questions. Second, we're going to get down to a tenth of a percent of cesium hydroxide and we're going to walk through the logic on that and we're going to find the same that there are not a lot of questions I have to ask you.

MEMBER KRESS: I understand. You might continue or are you might -

MR. SEGALA: Well, just we did provide you a 2,000 page document on --

MEMBER POWERS: No, you provided a 2,000 page disk.

MR. SEGALA: Well, that's sitting on the desk right behind you. We provided that. You just needed some staff to carry it for you. That's the problem.

MEMBER POWERS: Yes. I asked for both. I didn't get either.

MEMBER KRESS: I'm with you, Dana. My eyes crossed when I tried to read those disks on the computer after a while.

MR. SEGALA: I'll just go through the rest of the slides. A long time, up to five hours before recirculation allows settling of the particles or debris. Deep containment flood-up levels.

VICE CHAIRMAN WALLIS: It also allows a longer time for any chemical reactions which might be occurring.

MR. SEGALA: Water level at beginning of recirculation is about 10 feet above the top of the screens which if there's floating debris it won't get into the screens. There is short period of time when you switch from gravity injection to recirculation that you get a little bit of back-flow through the screens.

With regard to the ITAAC, the ITAAC verifies that the as-build screen design is in conformance with the design certification design. Location of the plates above containment of the screen makes sure that they are properly located, that you have the appropriate screen surface area. Location of the bottom of the recirculation screens are a certain height off the floor. Type of insulation and the dray film density of the coatings which is greater than 100 pounds per cubic foot.

COL action items. There is a COL action item that has the COL applicant perform a cleanliness program to limit debris inside containment.

MEMBER SIEBER: What will that consist of? I mean is this looking for gang boxes and tools and rags and things or is it actually cleaning equipment or do you know?

MR. SEGALA: I think it would be a look at when they go into outages that they clean up all the material that's left behind during outages.

MR. CUMMINS: This is Ed Cummins. I think it probably covers all those things. Really you have to satisfy the Staff that you process this sufficient to address safety issues related to containment cleanliness.

MR. SEGALA: The item says that the COL applicant will develop a program to limit the amount of debris that might be left in the containment following the refueling and maintenance outages. The cleanliness program will limit the storage of outage materials such as temporary scaffolding and tools inside containment during power operation consistent with the COL.

Then there is a COL action item where the COL applicant will perform an evaluation consistent with Reg. Guide 1.82 Rev. 3 to confirm that they have adequate long-term cooling and they are going to consider site-specific resident debris, post accident water chemistry and applicable research and testing. With regard to this item, the Staff believes that the outcome of this evaluation will be a programmatic change where the COL will go back and improve their cleanliness program. If new information comes out of this that says that something more needs to be done, I'll discuss this in two slides what the Staff plans to do to address that.

The Staff review is based on the current state of knowledge keeping in mind what's going on right now with the generic issue. Just to give a timeline again.

MEMBER FORD: Before you go into the second bullet, during the various reviews it brought up various materials degradation topics and we were satisfied with the disposition of those with the understanding that as we get more knowledge about materials degradation. So something would change.

Now in the onset to our inquiries that came back from the Staff, that particular item was somewhat legalistic. It referred to various things in the rules which quite honestly, I didn't understand. Can you briefly reassure me that since this is the last time that we'll be addressing this issue how these materials degradation issues in the future will be addressed?

MR. SEGALA: And the next slide I think we'll go over that.

MEMBER FORD: Okay.

MR. SEGALA: And it will be applicable to both issues or any new issue that comes up in fact. The Staff plans to issue the FSER and FDA on September 13th. Complete design certification rule-making by December 2005. According to the Staff's presentation that you're going to get next, the total complete review having everything done with GSI 191 is going to be by December 2005.

VICE CHAIRMAN WALLIS: `07.

MR. SEGALA: I'm sorry. 2007.

VICE CHAIRMAN WALLIS: That's a long time for something to come out.

MR. SEGALA: Yes. Just to give you a timeframe of where we are in the completion of that project. This slide is the regulatory change process and up until the time we issue the FSER and FDA, we can make changes fairly easily. If new information is identified after we issue the FDA, there is a process which the Staff can go back and have the Applicant fix the issue or address the issue.

In the timeframe after the FDA, but before rule-making is complete, Appendix O of Part 52 Item 5 and 50.109 which is the back-fitting rule is what we would follow and that requires either adequate protection or a compliance back-fit. What the staff is proposing for the resolution of GSI 191 is a generic letter with a compliance exception to the back-fitting rule and a compliance exception basically if you determine that the applicant is not in compliance with the regulations that you don't have to do a full back-fit analysis or a cost benefit analysis.

If you can do that evaluation which the Staff is going to do for operating reactors, that would also apply for us to go back to Westinghouse and tell them to address this issue. There's a COMSECY paper 94-003 which says that if a new issue comes up after FDA that requires a revision to the zoning control document that we're to notify the Commission.

In the time period after the rule-making but before we get a COL applicant come in, 10 CFR 52.63(a)(1) again is similar to 50.109, but it's a generic back-fit that we would make to do a revised rule-making and that would also be based on a compliance back-fit type approach.

Post COL application. If a COL came in

and said they want to build an AP1000 and new information came upon us at that point, we could issue a plant-specific order in accordance with 52.63(a)(3) and that would be based on compliance back-fit as well.

MEMBER FORD: Could I ask a question? The first bullet says if new information is identified. Identified by whom? The NRC or Applicant?

MR. SEGALA: The NRC.

MEMBER FORD: So for instance, the materials degradation issues, we came up with the hypothetical, the possibility, the ADS valves could prematurely activate because of materials degradation. Is the NRC going to be following the development of those particular designs that closely on a real time-basis?

MR. SEGALA: If the NRC has found that the materials that are being used are not adequate, that would be something that we would go back and address.

MEMBER FORD: Okay. So there would be somebody on the NRC staff who would be watching evolution of the ADS4 valves for instance, the details of that for the time basis.

MEMBER KRESS: We were given a description of the inspection program with respect to that.

MEMBER FORD: Okay.

MR. SEGALA: But the general idea if new materials come around and we find that there's problems with the materials that are being used, the Staff would take action against operating reactors as well and then when a COL would come in, we're going to go back and look at all the generic communications and whatnot that have issued before then and we would do an assessment. When a COL comes in, do we need to back-fit them on any of those issues?

MEMBER ROSEN: This is all very well, but let me reduce it to something simple which has troubled me since we started talking about this and I've made this comment before. To me, the back-fit rules were established to protect the licensees from regulatory intervention which had no basis because it resulted in an unstable industry if we had continuous change. On top of that, we have the certification process that came along later and it was always my view that that was a good thing because there was to be more stability here and new issues would identify in the future we had all these mechanisms that you had here outlines on this slide.

This is a curious circumstance, the one we have now. We already know there's an issue with some clogging in PWRs. We just don't know which plants it applies to. We think it applies to some, but not all. So we are devising ways to do plant-specific analysis. Why would we consider that circumstance here something that is post design certification rather than something that's not a back-fit at all? It's not a compliance back-fit. It's not any kind of back-fit. It's a known issue in a new design that simply ought to be corrected or dealt with now in the design.

Well, I understand it can't be because we haven't finished exactly how to do the calculations. Fair enough. Why don't we just condition the license that says, "When we figure out exactly how to do these calculations and endorse it by reg." It may be an industry rule by Reg. Guide with whatever additional exceptions the Staff feels necessary, just simply have it as a matter of a license condition on the AP1000 that they'll have to go back and do the analysis that way and make whatever changes, if any, that come out of the analysis just like on operating plants. It seems to straight forward to me.

And in fact, that's not what you're suggesting here. As I understand it, what we're talking about is when we finally get those rules squared away and the revision to the Reg. Guide out that has references to the rules, we'll go through all of this Part 52 Appendix O if it's pre design certification rule-making and Part 52.63(a)(1) if it's post design certification rule-making.

I mean it seems so much more complicated to do that than to simply state when the license is sent out that it's a condition of your license. You have to do this. Bang. That's just so much simpler. Why not do it that way? But I admit I'm not a regulatory lawyer.

MR. LYONS: If I could interject. This is Jim Lyons. I'm a program director for the new reactors. I think that really what we're doing is what you're asking. If you look at the way we've address this in the sense that we've taken the design as far as we think we need to take, we've looked at that and found it to be robust, we've put in there a COL action item for them to relook at their debris program and to make that the assumptions that we made in finding this acceptable are still valid and those COL action items are subject to review at the COL timeframe, if there's something there that causes us to either have them make programmatic changes to change their programs to ensure that they have less debris, if that's the issue or if there is a chemical issue that they address the chemical issue, then we'll do that at the COL. If it actually takes it to a point where we see that additional design changes have to be made, then those design changes, we can order them at that time to do it or more likely, there will be a give-and-take with the COL applicant and they'll say, "Yes, we'll provide you a design that satisfies this" because they're going to have to satisfy those COL action items to show that the system is going to operate the way we expect it to.

So I think we really do what you want within the legal confines that we have of the ITAAC to look at the hardware and then we have the COL action items that's going to look at the program. I think what John is trying to say here is if, in the intervening time, we find out that there's no way a 140 square, two 140 square foot screens, are going to satisfy us, then we can take action in the intervening time. I think at this point, we're saying that we have looked at that design and feel that it is robust and that it will survive.

CHAIRMAN BONACA: How would you take action? You said you would take action.

MR. LYONS: In the intervening time we could --

CHAIRMAN BONACA: In the intervening time.

MR. LYONS: -- we could go through the backfit process. I mean, that's why it's there.

CHAIRMAN BONACA: So you would treat on the backfit process.

MR. LYONS: Yeah.

CHAIRMAN BONACA: And this design as if it were --

MEMBER ROSEN: Twenty years old.

CHAIRMAN BONACA: -- an established plant, you can do that?

MR. LYONS: Right, yes, yes. We have that capability.

MEMBER ROSEN: But you see, Jim, the question is why hobble yourself so much from a regulatory perspective.

MR. LYONS: Well, because the design certification process is to resolve these issues at this time. You know, there's always issues that are coming up, and there's always issues that you say, "Well, why don't we wait a little bit longer to address this issue or wait a little bit longer to address that issue?"

And the process is to take a stand, to say this is a good design at this point and that as we learn new information in any area, we can apply that to these plants if it really makes a safety difference.

And so, you know, it's the same thing as if you look at we have rulemaking going on in 5046 that we define large break LOCAs. Well, we're not waiting to see what happens there to find this acceptable. or to try and apply, you know --

CHAIRMAN BONACA: But it just seems to me that, I mean, a defining issue is if you intervened before the COL, it would have to be a conceptual design issue, a deficiency that is in the design itself that you want to have corrected because you will not have a provided permit on this design if you had known that it was a conceptual flaw.

MR. LYONS: Right.

CHAIRMAN BONACA: So is this the distinction you're making? I mean, the whole design process you have a phase of conceptual design. You have the implementation phase, and so on and so forth, and so trying to understand to what extent you would exercise that. That's an important issue because, you know, this may sit on a shelf, and hopefully it doesn't, but for a number of years without being used, and then you have almost an obsolescence coming to the package due to new issues that are being raised and dealt with.

MR. LYONS: You're right, and it requires discipline on the staff's part to, as new issues come up and we address them for the current fleet of operating plants, that we also take at the same time and say, "Oh, how does it affect the designs that we have certified and address them at the same time. There is an amount of discipline that we have to do to do that.

And I think the other thing that I wanted to just kind of mention, Peter Ford had asked a little bit about if materials issues come up, you know, you ask who would identify those. Obviously if we identify them, then we would bring them forward.

But the combined license holder, I mean -- excuse me -- the design certification holder is also obligated under the regulations that if they come up, if they find information, if they come upon information that would call into question the adequacy of the design, I think it's still under Part 21 that they would be required to advise us of those issues so that we could then evaluate them. So it's not just us having to identify them. The industry would also identify those to us also.

CHAIRMAN BONACA: I think it would be good to have a clear distinction so we understand it. It seem to me, again, that, you know, issues that really should be dealt at the implementation level because they have to do with the specifics of how you connect a certain component and possible corrosion that may be caused by a specific feature. they could be dealt with, it seems to me at the ACOL stage. Probably they should.

MR. LYONS: Right.

CHAIRMAN BONACA: And there are others which are of a real conceptual nature that should be dealt before that. I think you have to have some clear understanding of how you're going to intervene on whatever you approve now.

MR. LYONS: And I think, you know, we have the processes in place to do that, and so, you know, as you can see, some of them you jump around the regulations to find them, but that's our job. Nowhere to look and where to go.

MEMBER SIEBER: Well, I think materials degradation is a little bit different issue than the other aspects of an application that we've talked about. For example, the applicant really doesn't have to tell you what materials he's going to use. All he has to say is, "I will build this system," which includes piping and pressure vessels, "in accordance with the ASME code."

And the code now specifies what the strength of the materials, what special processes are involved and so forth, to define that. The code also requires an inspection program, and this is where degradation shows up, and the code also specifies repair methodology.

So the idea of the staff saying, "Gee, I don't like this alloy. I like this one over here a little bit better," is not relevant because it's the applicant that chooses the design and applies that design to the requirements of the code, and it inspects and repairs the facility in accordance with the code.

So this is where the degradation issue comes in.

MEMBER FORD: The only snag I have with that, I agree with what you're saying factually, of course, Jack, but our history in the last 20 years has not been that good in terms of inspecting to prevent an unfortunate incident.

MEMBER SIEBER: I think the failure rate, with a couple of exceptions though, has been pretty good, and so the inspection and repair process has worked, and that's what we rely on.

The staff is the regulating authority under the code, and so they can impose additional requirements as the need arises. For example, control rod drive mechanism cracking, pressurizer penetration, and so forth, they can do that as the regulating authority because they're named by the code as that person.

And I don't think that -- if you wanted to do more than that and be more proactive so that you could tell licensees what to do as opposed to allowing licensees to design to meet certain engineering criteria, that you'd have to come up with new rulemakings to give the staff that authority. At least that would be my interpretation as to how things work now.

And whether it's good or not, I'm satisfied that it's good. Perhaps the staff would like to comment on that if they see things differently than I picture them.

MR. LYONS: This is Jim Lyons again.

Yeah, we agree with you.

MEMBER SIEBER: Okay.

MR. SEGALA: And this is what I started

off with, that we believe it's a robust design and that we have a regulatory process for addressing significant findings from the GSI 191.

CHAIRMAN BONACA: Could you just step back a moment?

MR. SEGALA: Sure.

CHAIRMAN BONACA: I want to look at that slide.

Okay. So, I mean, your second bullet says that this plant would comply with the resolution of GSI 191.

MR. SEGALA: No, the second bullet is saying that if issues come out of the resolution of the GSI 191, that we have a process for going back and having Westinghouse address it.

CHAIRMAN BONACA: Yes, and I agree with the "if." Of course, if there is no problem --

MR. SEGALA: Yeah, then they determine that Westinghouse doesn't need to address it.

CHAIRMAN BONACA: All right. That's fine.

MEMBER SIEBER: But that would not be under the backfit rule. That would be a compliance or adequate protection issue.

MR. SEGALA: It is under the backfit rule, but it's a compliance exception to the backfit.

MEMBER SIEBER: So that, yeah, you don't have to do the backfit calculation. Okay.

MEMBER SHACK: But, I mean, that's the regulatory process they're going to use on the operating plants also.

MR. SEGALA: That's right.

MEMBER SIEBER: That's right.

MEMBER SHACK: So it's the same one.

MEMBER SIEBER: Yeah.

MEMBER SHACK: But I guess what I'm missing here is how do you force them to evaluate whether they meet the conditions that are set up in the resolution of 191.

MR. SEGALA: Well, the compliance backfit, we'd send them a letter that would say that you need to address this issue.

MR. CUMMINS: This is Ed Cummins.

We have the COL item at the COL stage, and we have to satisfy the staff that that COL item is the best, which says take into account all of the chemistry experiments and recalculate your screen performance.

MR. LYONS: This is Jim Lyons again.

John, it might be helpful for you to show your back-up slide number 26. Do you have that?

VICE CHAIRMAN WALLIS: Why is this Westinghouse's problem? The compliance backfit is plant specific. It goes to the plant specific. The plant makes the calculation based on the details of the plant. It's not generic. Why is it Westinghouse's problem? Isn't it the plant's problem?

MEMBER SIEBER: It's their application. So they've got all of the problems that come with that application to solve.

MR. SEGALA: The last page of your slides handout is a background slide that gives the detailed description of what is the COL item.

MEMBER ROSEN: Does that mean that first bullet that the COL applicant will perform an evaluation system is Reg. Guide 182, Rev. 3? Is that the revision that references the NEI guidance?

MR. SEGALA: I don't believe that references the NEI.

MEMBER ROSEN: Right. So they can do anything they want. See, this is my whole problem with it. You're basically giving them a free pass, is what you're saying.

MR. SEGALA: Well, down here we have that statement about applicable research and testing. They need to take that into account.

MEMBER ROSEN: A very weak basis is my conclusion, and hobbled yourself with all of this regulatory stuff when you could just simply say it in a condition of the license that you have to do the COL or whoever, the applicant has to do a calculation consistent with the known, the best guidance available, and that's been endorsed by the staff, and demonstrate that the recirculation cooling will meet its design objectives.

And all of this is a way to avoid that, and to narrow the scope and to put it in the future, and I'm just so puzzled by all of that. This is the stage when you tell Westinghouse and any potential COLs that here are the rules of the game. If you want to play and get a license, you have to do these things, and then they could decide whether they want to do that or not.

And you have all of these ways of getting around the problem as if you just didn't want to touch it, and I'm just so puzzled by it that I don't -- I'm just very puzzled by your seeming reluctance to grapple the issue.

MR. CUMMINS: This is Ed Cummins.

I think maybe it's helpful to clarify the review process. We didn't start at this point. We started with Westinghouse performing calculations and the staff reviewing calculations, and I'd suggest that the calculations meet what probably is the current NEI guidelines, though there's a lot of interpretation and disagreement about what the input terms are.

And so how do you review that? Well, you try a series of input terms and see what kind of answers you get, and the staff decides. That helps them create an engineering judgment that these screens are robust because regardless of the inputs, we still pass. That's not regardless of any inputs. It's regardless of the ones that we jointly pick.

So it's not a case of no technical review being accomplished. It's a case of that we tried to do the technical review completely, but we've come to a point where it's pretty clear to all of us that we haven't established the rules for the technical review, and so that's what leads to this.

Now, if you talk about design certification and what the industry wanted with it, the industry wanted from design certification certainty similar to the plants in a backfit situation where they certainly didn't want a piece of paper that says except for all of the generic issues, you know, you have approval because how do you pressure the staff and the NRC to decide whether it's acceptable or not?

And we think it's important to pressure the staff and the NRC and the ACRS to decide whether things are acceptable with the information that they have today.

CHAIRMAN BONACA: Going back to the second bullet, why don't you have somebody who applies, and still have some that works to the degree to which it is defined by the resolution of GSI 191?

MEMBER KRESS: I think we can move on to the iodine.

MR. SEGALA: Okay. This was Issue 6 from the interim letter that you guys issued to the staff. The issue regarded the water film pH determines the iodine behavior. A pH less than seven leads to production of elemental iodine, some of which is converted to organic iodine.

MEMBER POWERS: But is it true as it implies there that if I'm at seven or less I can get organic iodine, but if I'm at greater than seven I get none?

MR. SEGALA: I believe that -- I mean, Chris can check me if I'm wrong -- but I believe even a little bit lower than seven you're still okay. It's maybe --

MEMBER POWERS: Okay is a question. I'm sure we're going to --

MR. SEGALA: There's a point at which the curve drops off and you have significant production.

MEMBER POWERS: I think that's probably true if I was talking about molecular iodine. If I'm talking about organic iodine, doesn't it fall off fairly slowly?

MR. SEGALA: I think the staff feels comfortable if it's above seven that we are okay in terms of organic iodine re-evolution.

MEMBER POWERS: Where does that comfort stem from?

MR. SEGALA: i believe it's from the NUREGs that we have.

MEMBER SIEBER: Well, the current plants have the same --

MR. PARCZEWSKI: Kris Parczewski, NRR.

We did audit the licensee analysis. We did not perform our independent. We did audit the analysis, and we found to us it was acceptable.

MEMBER POWERS: Okay. Well, he's made the contention that if he can keep his pH greater than seven he doesn't have an organic iodine problem. Why are we so confident of that?

It seems to me there were sump tests done in irradiated solution in England by Howard Simms in which he saw even at pH nine that he was getting organic iodine coming off.

MEMBER KRESS: Dana is correct. The pH of seven -- I had something to do with that -- was intended to keep from getting too much elemental iodine released from the sump water at the time, and it really didn't address organic iodine at all, other than the fact that organic might have been produced from elemental iodine while the iodine ion is in solution.

But the pH of seven really didn't address organic production I don't think. Is that your understanding, Dana?

MEMBER POWERS: Yeah. Well, I mean, it's been an article of faith, and it moves around. It's seven. Sometimes it's eight. Other times it's six and a half, and it gets small for elemental iodine.

But when we look at the radiolytic solution process and think about what's happening to the organic materials that might be in that solution, you come away and say, well, you know, there's nothing really too magical about pH here. It doesn't have the strong pH of the dependence of the equilibrium that you have with elemental iodine.

And Howard Simms reported some stuff at one of the iodine conferences that I'll admit attracted a lot of attention, shall we say. He was getting fully ten percent of the organic iodine coming off at pH nine that he was getting at pH five. Okay?

And it was a puzzlement to him and everyone else, and I'm just wondering why are we so confident. I mean, we've audited the licensee's calculations and found them reasonable. So surely the licensee must know why we're confident about pH seven, or the applicant in this case since he doesn't have a license yet.

I mean, somebody has got to be confident in this number that you're not very confident about, and it has been a long time since I've looked at it. So I'm not very confident in it. Who's confident in this number?

MEMBER KRESS: Well, I think the problem is we're thinking in design or people are thinking in design basis space, which has almost ignored the question of elemental or organic iodine. I mean, it's been ignored completely. So they threw something in there, and it's based on -- the amount that they threw in there was based to some extent on calculations and to some extent on the findings they had years and years ago at Hanford in their containment, which didn't have an exact chemistry. It didn't have the right things, but it's the age old problem of in design basis space you're told what to deal with, and if you can deal with that, the assumption is that in severe accident or PRA space you're all right, even though you may be producing a lot of organic iodine that you didn't count on, that you designed the system robustly enough in design basis space, and combine that with the low probability or low frequencies of severe accidents, that you probably meet the safety goals even though you've put in a lot of iodine.

So I don't know how to deal with it, frankly. I think it's an issue that we haven't dealt with very well. I think like you I believe there is an organic iodine pump; that if you have organics present to react with the iodine, it will continue to put organic iodine in the containment indefinitely.

And the question is: is that an issue or problem? I don't know.

MEMBER POWERS: Well, what it will come down to is sooner or later we'll come down to this one, .15, .33 percent concentration in the containment, which turns out to be numbers I really have no objection to.

But we have all of these ancillary statements that show up. Now we get into this problem that people seem to roundly decry lately, where we put these things in, and now somebody else is going to come along and grab this and say, "Ah, there's a cliff at pH seven," and --

MEMBER KRESS: I agree with you. I think the pH seven is a bit of a perversion of its use.

MEMBER POWERS: I mean, this is an area where there has been a huge amount of research, and we see people standing up at ANS meetings profoundly saying that, well, nobody has gone and corrected the understanding of iodine.

There's been a huge amount of work here, but we're grabbing hold of things. I mean, this is, I think, a problem that, boom, here's the answer, and we've done tests at RTF facilities in Canada. We've done tests in strangely named facilities in France. We've done these tests in Great Britain, and here's the answer, but that's not what we get.

MEMBER KRESS: And I think in my mind this is a potential research issue that needs to be addressed.

MEMBER POWERS: It has been addressed. I mean, we have beaten this thing half to death.

MEMBER KRESS: I mean research from the standing of research needs to look at what the findings of these tests are with respect to organic iodine and maybe come to some sort of a finding of whether we have a generic problem or not.

VICE CHAIRMAN WALLIS: Well, the concern is that there's an incorrect statement being made, that decisions are being based on this magic number?

MEMBER KRESS: well, we don't know if it's incorrect or not. It's just that the pH around seven was meant to control the partitioning of elemental iodine.

VICE CHAIRMAN WALLIS: That's a different question.

MEMBER KRESS: It didn't deal with --

VICE CHAIRMAN WALLIS: That's a different question.

MEMBER KRESS: But it does impact elemental and organic because it's a chemical process that --

VICE CHAIRMAN WALLIS: Well, it was an unsubstantiated statement.

MEMBER KRESS: It hasn't been

substantiated for production of organic iodine.

VICE CHAIRMAN WALLIS: Well, we should probably point that out because someone else may use this for the wrong purpose.

MEMBER KRESS: Yeah, it's something worth pointing out.

VICE CHAIRMAN WALLIS: Even though it may not impact the safety issue with this plant.

MEMBER KRESS: It may be a lessons learned type thing, that we want to put in a lessons learned letter.

VICE CHAIRMAN WALLIS: I had a question on the next slide.

MR. SEGALA: Okay.

VICE CHAIRMAN WALLIS: What do you mean by a minimum of 270 grams were sufficient to keep the pH above seven?

MR. SEGALA: Westinghouse -- the three bullets are the three --

VICE CHAIRMAN WALLIS: Yeah, but would you explain what this means? I mean, there's a film running down the wall?

MR. SEGALA: If you look --

VICE CHAIRMAN WALLIS: Where is the ground? Where are these applied when and how? How does this stuff get into the film and where and when? Does it get in in one stop? Does it get in over a long period of time? Does it get in in one place? Does it get in in the form of a rock? Does it get in in the form of vapor or what is it?

It's not a meaningful statement as it stands.

MEMBER POWERS: Well, just to go on further, if you accept the statement at face value and say a tenth of a percent of the cesium hydroxide until it gets in there keeps the pH above seven, it means that film, as you would well guess, is extremely sensitive to a certain amount of contamination. It doesn't take very much to change its pH.

And we have assuredly looked at cesium hydroxide, and I can assure you that most of the material coming out of the core is not cesium hydroxide in this. Most is something else affected the pH.

VICE CHAIRMAN WALLIS: That's a broader question which you raised earlier. All kinds of stuff influences the pH.

MR. CUMMINS: We did the calculation independent of pH.

MEMBER POWERS: We understand that.

VICE CHAIRMAN WALLIS: Maybe that's the answer we need.

MEMBER POWERS: It is. It is.

VICE CHAIRMAN WALLIS: It's other things.

MEMBER POWERS: It's all this ancillary stuff, that if you just threw that out and said, "Look. I varied the amount of organic iodide from ten to the minus ninth percent up to a tenth of a percent or up to one percent, and it didn't change my boundary conditions very much, and I don't know very much about this, but I don't see it getting beyond that," I would probably shake my head and say, "Well, I could do a better job here, but this is good enough."

What we're taking in here is all kinds of things, that people are going to come along later and say, "Oh, a tenth of a percent of cesium hydroxide inventory is present in cesium hydroxide, and I'm going to use that for some other calculation."

And in fact, right now people have a very hard time understanding how any of the cesium would ever be in cesium hydroxide form, and the cesium hydroxide can't get out of the primary piping system without reacting and forming something else.

And some of us are around saying, "I don't understand why this stuff isn't chromic acid solution."

But I mean, -- well, --

VICE CHAIRMAN WALLIS: So what we're learning is that the staff didn't ask the kind of questions which would occur to a reasonably informed technical expert.

MR. SEGALA: I think staff had Westinghouse perform these evaluations, and when they performed their sensitivity study where they assumed no cesium hydroxide was present and they still met the DBA dose criteria, that's the point where the staff felt comfortable that they've adequately addressed this issue, which is the third bullet on the slide.

MEMBER POWERS: Your understanding of what Westinghouse did is they came along and said, "Look. I've got up to as much as 81 grams of organic iodide suspended in this containment over some period of time, and I'm leaking it out of the containment at the design basis leak rate. It's" --

MEMBER KRESS: Point, one percent, I think.

MEMBER POWERS: -- ".1 percent per day."

MEMBER SIEBER: Per day.

MEMBER KRESS: Per day.

MEMBER POWERS: "And it always has 81

grams suspended in the containment. During that leak rate nothing drains down."

MR. DROZO: This is Andre Drozo.

The only constant value is the leak rate about in 24 hours. The amount of airborne is changing in time calculated by simplified equation with so-called removal rate or lambda.

MEMBER POWERS: The lambda applies to the IRSL (phonetic) fraction.

MR. DROZO: We also apply to some extent to organic iodine.

MEMBER POWERS: Oh.

MEMBER KRESS: The reason being that that lambda is mostly thermal phoresis and diffusial phoresis, and most of it is diffusial phoresis?

MR. DROZO: That is correct, and there are some other studies indicating that one way or the other gaseous iodine is being removed, and we came to the conclusion that the rate of it is similar to that of removal of aerosol. Therefore, we don't distinguish one from the other.

MEMBER POWERS: I guess I'm unaware of those studies. In fact, to the contrary, I am aware of experiments that show we reach a quasi steady state concentration of organic or elemental iodine and the containment just holds there because you've got a dynamic process of partitioning out of the water phase and destruction in the gas phase.

MR. DROZO: So for better or worse, that's what we do. Unless somebody would tell us we are totally wrong, that's what we do.

We are kind of limited by a set of regulations and NUREGs that we can work with, and as regulators we are kind of blindfolded. Unless somebody tells us that NUREG 45 or some other NUREGs are wrong, that is our basis.

VICE CHAIRMAN WALLIS: So if there's some other scientific evidence which doesn't happen to be in the NUREG, it's ignored. Is that the case?

MR. DROZO: Well, I wouldn't put it that way, but --

(Laughter.)

VICE CHAIRMAN WALLIS: That seemed to be what you were saying, that you only look at NUREGs.

MEMBER KRESS: That is the nature of design basis specs.

PARTICIPANT: I mean, I think that's a correct statement.

MEMBER POWERS: I mean, the trouble the regulator quickly gets into is that alternative evidence is so equivocated relative to the absolutes of the regulatory process that even if he was aware of, there's not a real good mechanism for using it in a generic sense.

VICE CHAIRMAN WALLIS: Well, the other problem you have then is if the new evidence shows that the NUREG was wrong, what is the mechanism for changing it.

MEMBER POWERS: well, I mean, the thing for them to do is to flag it and say, "Fix it." I mean, if they feel handicapped and blindfolded and whatnot, just put a codicil on the thing and say, "Fix this damned thing."

But, I mean, here I think we've got a fundamental divergence in what we think is going on with respect to iodine. I mean we concede the first 24 hours most of the iodine in containment is always going to be particulate iodine in the normal reactor. Here you've got a more interesting situation because of the diffusial phoretic component, and suddenly the organic and the molecular become much more interesting here because you are removing a lot of the particulate.

And I haven't gone through the simple exercise of saying at what point does organic become dominant here, and shame on me for not doing that, but at some point it does.

But the organic material, I think most people, based on a bunch of tests that were run up in Canada, and I think the committee got exposed to that when the ACR700 folks came down and gave us a preview of the science behind their application, discussed this, believe that what you're seeing in the containment atmosphere as far as these volatile species is dynamic equilibrium holding you at a quasi steady state, and, yes, material is being removed, but it's promptly being replaced because the solution is madly trying to maintain an equilibrium concentration in the atmosphere.

And so it becomes an issue of how much driving force do you have for leakage. Now, the numbers we see on the dose calculations and a .1 percent per day leak rate means that a host of sins can be committed here on what the driving force is, and you're not going to change that site boundary dose. It looks like maybe the control room dose is a little more sensitive to it, but not a great deal.

VICE CHAIRMAN WALLIS: So the consequence there is that there's all kinds of uncertainties, but it doesn't affect the conclusion about AP1000?

MEMBER POWERS: That seems to be the answer that one of the previous speakers was giving us, and gets whispered into my ear about every 30 seconds here. I'm a good student of back seat drivers.

But nevertheless, we've got a problem, it seems to me, and we need to keep our viewgraphs, if not our documentation, clean.

MEMBER KRESS: I think that's a good message.

MEMBER POWERS: I mean, for instance, just saying, okay, a minimum of 270 grams of cesium hydroxide keeps the pH at seven, my conclusion from that if I was doing a review is the pH of this film is extremely sensitive to contamination from the stuff coming in in the containment, and so I don't care what pH this guy says it's going to be, unless he can demonstrate it in an experiment, it's going to be the bad pH. So show me a sensitivity calculation much as he's done.

And this is the only thing I'm going to pay any attention to, and the question is: did he go over a big enough range here? And like I say, .15, .23 percent inventory doesn't sound like a bad number.

MEMBER KRESS: And did he hold it forever at that level.

MEMBER POWERS: Yeah. Well, that's the other question. Did he treat gaseous iodine as distinct from a particulate iodine because different physical process is affecting it.

MEMBER KRESS: Okay. Could you go to your conclusion slide?

MR. SEGALA: Yeah. This is all of our DSCR open items are resolved, including the five new open items. We believe that we've addressed all of your interim letter issues.

VICE CHAIRMAN WALLIS: You mean you've resolved them, too? You can address things without actually doing anything at all.

MR. SEGALA: Well, it's up to you to determine whether we have resolved them.

(Laughter.)

VICE CHAIRMAN WALLIS: You mean you believe you have resolved them.

MR. SEGALA: Yes.

MEMBER KRESS: Address unknown.

MR. SEGALA: And we're on schedule to issue the FSER.

MEMBER POWERS: The 404 error, isn't it?

I think we can come back to one that you did not touch upon, and that's -- maybe you did touch upon it -- and that's the in vessel retention. The previous speaker said, "Gee, I think I get in-vessel retention, successful in-vessel retention if I just depressurize and get water around the vessel in a timely fashion."

Do you accept that argument?

MR. SEGALA: The staff -- I don't believe I have the reviewer here, but the staff believes that in-vessel retention is going to happen, but we had our Office of Research do an evaluation to look at what happens if it does get ex vessel, and the staff has determined that looking at that, that the containment would be in tact and you know.

MEMBER POWERS: Isn't, in fact, the amount of radioactivity suspended in the containment atmosphere if it was ex vessel?

MR. SEGALA: In terms of dose to the public or --

MEMBER POWERS: Well, that's where we're going to go eventually.

MR. SEGALA: Yeah.

MEMBER POWERS: I mean, you're going to fix the leak rate so that what it does to the public is totally dependent by the inventory suspended in the containment atmosphere as a function of time.

MEMBER KRESS: I think the staff only looked at the potential for failure of containment with the ex vessel. They didn't deal with fission products.

MEMBER POWERS: Well, that's remarkable, isn't it?

MEMBER KRESS: I think they might argue that a lot of the diffusial phoresis has cleaned the vessel atmosphere before you get an FCI, although I haven't seen the relative timing of that. But you know, that would be my thinking, except for this pump process where you keep the iodine, some gaseous form of the iodine airborne indefinitely.

MR. SEGALA: One of the interim letter items was that you wanted us to provide you a copy of the evaluation that the staff did, and we provided that, I think, before the June 3rd meeting. I don't know if you've had a chance to look at that.

MEMBER KRESS: I have looked at it, and basically I think the rest of the committee has not had a chance to look at it, and I don't know what mechanism at this point to do that with other than to say that I looked at it, and what they did was a sensitivity analysis on the amount super heat that the melt would have coming in, the content of the super heat of the metal, that is, metal fraction; the total amount of mass entering the water, and the actual subcooling of the water.

Using those as sensitivity parameters, they looked at what might be considered a delayed trigger. Normally the trigger in this Texas code they use is when it hits the bottom, they delay that so that by delaying it that creates more mass entering into the system.

Then given that total mass and the super heat and the metal content and the subcooling in the water, they just applied texas directly, and --

VICE CHAIRMAN WALLIS: What does Texas do?

MEMBER KRESS: First, it assumes a pre-size for this metal or for this mass. At the trigger point, it sets off a shock wave that goes through the total amount of mass and --

VICE CHAIRMAN WALLIS: Makes the energy available to the water.

MEMBER KRESS: No, it puts the energy into the -- drop it into the mass, the melt mass, converts it to very small particles that have a rapid heat transfer process, creating a thermal shock that goes out and damages -- it hits the containment and bounces back and forth. It actually reverberates and does whatever damage and impulse --

VICE CHAIRMAN WALLIS: It's a pressure shock. It's not a --

MEMBER KRESS: It's an impulse shock, and the calculated loads were such that they did not fail containment over this sensitivity rate.

Now, that was my understanding of what the staff did, which is fairly robust, I think. You have to believe the Texas code calculations. You have to look at those, and you have to look to see whether they delayed the initial, the trigger long enough to get a significant mass, and it also converts a certain fraction of that mass into energy.

I don't know how else t. I've got the reports. You can read those.

MEMBER POWERS: It's neither here nor there to me because the issue is whether you violate the rules on the dose site boundary.

Saying it's neither here nor there is too strong. We don't fail containment. Okay? Now, do we change the inventory of material to release? Hard to believe that you don't change it some. So now it's a question of do we change it enough to change that conclusion.

MR. CUMMINS: This is Ed Cummins.

I think we're talking about two different subjects. When Terry was talking about success, he was talking about how we achieve the probability of a large release frequency, which is not in design basis, and what he said is in our PRA if you have water and low pressure, you have IVR, and if you had a different sequence that included the NRC study, if you said -- and IVR was .9 percent successful and the other .1 percent you had a vessel failure, then staff's analysis would say that still doesn't cause containment failure, and you're still okay.

So that's just how PRA works.

MEMBER POWERS: You are correct. Now, let's go back and let's explore this issue of whether having water is sufficient to get in-vessel retention. There has been a lot of work lately on natural circulation in internally heated pools with two phases present, and they refer a lot to a focusing effect, and that seems to impose enormously high heat fluxes on the perimeter of the vessel.

Were those things taken into account when we derived this confidence that we were going to get in-vessel retention?

MR. CUMMINS: We'll let Terry answer that.

MR. SCHULZ: Yeah, Jim Scobel from Westinghouse is really the right person to answer that, but he's not here.

MEMBER POWERS: Well, right now I'd really like to have the staff answer that question. To be honest with you, they're the reviewers, and they're the ones that have this faith.

MR. SEGALA: I don't have the cognizant reviewers here right this second. We could try to get them for you.

MEMBER POWERS: We get a lot of those answers.

MR. SEGALA: Well, we have 80 -- we have 90 reviewers. I couldn't fit them all in this room.

MEMBER KRESS: They wouldn't all fit in here.

MR. SEGALA: Eighty-eight, whatever.

MR. CUMMINS: We did include focusing, but I'm not sure that we can answer the next question because how did you include focusing; we need to really get the experts here.

MEMBER KRESS: I think we're running a little over time, and at this point I'd like to close off this FAS presentation and ask if there are members of the public present that wish to make any comments before we move on.

PARTICIPANT: Tom, Dr. Sterret wants to make a statement.

MEMBER KRESS: Yes, please come up to the front. She'll introduce herself.

DR. STERRET: Can you hear me?

MEMBER KRESS: Yes, please introduce yourself.

DR. STERRET: Hi. This is Susan Sterret. I'm an Assistant Professor of philosophy at Duke University.

I've previously raised some concerns about the AP600 design certification, and the NRC had said that they would respond in a letter, which they did recently, and what I've done is I've prepared -- I realize you're short on time here -- so what I've done is I've prepared a chart of a summary of the questions I've asked and the response.

I have also with me the entire letters if anybody wants them. I have packets of the entire letters for you if you'd like.

What I've done here is shown why a lot of questions still -- some weren't addressed and some were addressed but I felt not adequately answered.

So first I want to say I appreciate very much that the NRC went to the trouble of writing this very long letter. I think it's very helpful, but I feel there are still are some pretty serious questions in my mind.

Do you want me to go over these or do you want me to just let you look at it and you ask me some things about it?

MEMBER KRESS: I think it might be well for you to just go over it.

DR. STERRET: Okay. If you're willing to give me the time, I appreciate that. Okay. I wasn't expecting it, but thank you.

Okay. The first topic was on the heat of solar radiation. The idea is that at different latitudes certainly the radiation from the sun is going to have some effect on the concrete temperature. So my question was: was the effect on the concrete temperatures which are used in the analysis for the containment cooling accounted for?

The answer that was given me only addressed the water temperature in the PCS tank. So that question wasn't addressed.

I'm not saying I know it's a problem. It's just that you'd like to see the climactic condition of the latitude come in. The reason that my attention was drawn to it is I don't see it in one of the site parameters, and you'd think that this is a different kind of cooling than the other means used on active plants.

So then in terms of the water temperature, the answer I was given was that it was just judged negligible, and I don't know if that was quantified or what, again, since the answer didn't appeal to site latitudes.

When I say "latitude," I mean geographical latitude. I can't really tell how in depth that analysis was.

The second part of the answer was that tech spec requirements and actions will bound any possible solar radiation effects, and what they meant there is that if water in the tank gets too high, we have tech specs. We're constantly monitoring it, and we'll shut the plant down.

Okay. Really the question is: is the plant designed to operate under the site parameters, not that it will be safe because we can shut it down?

And then I point out that, of course, if we consider what happened in France recently where 15,000 people died because of the heat, the one thing you don't want is when it gets in the middle summer that the plant is safe because you can shut it down because people are going to need the electricity during then.

Okay. So that was the first issue. So I think that that question -- I'm not saying I know that it's a problem. It's just that I feel that that wasn't answered to my satisfaction.

The second question had to do with fluid systems designed. I asked this question very, very early in the process, over a year and a half ago, I think. Two key question were: have signed off fluid system performance calculations been done? And the answer that has been consistently given is, no, that's not expected either because Westinghouse is using the approach of DAC, design acceptance criteria.

I believe -- and I think the people here who know for sure are here, so this is good -- I believe that this answer is based on a misunderstanding because the DAC areas, design acceptance criteria, fluid system performance is not one of them as far as I understand.

MR. SEGALA: The design acceptance criteria is for piping, I&C, and control room human factors design.

DR. STERRET: Okay. Then when I asked the question on, okay, suppose there are some things that aren't going to be far enough along, well, then the answer is then my question is maybe you have to have L/D criteria, and that's length over diameter. It's a criteria of piping resistance that you use to specify how constrains on the piping layout so that your fluid system performance won't be adversely impacted.

And the answer I was given is that the NRC will verify calculations through, quote, appropriate use of ITAAC of design and construction activities, and the NRC will review adequacy of licensee design engineering during construction phase.

And my feeling, and this has been sort of consistent, we have sort of had this stance consistently over the year and a half. I guess I felt ITAACs were supposed to provide a check on an as-built design, not eliminate the need for doing the basic design prior to the FDA milestone final design approval.

And an overall comment on this is that this seems to me to be missing one of the points that the Kemeny Commission stressed wasn't emphasized that much at the time of TMI, but they did point it out and I think now it become salient. They cited the dangers of a licensing process where the NRC attention is really focused on the primary safety systems in great detail, and then when problems are found at the later stage that require design changes, there's a lot of economic and political pressures not to make those changes.

Okay?

VICE CHAIRMAN WALLIS: I'm trying to think of what system you have in mind for the criteria.

DR. STERRET: Oh, well, yeah. It's very simple. If you look, for instance, Chapter 15, look at the accidents they consider, a lot of them start in the secondary system: how heat is removed from the RCS, how extra heat is put in over cooling. Those are all secondary side systems. Okay?

So all of these things matter to the safety analysis, and so if I ask does your safety analysis depend on some of these fluid systems requirements, the answer is yes.

Then I say: okay, what gives you confidence in your analysis then? ITAACs. I don't think that's appropriate. I think that ITAACs are supposed to just check that your as-built is as designed, not that your as-built meets --

VICE CHAIRMAN WALLIS: Will work.

DR. STERRET: Yeah, yeah. The third basic category was on design control. The question that I asked in the letter to the ACRS was for AP600 documents referenced in the design certification submittal, who decides or what process is used to determine or declare these are applicable to the AP1000?

And when I said that, I meant is it the group or person or whatever that was responsible for authoring it initially or is it, you know, whoever is putting together the submittal, say, the project manager or is it the same kind of group?

And the NRC response I got was -- I'll just quote here -- "Westinghouse has stated that they have a continuous QA program spanning the AP600 and the AP1000," and that is Westinghouse's QMS, quality management system, and the NRC reviewed that in 1996 for conformance with 10 CFR 50, Appendix B.

The other comment, the AP1000 was derived from the AP600, but there's an AP1000 project specific design control process -- actually the AP600 change control process -- specified all documents generated for the AP1000 design are subject to independent review.

Okay. That answers a question about how

new documents that are generated for the AP1000, how they're controlled, but it doesn't answer the question about do they control over claims that appeal to AP600 documents. And I looked for some specific examples in the DCD, and here's an example.

For the adverse interaction report, if you know what that is, that's a question here there's unintended consequences of things that interact with each other and new changes that are made.

The answer that's given in the DCD is referral to the AP600 adverse interaction report and a statement that because of fluid system design it's the same. It's applicable to the AP1000.

Okay. Maybe that's true, but the question is was that done by the people who designed the systems and originally wrote the adverse interaction report or should have written it, or is that done by the three people who signed the DCD who are the project management types of people?

Another example that I think is salient, which was actually relevant to the discussion today, is about incorporating industry experience. If you look at the justification there, it says, well, engineers are always paying attention to things that are coming from the NRC.

But then it also says, well, the utility requirements document incorporated a lot of industry experience and the utilities who oversaw the AP600 design incorporated a lot. That is true. The thing is that that's, again, for the AP600, not for the AP1000.

Okay. Who oversaw that? Was it technical people who were actually cognizant of things like material degradation issues, for instance, things like that?

Okay. So what I'm saying is that the answer that was given doesn't address the question about referral to AP600 documents. Who decides how that's applicable?

It also doesn't describe a process of comprehensive review to determine which things need to be changed in deriving the AP1000. It says if you make this change and you're going to have an AP1000 document, you know, make sure it's consistent with the plant parameters, but as far as I know, the answer doesn't talk about a process where you do a comprehensive review to determine what needs to be changed.

Okay. The last thing. What was the process for generating overall plant parameters for the AP600? And the answer to that was the AP1000 is not an operating of the AP600. So it wasn't an operating process, and as far as NRC review, the NRC prepares the safety valuation report for the AP1000, and that is independent of the AP600. The scope and contents of the design application were supposed to be equivalent to the level of detail found in a final safety analysis report for current operating plant.

Since the SER is not publicly available and, in fact, it is not going to be publicly available before FDA is granted, I can't really review it to tell much more. All I can say is that it would seem that the question of how all the plant parameters are interrelated -- and here I'm talking about something like, say, the consistency of the plant heat balance, overall plant heat balance with plant system parameters and site parameter envelope. That should figure in the NRC review in various ways I would think.

So this is a summary. I guess I'm asking you to look at it.

MEMBER KRESS: Are there any questions of Ms. Sterret at this time? Or do we want to take time to read this letter and cogitate on it before we -- well, we thank you --

DR. STERRET: Thank you.

MEMBER KRESS: -- for your input. It is always useful.

DR. STERRET: Thank you.

MEMBER KRESS: And we will take a look at this and think about it and try to digest it a little better.

Thank you.

DR. STERRET: Thank you very much.

MEMBER KRESS: With this, Mr. Chairman, I'll turn the program back to you.

CHAIRMAN BONACA: Okay. Thank you.

I think we need a break, and so we will break until ten after 11.

(Whereupon, the foregoing matter went off the record at 10:53 a.m. and went back on the record at 11:12 a.m.)

CHAIRMAN BONACA: Let's get back into session.

On the agenda, the next item is the Draft Generic -- Final Generic Letter on Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accident at PWR. And Dr. Wallis will walk us through this presentation.

VICE CHAIRMAN WALLIS: Well, I'll try to

run you through it.

CHAIRMAN BONACA: Hope so.

VICE CHAIRMAN WALLIS: I'm sure my colleagues are already familiar with this issue -- potential sump screen blockage following a LOCA. But I think it will be useful if I provide an introduction. It might actually save us some time later.

This matter presents an interesting challenge to the Agency. For decades, licenses have been -- licensees have been permitted to make certain assumptions to ensure compliance with the regulations. The new research indicates that when more complete mechanistic analysis is performed many plants are likely to no longer be in strict compliance.

So what should be done? The staff issued a bulletin asking plants either to ensure compliance or to take compensatory actions. Only one plant -- Davis-Besse -- chose to modify its sump screen in order to ensure compliance. The other plants took some form of compensatory action.

The staff also issued for public comment over a year ago a draft Generic Letter, which is the subject of today's meeting.

In essence, it asks the plants to make

mechanistic analyses and to take appropriate action, but the details of this letter have changed through various drafts. The actual requirements on the plants, and the actions asked for, have changed. And we have, in fact, just been handed a new version that appears to contain many differences from the version that was presented to the subcommittee a couple of weeks ago.

We wrote a letter in February 2003 on the original draft Generic Letter, and we wrote another last September on the associated Regulatory Guide 1.82 Rev 3. And I'll just repeat some of the points we made.

The phenomena are many and complex, and there is considerable uncertainty about how to analyze them. There is very little evidence at all about chemical effects. We suggested that alternate ways to ensure long-term cooling should be explored, and we also suggested that a risk-informed approach should be investigated.

The staff and the industry have followed up on these points. NEI has prepared guidance for performing calculations. The staff is reviewing this guidance and preparing a safety evaluation report, which the Thermal Hydraulics Subcommittee expects to see in August. The ACRS itself has not yet reviewed either the NEI guidance or the SER.

Various steps have been recommended -- for example, by the Westinghouse Owners Group -- to improve the likelihood of achieving long-term cooling, for instance, by certain operator actions. Response has been plant-specific, and there do not appear to be any measures of its success. The subcommittee asked for these measures, and we didn't get them.

Both the staff and the industry have proposed some risk-informed alternatives. I don't know if these are part of the latest Generic Letter or how the staff intends to treat them in any future version of this letter or how it will react if a licensee uses such an approach in its response to the Generic Letter.

Now, my understanding is that the staff's presentation today, and any letter that we write, is expected to concern only the Generic Letter and not some of these broader questions, although they obviously are going to influence what the staff says and what we do.

So without more ado, I welcome the staff to make its presentation.

MR. HANNON: Good morning. Thank you. My

name is John Hannon. I'm the Plant Systems Branch Chief. I have with me Suzy Black and Dr. Brian Sheron from the Office of NRR. In a minute I'll introduce David Cullison, who will be walking us through the Generic Letter.

I just want to, first of all, thank you for the opportunity to work with us as we move forward. We are interested in getting your comments. We did meet with the subcommittee a couple weeks ago on an earlier draft of the letter. As you pointed out Dr. Wallis, it has gone through considerable revision as we try to fine-tune it.

But we do have today the current version, which has the benefit of OGC's comments already incorporated into it. And, hopefully, we'll be able to address some of your ancillary concerns as we go through the letter.

So with that, let me turn it over to Dave.

MR. CULLISON: Good morning. I'm Dave Cullison from Plant Systems Branch, and I'll be going through the Generic Letter.

Next slide.

We had a media problem. That's why the presentation is not on the computer, and we're having to use slides.

The purpose of this presentation is to obtain ACRS endorsement of the GSI-191 Generic Letter, and the staff's conclusion is that the issuance of this Generic Letter will confirm the continued compliance with the long-term cooling requirements of 10 CFR 50.46 for our addressees in light of the new information coming from the efforts to resolve GSI-191.

VICE CHAIRMAN WALLIS: Can I ask you what we're going to endorse? Are we going to endorse the latest version that we see in front of us, or are we going to give an endorsement of something yet to be written?

MR. CULLISON: The version that you received this morning is considered to be the final version.

VICE CHAIRMAN WALLIS: It is considered the final version. Thank you. That's very good. That's very useful.

MR. CULLISON: Next slide.

The first Generic Letter was issued for public comment the end of March of this year. The comment period ended June 1st. These are the external stakeholders who provided comments. I'll give you a minute to take a look at it.

Next slide.

These are major issues coming from the external stakeholders. These comments and those of internal stakeholders are factors in determining what changes to the Generic Letter were considered. The final disposition of the comments, not the implementation of the Generic Letter, is still under review. However, the Generic Letter has been reviewed up to the Associate Director letter and by the Office of General Counsel.

We had several industry comments on making the Generic Letter more action-oriented, similar to the Bulletin 96-03, and Bulletin 96-03 dealt with the BWR.

VICE CHAIRMAN WALLIS: I think that the subcommittee felt it was now more action-oriented when they saw the version. Is the new version --

MR. CULLISON: The new version is changed.

VICE CHAIRMAN WALLIS: Is it still action-oriented?

MR. CULLISON: No, it's not. It's an information letter.

VICE CHAIRMAN WALLIS: Why is that? It seems very strange that --

MR. CULLISON: Based on comments from OGC that the Generic Letter should be an information request and not requesting action, the -- what you saw before sounded more like an order than a Generic Letter.

VICE CHAIRMAN WALLIS: But essentially 50.46 is very clear that if you find out you're not in compliance you're expected to do something. And I think it's actually referred to in Section F in your new version, that -- whatever the 50.46 --

MR. CULLISON: What we have done is we took out the action -- the requested action, which was requesting that analysis be performed and request that they implement all corrective actions.

VICE CHAIRMAN WALLIS: Item 2 essentially is a request for a corrective action. They're calling to the -- oh, it's not 50.46. Isn't it 50 -- oh, I see. There is a 50.46F, which says, "If you find you're not in compliance, you must fix it."

MR. CULLISON: This is 50.54.

VICE CHAIRMAN WALLIS: It's something else. Okay. So I'm not sure what the action is. It may be you have to tell us that.

MR. CULLISON: And also, we had comments that the draft Generic Letter that was sent out for comment was -- emphasized too much on compliance, and we had comments from the Union of Concerned Scientists and from industry, and also comments on the backfit. The draft Generic Letter was not a backfit.

VICE CHAIRMAN WALLIS: Well, they kept saying it wasn't a backfit, but it seemed to imply a backfit.

MR. CULLISON: Well, that was that version.

VICE CHAIRMAN WALLIS: The subcommittee went through this with you with a different cast of characters from --

MR. CULLISON: Right.

VICE CHAIRMAN WALLIS: -- the agency, and we were assured that this was going to be a compliance backfit.

MR. CULLISON: Again, based on --

VICE CHAIRMAN WALLIS: Have you backed off from that?

MR. CULLISON: We've backed off on that.

VICE CHAIRMAN WALLIS: So it's a complete reversal of what we heard two weeks ago, essentially?

MR. CULLISON: I wouldn't say a complete reversal. What we've done is gone back more toward the draft Generic Letter that was sent out for comment. Because it's an information request, the comments from OGC were that it's not a backfit.

VICE CHAIRMAN WALLIS: So you're now saying it's not a backfit. It doesn't require them to do anything?

MR. CULLISON: Well, it doesn't meet the criteria for 50.109 for a backfit. We are requesting that they provide us information under 50.54F.

VICE CHAIRMAN WALLIS: That's all?

MR. SHERON: Excuse me. Dr. Wallis, this is Brian Sheron from the staff. Maybe I can try and clarify a little bit. The guidance we got from OGC was that if we were to impose fixes to the sump -- in other words, revisions to the sump screens or whatever -- that -- in the form of a backfit, that a Generic Letter or a Bulletin, either one, which is issued under 50.54F, is not appropriate.

When you're requiring a licensee to do something, they believe that either you should do it through regulation or through an order. If we did it through regulation, first off, we kind of scratched our head because there is really no regulation right now that talks about the specifics of the sump model, for example, and the blockage. That's all in a Reg. Guide.

And so that would basically force us to

basically put the sump blockage requirements into the form of a regulation, which it currently isn't in it -- that detailed.

VICE CHAIRMAN WALLIS: Doesn't 50.46 already do that, though? It says they have to assure long-term cooling. And if they can't --

MR. SHERON: Yes, but it doesn't --

VICE CHAIRMAN WALLIS: -- comply, then they have to fix it.

MR. SHERON: Yes, but it doesn't provide the details of -- you know, for example, it doesn't specify 50 percent blockage, and the like. If we went with an order, the concern is is that if an order is used it implies that there is a -- a very high urgency associated with the issue, almost to the point that if we are requiring license -- if we have to go out with an order ordering licensees to take some action, that there appears to be an immediate safety concern, i.e. you're in adequate protection space, and we do not believe we are in adequate protection space with this issue.

So an order is probably not the right mechanism at this point to use. The only other generic mechanism we have is a request for information. And so what we've done is we have reformulated this to request licensees to tell us that, based on this new information that we have from the Office of Research regarding GSI-191, they need to tell us either why they believe their sumps are still in compliance with the -- with 50.46, okay, or if based on reanalysis that they believe they are not in compliance they need to tell us what actions they intend to take to come into compliance with 50.46. Okay? Which could involve making physical changes to their sump design.

Some plants obviously will analyze their sumps and may conclude that their sumps still meet 50.46 and don't require any modification. That's been the whole dilemma with this generic issue from the start, and that is we do not know which plants do or do not meet the requirements of 50.46 based on a reanalysis.

So what we're doing is we're asking licensees to submit the information to us. It's a request for information. Tell us whether or not you are in compliance. And once they decide whether or not they're in compliance, then they would take appropriate action, you know, as required by the regulations.

CHAIRMAN BONACA: By when do they have to respond to this request?

MR. CULLISON: Their response is due by September 1, 2005.

MEMBER SHACK: But even now, I mean, your requested information says guidance for performing the requested evaluation, complete the requested evaluation. But you've stripped out the request for the evaluation, so I'm not sure what you're asking for.

If you look at the latest revision of the Generic Letter, page 10, bullet one of the requested information, what's the requested evaluation now, since you've stripped out the request for the evaluation?

MR. CULLISON: The first bullet of Section 2?

MEMBER SHACK: Bullet one.

MR. CULLISON: Bullet one?

MEMBER SHACK: Requested information. Within 60 days, for performing the requested evaluation -- but the requested evaluation has now disappeared from the requested action.

MR. CULLISON: Well, that's true. I will take fault on that. I didn't clarify that when I made the revisions to the letter, because --

MEMBER SHACK: But this is the final.

MR. CULLISON: Right, and that's my fault. It's a typographical error, because what it is --

MEMBER SHACK: What is it supposed to say?

MR. CULLISON: Well, what we're here -- what this section is is within 60 days of the issuance of the staff guidance for performing evaluations, mechanistic evaluations. It wasn't for the request. I should have placed that with a more general term, because the -- the staff will be issuing the guidance in September. And I obviously didn't catch this.

MEMBER SHACK: "To complete the evaluations that are no longer requested" -- in the next sentence, at the end of the sentence?

MR. CULLISON: Well, earlier in the letter we reference the methodology for performing an NRC-approved methodology performing sump evaluations. And there's actually -- you're looking at the redline strikeouts, so the pages aren't the same. But the -- there's a footnote in I guess an earlier page that you have.

The NRC is currently reviewing evaluation guidance developed by the industry -- the NRC staff insists the documents reviewed on a safety evaluation, which licensees can reference in regulatory guidance.

And earlier on in the Generic Letter we reference this as guidance for addressees to use in confirming their compliance with 50.46, in light of this new -- the new information coming out of GSI-191. And that's what the methodology is for.

And what I didn't do was, when I went through to make all of the changes to reflect the OGC comments, I obviously did not make the correct correction here. And we're still going to tie it to -- this response to 60 days after the issuance of that methodology, because that's when the addressees will know what our approved methodology is.

VICE CHAIRMAN WALLIS: We're told this methodology is very, very conservative. That's what NEI told us at the subcommittee. And, therefore, it would seem to me it's going to give more conservative results for all of it in the study, and, therefore, the conclusion will be that almost all of the plants have to take some action.

And I wonder if you've thought about how you're going to do this. You've got 64 different plants, we were told, all doing different analyses and all proposing different actions. It's going to be a nightmare to figure out how to resolve it.

MR. CULLISON: John?

MR. HANNON: You're correct that the baseline in the industry guideline is conservative. However, they also have refinements to that baseline that take out much of that conservatism, which we have under review right now and would intend to endorse, to the extent we find acceptable, in the safety evaluation report we issue in September. So some of that conservatism will be allowed to be removed.

VICE CHAIRMAN WALLIS: So it seems there's a major technical issue here about how good these refinements are, and how the different plants are going to implement them. And you're going to have as we -- again, as the subcommittee was told, sort of 64 different versions of analyses, which the staff has somehow to be wise enough to evaluate with all of these different choices of refinements here, there, and everywhere.

Are you sure that your folks can handle that?

MR. HANNON: One of the things that we do have in the plan is to do an audit after the modifications -- or as the modifications are being made, in addition to the review of the submittals that come in. Yes, we do think we can -- we have the resources to handle it.

VICE CHAIRMAN WALLIS: Do you have some idea of the order of magnitude of the actions that these licensees might need to take, or is that just something you are waiting to see?

MR. SHERON: Are you referring to analysis or actual modifications to the plant?

VICE CHAIRMAN WALLIS: Well, there's already been some analysis made, and there's -- you know, certain plants in certain countries have made changes already. Have you got some idea of the order of magnitude of the actions that would be -- probably be required from these licensees two or three years from now?

MR. SHERON: I mean, I -- my opinion is that probably there is going to be a number of plants -- and I couldn't venture a guess, maybe it's, you know, a dozen, two dozen -- that may have to make modifications to their sumps, increase the screen size, or the like. Others may conclude that they can change out insulation, for example, and eliminate the debris source, and, therefore, their sumps would analyze as acceptable.

How they go about -- how licensees go about meeting this requirement, okay, for demonstrating compliance is really kind of their decision. Okay?

My understanding, too, is some of them could -- you know, if they don't want to get into a refined analysis, could just use a -- go up to the double-ended guillotine break, do the analysis. If their sump doesn't perform, you know, as John said, they can do a more refined analysis, maybe a more risk-informed one, and the like, and demonstrate that it is acceptable under those conditions.

Other plants may say, "I don't want to go through that process of going through a more refined analysis, maybe more detailed justification." Maybe they just decide they're going to bite the bullet and revise their sumps -- you know, modify their sumps.

It's really hard to say. I think each licensee has to evaluate their particular design and decide what is the safest, most economical way, whatever criteria they use, to demonstrate compliance.

VICE CHAIRMAN WALLIS: So you're going to -- excuse me.

MEMBER FORD: Well, I think -- I'll take another attack of the same problem. I think the problem that Professor Wallis has got is that a little over two days earlier this month -- or last month -- we went through a whole lot of technical problems --

definition of zone of influence, the chemical effects, downstream effects -- and there was no resolution to those technical questions.

And yet those are basic -- the resolution of those problems are basic to coming up with any methodology that you're going to use to satisfy the information that's really being asked in this Generic Letter.

And I also I think mirror Professor Wallis' concerns. I just don't see how anybody can review the whole raft of different answers you're going to get back, if you don't know the fundamentals or the physics of the process.

And we were told that these would all be sorted out by August of this year. That's crazy.

CHAIRMAN BONACA: But among this issue, one that I have not participated in in subcommittee, but reading material, you know, one statement is that the industry doesn't believe that our chemical effects -- that we have to worry about it, and that would be defined later in time.

We do believe as a committee there are chemical issues, and I'm sure that -- so, therefore, they are not ready to address those issues in the context of the response. So it's an open-ended -- I mean, I understand you are waiting for the industry to address individually plant by plant how they are going to address this issue. You certainly will have certain expectations on what -- the content of what has to be addressed.

And that confused me -- the fact that industry can say, "Well, we don't think there are chemical effects, and we will find out about that sometime in the future." I mean --

MR. SHERON: We've told the industry that when they do go about addressing, you know, their analysis of the sump and deciding what modifications may be necessary, it would probably be a very wise idea for them to include margin to accommodate any adverse effects that may come out of further research with regard to chemical effects.

CHAIRMAN BONACA: Okay. So you are proposing at least some approach where --

MR. SHERON: Yes. They need to understand that if chemical effects were to become a -- something less than insignificant, if you can use that term, they should probably -- I think prudence would dictate that whatever changes they propose to make to their sump that they allow some margin in there to accommodate that.

CHAIRMAN BONACA: But in order to -- and I appreciate this, but in order to -- to allow some margin, you've got to understand how you would model chemical effects and what the potential results could be, depending on what kind of debris are entrained or whatever the issues may be.

Do we have sufficient technical information for them to do that?

MR. HANNON: This is John Hannon again. The expectation is that research will have been completed by the end of the year that would identify whether or not there is an issue, whether or not the problem exists.

Once we come to that level of understanding, then the expectation would be that licensees -- and there would be a placeholder in our safety evaluation acknowledging that, that they're going to have to deal with it. If it turns out to be an issue, they would have to address it, either through design changes or through chemical methods, to take care of the chemical effects.

Similar for the downstream effects, as you pointed out, we need to have that resolved by August. And what we intend to do is have some guidance in our safety evaluation that would be intended to take care of downstream effects. So even though the research may not be completed by then, we're going to have some guidance in the safety evaluation for the methodology as to how to deal with it.

VICE CHAIRMAN WALLIS: I'm sorry. I'm reading the changes in what we saw last time. The Generic Letter that the subcommittee thought we were going to suggest that we recommend be issued actually asked for a mechanistic analysis, and it explained why it was necessary. What you've done is taken out all the justification for requiring a mechanistic analysis.

You say, "If a mechanistic analysis will be performed," well, how else are they ever going to confirm compliance except by making a mechanistic analysis? You seem to be taking out all of the teeth in the original letter.

MR. SHERON: Dr. Wallis, I think the problem may be more legalistic, and that is that in 50.54F we are only allowed to ask for information. We cannot tell a licensee how to get the information.

VICE CHAIRMAN WALLIS: Okay.

MR. SHERON: We can make suggestions on what might be an acceptable way for them to provide the information, but we cannot tell them how to provide the information.

VICE CHAIRMAN WALLIS: So you seem to be going into sort of a legalistic realm, which is something which is --

MR. SHERON: I have no choice.

(Laughter.)

VICE CHAIRMAN WALLIS: -- we are not very competent to advise you about.

MR. SHERON: I mean, I've been dealing with Generic Letters probably my entire career in the agency, and that has been a fundamental premise of Generic Letters.

VICE CHAIRMAN WALLIS: You can't ask them to analyze the performance of their system?

MR. SHERON: We can ask them to provide us information on the performance of their system. Okay? We can require them to provide us an answer to the letter, but the only thing we can do in the Generic Letter is request that they do an evaluation. But we can't tell them how to do it.

VICE CHAIRMAN WALLIS: Well, but you haven't even requested that. You said if the analysis, if the evaluation is performed. You aren't even requesting that they do the analysis anymore.

MR. SHERON: Well, it says if a

mechanistic analysis --

VICE CHAIRMAN WALLIS: Well, what else will they do? A non-mechanistic analysis?

MR. SHERON: They could do a qualitative.

VICE CHAIRMAN WALLIS: That's not acceptable.

MR. SHERON: You know, I can't --

MEMBER POWERS: Well, I mean, could -- I presume that the option would be open to do a very bounding analysis.

MR. SHERON: Yes.

MEMBER POWERS: Now, a guy could say, "I don't know how it gets here, but here's the total amount of insulation I have in my containment, and all of the coding, and I put it in the sump and the sump worked fine."

MR. SHERON: They could put it all on the screen and say, "See, it still works."

MEMBER POWERS: And it worked fine, and what not. That would be a non-mechanistic analysis that would be pretty acceptable to you, I suspect.

MR. SHERON: Yes.

MEMBER POWERS: I mean, you'd be real happy with that.

VICE CHAIRMAN WALLIS: It's still

mechanistic, it's just not detailed. It's just not detailed. It's still mechanistic, though.

MEMBER POWERS: No. I mean, it's deliberately a non-mechanistic analysis. I mean, the regulatory process distinguishes between those. He says, "I don't know how it got there, but everything I got in containment ends up on the screen." I mean, that -- that would be a non-mechanistic analysis. Am I correct, Brian?

VICE CHAIRMAN WALLIS: You're asking for analysis?

MR. SHERON: That's how I would interpret it, yes.

MEMBER POWERS: Yes. Whereas a mechanistic analysis would be one saying, "Okay. I break this up into little particles by a shredding mechanism, and it falls by hydronamic forces into the sump," and things like that.

VICE CHAIRMAN WALLIS: So this is more like what Los Alamos was doing. So what's going to happen here is it's going to be a very conservative assessment if they throw out all of the mechanisms and make all of the bounding assumptions.

MEMBER POWERS: Well, I would be -- I would be careful about that, because with a little skill I can certainly portray a very non-bounding accident as one that's very bounding. And do often, by the way.

(Laughter.)

VICE CHAIRMAN WALLIS: It sounds like slight of hand to me.

MEMBER SIEBER: Now, the procedure that you're going to approve will be set out in the safety evaluation report? Is that what you said?

MR. HANNON: Yes. The methodology will be approved in a safety evaluation report.

MEMBER SIEBER: Wouldn't it be better done through a regulatory guide? That's where I would expect to see approved procedures as one way to satisfy NRC requirements, rather than in a safety evaluation report. To me that differs from how I'm used to doing business.

MR. HANNON: That's true. If we had unlimited time to -- we would be talking about revising Reg. Guide 1.182. And ultimately they may -- that may happen after we produce the methodology. It could later get incorporated into the Reg. Guide.

MEMBER SHACK: Just coming back again, you issued an order for the BWRs. You've argued here that, you know, you've got maybe a dozen PWRs that may have to make changes in their sumps, other people are going to have to change out insulation.

MR. SHERON: Excuse me. I think you said -- you meant there was a Bulletin on the BWRs, correct?

MEMBER SHACK: There's a Bulletin.

MR. SHERON: Yes.

MEMBER SHACK: And the Bulletin only said provide information. Didn't even say that.

MR. ARCHITZEL: Ralph Architzel from the staff. The Bulletin for the boilers was an action-requested Bulletin.

VICE CHAIRMAN WALLIS: Yes. And they did all make changes, as I recall.

MEMBER SHACK: Well, then why not issue a Bulletin?

MR. ARCHITZEL: We have issued one Bulletin for the interim actions, by the way.

MEMBER SHACK: But, I mean, issue a Bulletin here for the analysis.

MR. SHERON: Again, you know, maybe -- I think someone said, you know, did you bring your attorneys with you? And we probably should have. The position has changed. I mean, they have concluded that a Bulletin or a Generic Letter is a request for information under 50.54F, and it is not an appropriate vehicle to impose a requirement -- namely, to require them to do something.

You know, I would have to defer to an attorney to explain that, but, you know, I think times have changed since 1996.

MEMBER SIEBER: Well, have times changed since last week? For example, I'm reviewing the ultrasonic flow meter, which requires a response, an analysis and response by licensees who are using those. And it seems to me to be an analogous situation to this one.

MR. SHERON: Well, in that case we're requesting information. Again --

MEMBER SIEBER: That's right.

MR. SHERON: -- UFM. Okay? And that's what we're doing here is we're requesting information. We're requesting them to provide us information on whether or not their sumps comply with I think it's Section A3 of 50.46.

MEMBER SIEBER: Right.

MR. SHERON: Using this new methodology -- in other words, not using the 50 percent blockage assumption, but this -- this approved methodology. And that's the information that we're requesting.

MEMBER SIEBER: But the vehicles that you're using in this case are different than you're using on the last case that I reviewed anyway, which is the ultrasonic flow meter.

MR. SHERON: No, it's the same. The ultrasonic flow meter we're requesting --

MEMBER SIEBER: Well, you're using a Bulletin for that, right?

MR. SHERON: Right. The only difference --

MEMBER SIEBER: And you're using a Generic Letter for this one. The procedure is going to be in a safety evaluation. There the procedure is in a bunch of references issued by the vendor.

MR. SHERON: Right. The only difference between a Bulletin and a Generic Letter is that Generic Letters are issued for public comment before they go out. There is a draft and then there's a final.

A Bulletin is considered a little more urgent, and, therefore, we -- you know, and we use a Bulletin when we don't believe we have time to go through the public comment process.

MEMBER SIEBER: Okay.

MR. SHERON: But they are both the same.

They are both issued under 50.54F.

MEMBER SIEBER: Right.

MR. SHERON: And either one -- both of them, all they can do is request information.

MEMBER SIEBER: I'm glad I'm not an attorney.

VICE CHAIRMAN WALLIS: Can we go back to the presentation?

MR. CULLISON: Next slide?

This slide has changes to the Generic Letter. Based on comments from internal and external stakeholders, the staff has made changes to the Generic Letter in these areas -- and the purpose, the requested action/information in the backfit determination. Some of these changes are new since the subcommittee meeting two weeks ago, and I will discuss these areas in the following slides.

Also, on upgrading licensing basis -- a driving consideration in this Generic -- for this Generic Letter has been the proposed staff position -- or, actually, it's not proposed anymore, the staff position on approving the current licensing basis analysis to a more realistic model of sump performance.

The staff determined that in light of the new information identified during the efforts to resolve GSI-191, the previous guidance used to develop current licensing basis analyses does not adequately and completely model sump screen debris blockage and related effects.

This new information, had it been known at the time, would have been included in the original guidance. As a result, the staff is revising the guidance for determining the susceptibility of PWR recirculation sump screens, the adverse effects of debris blockage during design basis accidents requiring recirculation operations of the ECCS and the containment spray system.

VICE CHAIRMAN WALLIS: I'm going to go back to what I asked before. When the subcommittee met with the staff two weeks ago, we were told that the letter we saw at that time was not expected to have -- suffer substantial changes before, you know, this meeting, and so we should treat it as if it were final. And now we're assured that the new one is final. It's the same assurance.

I think we're a little reluctant -- I think we're all in favor of doing something and probably this Generic Letter is a reasonable thing to do. But we'd like to know what it is that we're approving when we approve something.

MR. CULLISON: What we presented at the subcommittee had not gone through the Office of General Counsel yet. Technically, we felt we were --

VICE CHAIRMAN WALLIS: So it was really the General Counsel that caused all of these changes? The legal people caused all of the changes.

MR. CULLISON: Yes.

VICE CHAIRMAN WALLIS: Okay. And they're not going to have another go at it?

MR. CULLISON: Well, they will when we go through with the CRGR package. But they've already seen it, and so we can always use --

VICE CHAIRMAN WALLIS: So we are further along than we were.

MR. CULLISON: We are further along, and so I -- again, I hate to say this, but we don't expect any substantial changes.

VICE CHAIRMAN WALLIS: Well, let's say if we write a letter on this, and if we find that it has substantially changed, then you will probably hear from us after -- if it's substantially changed after you've written a letter, I expect you will hear from us.

MR. CULLISON: I understand that.

MR. SHERON: I think if it substantially changes from the version you've seen, we would probably come back to the committee before we --

VICE CHAIRMAN WALLIS: That would make sense, I think, and avoid any hassle.

MR. SHERON: I mean, we're not trying to, you know --

VICE CHAIRMAN WALLIS: No, I know.

MR. SHERON: -- mislead you with something that's going to change.

VICE CHAIRMAN WALLIS: I realize that you have -- you're doing the best you can with a somewhat tough assignment.

MR. HANNON: I also want to point out that this letter is scheduled to be issued the end of August. Okay? So, you know, that's why we're trying to meet with you now early, because we understand you don't have a meeting in August. So the timing is such that it was important for us to have this dialogue today.

VICE CHAIRMAN WALLIS: Well, we do have subcommittee meetings on the NEI guidance in August and the ACR. And it's conceivable that -- I don't know what's going to happen then. It's conceivable that that might influence our thoughts about the letter. I don't know.

MR. CULLISON: And the last bullet is a change from the subcommittee meeting. The staff has since then determined that the sump performance evaluation is a boundary evaluation of the ECCS model. The staff determined that deficiencies in the previous guidance potentially resulted in a potential analytical error that could result in ECCS performance that does not conform with the requirements of 10 CFR 50.46B(5). As a result, the requirements of 50.46A(3)(ii) apply in this situation.

MEMBER SIEBER: But sump performance may be poorer than originally analyzed --

MR. CULLISON: Right.

MEMBER SIEBER: -- but you could still be in compliance with 50.46.

MR. CULLISON: Right.

MEMBER SIEBER: Depending on how much margin you have.

MR. CULLISON: Right.

MEMBER SIEBER: So that's the ultimate criteria.

MR. CULLISON: Right.

VICE CHAIRMAN WALLIS: Could you be in compliance by having alternative ways to cool the core without using recirculation? Or does the compliance require that the recirculation process actually work?

MR. CULLISON: I believe that would require an exemption from the rule.

VICE CHAIRMAN WALLIS: 50.46 requires that the recirculation mechanism work. It doesn't allow you to sort of say, "Well, we've got alternative ways to cool the core."

MR. SHERON: I think 50.46 just says that you're supposed to have long-term cooling. It doesn't say how.

VICE CHAIRMAN WALLIS: So alternative ways would be acceptable without using recirculation.

MR. SHERON: Yes, as long as they met other -- any other regulations that were applicable.

VICE CHAIRMAN WALLIS: So that's another option that they have in complying.

MR. CULLISON: Next slide, please.

VICE CHAIRMAN WALLIS: So that would remove the need for a sump altogether, if you had -- for the sump screen to work altogether, if you had another way to cool the core. Okay.

MEMBER ROSEN: You don't take credit for sprays.

VICE CHAIRMAN WALLIS: Hitch up to some

other source of water.

MEMBER SIEBER: There is some limit as to how much you can pump in there, though.

MR. CULLISON: The purposes of this Generic Letter are to request that addressees submit information to the NRC to confirm compliance with 10 CFR 50.46B(5) and requires addressees to provide the NRC a written response in accordance with 10 CFR 50.54F. And this is a change from the subcommittee meeting as the staff is no longer requesting addressees to perform any action.

Next slide.

And these are the regulatory requirements that form the basis for the Generic Letter. I left off 50.54F, because this -- basically, these were the two main ones. The first one is the 50.46B(5); the other one is 50.46A(3)(ii).

And the bullet on the bottom is an exemption from the requirement to take immediate steps that may be necessary upon a determination of non-compliance. And that's if there's a determination of non-compliance, and that is factored into the Generic Letter.

VICE CHAIRMAN WALLIS: Yes. The bit I remember from this is that that second part of the second bullet there -- that affected applicants shall propose immediate steps to demonstrate compliance.

MR. CULLISON: Right. And the --

VICE CHAIRMAN WALLIS: That does force them to take some action immediately.

MR. CULLISON: And depending on what that -- what action they choose, they can also come in for an exemption from the -- from that requirement, as long as they propose adequate other actions in accordance with 50.12 exemption request.

And in the request -- the information request, we actually -- when they submit it September 1, 2005, we're asking them to submit any exemption requests that they may have.

VICE CHAIRMAN WALLIS: Now, going back to your slide on public comments, several of the public comments were legalistic, saying you can't do this under 51.09 or something, you can't do this under so and so,r so and so, and so and so. You didn't put them in your presentation here, but --

MR. CULLISON: Right.

VICE CHAIRMAN WALLIS: -- presumably someone has gone into all this, and now the legal --

MR. CULLISON: Yes.

VICE CHAIRMAN WALLIS: -- but it is sorted out?

MR. CULLISON: Yes.

VICE CHAIRMAN WALLIS: You are doing what you are allowed to do, and you aren't tangled up with --

MR. CULLISON: We've discussed this with OGC, with the lawyers.

VICE CHAIRMAN WALLIS: And you've sorted all of that out.

MR. CULLISON: To make sure that we're on the legal straight and narrow here.

VICE CHAIRMAN WALLIS: Maybe it's not too narrow, so you can actually get through this task.

MR. CULLISON: Right.

Next slide, please.

And on this slide, on the requested action, it is pointing out the fact that the letter is now an information request only. When we briefed the subcommittee, there were requested actions, and the --

VICE CHAIRMAN WALLIS: That makes it sound pretty weak. I know it probably is going to result in actions, but I think it -- I want to make sure to the public that -- that it is going to result in action. It's not just -- it sounds an awful weak thing to do, just ask for information.

MR. CULLISON: That's the mechanism we have.

VICE CHAIRMAN WALLIS: Well, you've already gotten an awful lot of information.

MR. CULLISON: Well, we don't -- we have a lot of information on a generic level, and what we're trying to identify here in the Generic Letter is those plants which may have a problem with their sumps based on the new information.

VICE CHAIRMAN WALLIS: But the information you request is in such a form that it is going to lead to action, if action is appropriate.

MR. CULLISON: Right. They could -- the range of responses we could get is that they are in compliance the way they are, and no additional effort is needed to --

VICE CHAIRMAN WALLIS: I hope you have a good way of checking that those statements made are, in fact, supportable.

MR. CULLISON: We do have plans to perform audits on --

VICE CHAIRMAN WALLIS: All these different -- 64 different --

MR. CULLISON: Not on all the plants, but on a number of plants. And the first --

VICE CHAIRMAN WALLIS: Well, we're going to hear from NEI later, but hopefully what will happen is that industry will realize that it's up to them to fix this anyway, and you won't have to lean on them too much so that it will all be resolved.

MEMBER SIEBER: Generally speaking, and from my experience, once you get one of these, the licensees understand what the deal is and respond. So, you know, we're jumping through a lot of legalistic hoops right now, but when it's finally issued and the licensees get it, they know all about this anyway, so they can run off and do it. And I imagine anybody that says "I'm okay" gets an audit, right?

MR. SHERON: Well, I mean, what -- what the letter really does is that, you know, I don't think any licensee is going to come back to us and say, "You know, we've done the analysis, and we're not in compliance. Thank you very much." Okay?

MEMBER SIEBER: Well, they got -- once you identify you're outside of your licensing basis, you've got to do something or shut down.

MR. SHERON: Yes. And if you look at 50.54F, it basically says, "We are requesting information to determine whether we need to modify or suspend or revoke your license."

MEMBER SIEBER: Right.

MR. SHERON: You know, those are pretty strong words.

MEMBER SIEBER: Yes.

MR. SHERON: Okay? And so I don't think a licensee is going to come in and say, "I'm out of compliance, and I'm not going to do anything about it."

MEMBER POWERS: But don't you ask him for a JCO?

MR. SHERON: What?

MEMBER POWERS: Don't you ask him for a JCO if he's out of compliance? Justification for Continued Operation.

MR. SHERON: Licensees have requirements. Once they find themselves out of compliance, they either have to, you know, come in and provide, for example, compensatory measures, a justification for continued operation --

MEMBER POWERS: I thought this thing actually required --

MR. SHERON: Or, as Dave said, they may want to come in and request an exemption.

MR. CULLISON: The Generic Letter does

what the -- for the information to be sent in on September 1, 2005. If necessary, there is -- they are to submit a JCO.

MEMBER POWERS: Yes. I mean, I thought I read the report to --

MEMBER ROSEN: Would that justification for continued operation be okay if it was based on risk analysis? In other words, was risk-informed? It might be?

MR. SHERON: Yes, we can -- yes, we've accepted risk as a basis for -- you know, again, if there's a -- you know, I think there would have to be determination, okay, whether or not there was a compliance issue. And then, you know, risk may be justification for an exemption, for example.

MEMBER ROSEN: Well, I was trying to phrase it a little more narrowly than that, Brian. I was trying to say -- because I know that the exemption process is difficult. You have to get through 50.12 and all the rest. But let's leave that aside for the moment for this question.

If the licensee said they were not -- did the analysis, felt they were not in compliance, defined steps to get into compliance, they would take some time, and that their justification for continued operation was based on a risk analysis. Would that be acceptable for the staff?

MR. SHERON: Probably. I want to qualify it, but I would say, you know, that I -- I don't see any reason why it wouldn't be.

MEMBER ROSEN: Okay. Thank you.

MR. CULLISON: And the first set of information is due within 60 days of the issuance of the guidance SECY. And actually, on this bullet I carried forward the mistake I made in the letter about returning to the requested evaluation. But in that response we are asking for their plans and their expected completion dates.

Next slide.

MEMBER SHACK: To demonstrate compliance, is that what you're asking?

VICE CHAIRMAN WALLIS: That's the next one. See, this first bullet, they're just demonstrating compliance. It says nothing whatever about risk. I mean, it's quite a different -- compliance is a deterministic thing, isn't it? You either meet the regulatory requirements or you don't. You don't -- you would bring risk into it.

MEMBER ROSEN: That's why I phrased my question the way I did, is if the licensee concludes it's not now in compliance, but that the justification for continued operation includes here is the risk of us continuing to operate in non-compliance for X period of time. And so I phrased it to Brian Sheron whether or not that would be acceptable, and he said -- I think he said, "Yes, probably."

MR. SHERON: I mean, a lot of times licensees do that in combination, for example, with proposed compensatory measures.

MEMBER ROSEN: Sure.

MR. SHERON: You know, and we've used those as a basis I think in fire protection.

MR. CULLISON: The second response, which is due September 1, 2005, is the main response to the Generic Letter. And in the next couple of slides we'll go through some of the information we're requesting in the Generic Letter.

The first is that addressees provide confirmation that their ECCS and CSS recirculation functions under debris loading conditions are or will be in compliance with the regulatory requirements and the general description of and implementation schedule for all corrective actions, if any.

And also, we want them to initiate actions to implement corrective actions no later than the first refueling outage starting after April 1, 2006. However, all corrective actions should be completed by December 31, 2007. And if all corrective actions will not be completed by December 31, 2007, describe how this is consistent with the requirement of 50.46A(3)(ii), the requirement to take immediate steps to demonstrate compliance.

VICE CHAIRMAN WALLIS: Now, they used to provide confirmation by this 50 percent assumption. That's --

MR. CULLISON: Right.

VICE CHAIRMAN WALLIS: It's clear that that has gone by the board, and the confirmation has to be based on presumably this NEI guidance. Is that it? Or something like a bounding analysis, which is more extreme. That's what it's got to be based on.

MR. CULLISON: We used the generic phrase "NRC-approved methodology."

VICE CHAIRMAN WALLIS: So you make it clear in the letter what is going to be acceptable --

MR. CULLISON: Right.

VICE CHAIRMAN WALLIS: -- evidence for this confirmation.

MR. CULLISON: It's in the methodology.

VICE CHAIRMAN WALLIS: It's in the

methodology. I haven't studied that -- the new version of that yet.

MR. CULLISON: Next slide, please.

MEMBER SIEBER: But there's nothing in the Generic Letter that implies a risk-based approach.

MR. CULLISON: No.

MEMBER SIEBER: And if the staff were to want a risk-based approach, or be inclined to approve it, it would show up on the methodology.

MR. CULLISON: That's correct.

MEMBER SIEBER: So this is all deterministic here.

MR. HANNON: No. Understand that the methodology has a risk-informed section that would enable a licensee to reduce the break size for debris generation calculation purposes. So that --

MEMBER SIEBER: Right.

MR. HANNON: And so that's an allowed method that we're going to be looking at for the approval.

MEMBER ROSEN: So there's two levels of risk analysis you can use -- the risk analysis that's embedded in the methodology and a risk analysis that might be used in a justification for continued operation.

VICE CHAIRMAN WALLIS: Now you're taking a risk here, because we haven't seen this yet. And when we review all this stuff in September, we may say, "This risk-informed approach is baloney." I'm not saying we will, but, I mean, there is -- we probably won't, but --

MEMBER ROSEN: We might say that, but we did say in our letter that -- we did encourage the staff and the industry to use risk-informed approaches, and I think they are using it.

VICE CHAIRMAN WALLIS: We haven't yet seen --

MR. HANNON: I would also point out that we are attempting to couple closely with the effort on revising the regulation 50.46.

MR. CULLISON: And on this slide there's a couple more bullets on what we're requesting for September 1st. The results of the -- or the submittal that describes the methodology, that used from the analysis, and the results of that analysis. Also, at the time they make the submittal, we are requesting that they submit any changes --

VICE CHAIRMAN WALLIS: You mean with a blocked sump screen, don't you? Without a blocked sump screen, there's no problem. So there's no sense in doing the second white bullet there. Do you mean including the minimum available -- with whatever blockage you happen to get. You don't mean with an unblocked sump screen.

MR. CULLISON: What I did do is I -- I just put that first bullet on there. That's one of the --

VICE CHAIRMAN WALLIS: Yes, but the second bullet doesn't make any sense. I mean, if it's a clean screen, why is there an issue? I mean, there isn't any issue with a clean screen, so you've got to say with a realistically blocked sump screen or something.

MR. CULLISON: Well --

MEMBER SIEBER: Or partially blocked.

VICE CHAIRMAN WALLIS: Partially blocked.

MR. CULLISON: Well, what I didn't put on the slide is that we're asking for the maximum head loss postulated from debris accumulation on the submerged sump screen.

VICE CHAIRMAN WALLIS: That's not what the second thing says. It says unblocked sump screen.

MR. CULLISON: This is in addition.

VICE CHAIRMAN WALLIS: In addition.

MR. CULLISON: This is in addition. I

didn't put all --

VICE CHAIRMAN WALLIS: Oh. So they're in real trouble if it doesn't work when it's unblocked.

MR. CULLISON: Right. So in the letter it's a list of items that we're requesting. But we are asking for the maximum head loss postulated from debris accumulation on the submerged sump screen and a description of the primary constituents of the debris bed that result in a head loss.

VICE CHAIRMAN WALLIS: Well, why do you ever ask, though, for an unblocked sump screen analysis? Since they're being asked to do an analysis of a blocked sump screen.

MEMBER SHACK: Presumably, they need a 50 percent block now, right?

VICE CHAIRMAN WALLIS: Yes, so it's just -- I think you mean with a realistically blocked sump screen.

MR. CULLISON: Well, we're asking for that, too. This is just an additional -- just to see what the margin is with an unblocked screen, the starting point, a clean screen analysis.

VICE CHAIRMAN WALLIS: They've already done the 50 percent one, which is a part of the record.

MR. CULLISON: Well, the 50 percent may not be an analysis per se. It's an assumption that they used.

VICE CHAIRMAN WALLIS: But they still have to predict an MPSH margin with that 50 percent. Isn't that part of the licensing basis?

MR. CULLISON: Yes, they do. They do have to calculate a head loss for that.

MEMBER SIEBER: That's right.

MR. ARCHITZEL: This is Ralph Architzel from SPLB. I guess the only point on that bullet -- and it's a little bit carried over from the earlier versions -- when you do an MPSH analysis, we don't have it all submitted. That's the starting point that you would then assess the blockage against, so we don't have that submitted to us across the board. So this information is used to assess the blockages that --

VICE CHAIRMAN WALLIS: So you would find it useful.

MR. ARCHITZEL: It's a limited set of information that's being requested.

VICE CHAIRMAN WALLIS: It would be interesting to see if the MPSH is bigger or less than it would be for 50 percent blockage.

MR. CULLISON: And we're requesting changes that, at the time they make the submittal, to submit any licensing actions and exemption requests, a description of the programmatic controls for controlling what materials are introduced into containment, and, as we discussed before, provide a JCO if needed.

VICE CHAIRMAN WALLIS: What is a JCO?

MR. CULLISON: Justification for continued operations.

Next slide.

And I put this slide up here --

VICE CHAIRMAN WALLIS: That means justify why you shouldn't be shut down?

MR. CULLISON: Right.

MEMBER SIEBER: Yes.

MR. CULLISON: Yes.

VICE CHAIRMAN WALLIS: Okay.

MR. CULLISON: I put this slide in here because the letter that was presented to the subcommittee was a compliance exception to the backfit rule. But now the Generic Letter requests information only. There is no backfit, but --

VICE CHAIRMAN WALLIS: But you don't specifically say it. The first Generic Letter had all kinds of things denying this was a backfit. There's no word that -- does the "backfit" appear at all, the word "backfit"?

MR. CULLISON: In the back, there's a backfit determination section.

VICE CHAIRMAN WALLIS: Oh, there is.

MR. CULLISON: And it discusses the fact that this is requesting information only.

VICE CHAIRMAN WALLIS: Okay, there is.

MR. CULLISON: No backfit is intended or implied.

VICE CHAIRMAN WALLIS: It seems very strange, because probably -- well, that was one of the comments from industry is you say this, but, in fact, you're going to require a backfit.

MEMBER SIEBER: No, you're going to require compliance.

VICE CHAIRMAN WALLIS: Well, okay, but it would amount to the same thing. It's just --

MR. SHERON: We're requesting information on compliance. If a licensee comes in -- a licensee may come back and say, "We're in compliance, and here is our reasons." And if we review those reasons and we don't agree with them, maybe they're still trying to justify 50 percent or something, then ultimately the burden becomes -- it goes on to the staff to decide if we want to backfit that licensee.

If we don't agree with that licensee, then the burden is on the staff. We can either order them to revise their -- modify their sump. Okay? But that's the whole purpose of the Generic Letter approach is we're requesting information to determine if we need to take action against a licensee.

If a licensee comes in and says, "I'm making changes. These are the changes I'm making," we look at it and we say, "Yes, that's acceptable. We have assurance now you're in compliance." Then that's fine. If a licensee comes in and says, "I'm not making changes. Here's my reason why," we review it, we don't agree with that. Ultimately, the staff then has the burden of deciding if we want to order that licensee to make those changes.

VICE CHAIRMAN WALLIS: You might not agree with the changes they propose, too.

MR. SHERON: That's true.

VICE CHAIRMAN WALLIS: So that although it's said that no backfit is implied, essentially a backfit is implied if you disagree with their argument.

MR. SHERON: That's right. But the burden is on the staff, then, to -- in other words, if we decide that we don't agree with them, if we impose a backfit it would be most likely through an order. The licensee then has hearing rights associated with that, and the burden is on the staff.

You know, I don't like getting into the legalistic, but that's basically what, you know, the licensee then -- for example, if it's an immediately effective order, I think a licensee has five days if they want to request a hearing, in which case then the staff has to justify why we are doing that. If it's not immediately effective, I think there's like 20 days. But there are certain rights that come with an order.

MEMBER SIEBER: Now, if a licensee came in and said, "I did the analysis, and I don't meet the MPSH requirement, unless you give me an exemption for containment overpressure," would the staff -- how would the staff mechanistically deal with that? You know, there has been a few of those --

MR. SHERON: You're going to complicate it with containment overpressure.

MEMBER SIEBER: Well, there's been a few of those issued --

MR. SHERON: Yes.

MEMBER SIEBER: -- in the past, but the majority of licensees don't have that kind of a credit.

MR. SHERON: Yes. And the position the staff has right now on containment overpressure is that we will give credit to a licensee for containment overpressure if it is appropriately justified --

MEMBER SIEBER: For short periods of time.

MR. SHERON: No, not for short periods of time.

MEMBER SIEBER: Do you mean for the whole accident? The whole length of the accident?

MR. SHERON: Well, they would -- two ways. One is they would have to demonstrate that the overpressure was available for the period of time that they required it. And, second, is they would have to show that the risk associated with taking that credit was acceptable, for example, a la Reg. Guide 1.174 criteria.

MEMBER SIEBER: So that's sort of another risk-informed alternative that a licensee could choose to use, and maybe the staff would approve it?

MR. HANNON: The allowance for the use of overpressure I believe is one of the refinements in the methodology that we have under review.

MEMBER SIEBER: Okay.

MR. HANNON: I don't want to unnecessarily complicate the exemption discussion. But what we had in mind for exemptions was, once a licensee determined they were not in compliance -- strict compliance with 50.46, they have the JCO, they can request a temporary exemption, schedule or exemption, to allow them time to make modifications.

MEMBER SIEBER: That's right. And what I'm proposing is a -- at least one type of permanent exemption that would allow that temporary JCO to go on until the end of the licensed life of the plant.

MR. ARCHITZEL: This is Ralph Architzel one more time. I'd just like to say that containment overpressures -- that's regulatory guidance, so it wouldn't be an exemption. Those that have been approved haven't been under the exemption process. But that's a regulatory guide requirement, not to allow containment overpressure. So that particular aspect wouldn't require an exemption.

MEMBER SIEBER: okay.

MEMBER FORD: I have a question. Has this revised Generic Letter gone out to industry again for comments?

MR. CULLISON: No, it hasn't.

MEMBER FORD: The reason why I ask the question is that at the end of the subcommittee meeting there was considerable discussion as to whether we should -- this letter should be issued in comparison to continuing just the Bulletin 2003 actual one.

And it was my impression after all the discussion of the technical issues that there was a tacit approval that the letter should be -- at a subcommittee level, should be issued with the hope that many of the technical questions would be answered by the fall of this year.

But now this Generic Letter has been changed substantially from that which presumably went out for public comment. So what is your view? Does the industry know about this revised version?

MR. CULLISON: No.

MEMBER SIEBER: They do now.

MEMBER FORD: Are there any --

MR. CULLISON: They haven't seen it. But it's very similar to what went out as the draft Generic Letter for comment.

MEMBER SIEBER: Yes, I see that.

MR. CULLISON: The fact that it's for information only, no backfit, under 50.54F, all those are the same as what went out for public comment. So the fewer the changes are, the use of 50.46A(3)(ii), and that's -- for the rest, most of the rest of it is very similar to what has been out for public comment.

VICE CHAIRMAN WALLIS: So another question is: why issue it now? You're hoping that the NEI guidance will turn out to be acceptable and usable, and this does to some extent depend upon that. And it's supposed to be available by September. Maybe you could wait a month or two. We could review this again in September with the NEI guidance and say, "Yes, the whole package works out."

And also, I just wonder if something which is done with last-minute changes is really the right thing to put out on such an important issue. Maybe you need to have at least a week to think about whether exactly all of the words are exactly -- just exactly what you want to put in there, rather than rushing to put something out when it has just been edited so substantially.

My experience says that it's sort of risky to do that. This committee puts out letters like that. My -- in my own professional life, I don't like to make a lot of major changes and then immediately put something out.

MR. CULLISON: The process --

MEMBER POWERS: Fortunately, there are more eyes looking at committee letters than just Professor Wallis'.

VICE CHAIRMAN WALLIS: No, I'm serious, though.

MR. CULLISON: And this letter will get more scrutiny for the wording, not for the technical content, but to make sure my -- when I make a mistake like I did, it will get caught before it goes out, gets issued. So we still have to go through the CRGR, and there's a whole review process before we get there. Most of the people who will review it have already seen it, but --

VICE CHAIRMAN WALLIS: So --

MR. CULLISON: -- it'll go through technical edit -- it'll go through an entire process to clean it up to make sure that the wording is exactly right.

VICE CHAIRMAN WALLIS: So all of this rewriting, and so on, is really -- doesn't really change the substance. What you're doing is you're getting enough information to decide whether or not these plants have to make -- you have to insist that the plants make changes. And, of course, if you get information that they've already made changes which are acceptable, then you won't have to insist on anything. Isn't that what you're doing?

There's an issue here -- you're getting enough information to decide whether or not they're in compliance. And if they're not, then you have enough information to decide what to do.

MR. CULLISON: That's correct.

VICE CHAIRMAN WALLIS: That's what the whole purpose of this is.

MR. CULLISON: That's correct.

VICE CHAIRMAN WALLIS: And all of these changes and drafts didn't change any of that.

MR. CULLISON: No. It's -- I guess the -- how we're doing -- how we're asking and the wrapping of the asking.

VICE CHAIRMAN WALLIS: Right. So that's sort of the regulatory side of it.

MR. CULLISON: Right.

VICE CHAIRMAN WALLIS: And the ACRS isn't an expert on the legalistic matters, and so on. But we are always asked to advise on technical matters, and the concerns that we have is with all of these technical issues floating around and all of that, are you really capable of making these decisions with a sound technical basis?

I think that's a place where we -- I think we can use our expertise, and we can advise you, and we probably can't do it until we see the NEI guidance and your response to it.

MEMBER SIEBER: Well, the key document is going to be the SER, as I see it. So -- and that is the key to this whole issue is how to do the analysis.

MR. SHERON: Obviously, if, you know, when the ACRS reviews the SER, if there are major problems, technical problems, with that, you know, first off my experience says we'd probably agree with you if you found something that was, you know -- basically said this thing was fatally flawed.

The other thing that you need to be aware of, and you'll be seeing this, and that is that I -- this is something I worried about -- Suzy will tell you, and John will tell you -- a long time ago -- was that supposing the industry, for example, doesn't complete their guidance document on the schedule we're working to, or supposing that the document they ultimately come up with doesn't prove to be acceptable to the staff. That doesn't -- we shouldn't be in a position where we have to go back to square zero.

And so the staff has developed a backup

guidance document, okay, that we feel is acceptable. And you'll hear about that as well I think later in the month. So we're not hanging everything on the industry document alone.

MEMBER SIEBER: On the other hand, maybe you can answer this. Will the information or the Generic Letter go out before the SER is signed off?

MS. BLACK: Yes. This is Suzy Black. We have changed the requested information, and now we ask for their response 60 days after we've approved the methodology. So the response date is no longer --

MEMBER SIEBER: Why don't you wait until after the SER is complete and we get a chance to look at it before you send the Generic Letter out? And then you don't have to go and pull anything back or, you know, do any somersaults in the middle of the air and --

MS. BLACK: We don't think we'd have to pull anything back, because the -- because it's -- the response is tied to the issuance of the approval for the methodology. And we also believe that it's important to get this information out and let the licensees see what we're actually going to be --

MEMBER ROSEN: Yes, I tend to agree with you, Suzy, because what -- if, for example, the NEI guidance was delayed or something, you know, interminably, you'd issue this backup guidance you've got, and that would be what you reference in your safety evaluation.

MS. BLACK: Right.

MEMBER ROSEN: So the words work, either with the NEI guidance or with your own.

MEMBER SIEBER: Well, the net effect of doing that is just to have all of the licensees worried about what's going to be in the SER, for however long it takes you to issue it. And I guess that's okay. That's what they do for a living.

MEMBER POWERS: Persuasive to me on that regard was just that there is a substantial information data collection activity that needs to take place before you can do any kind of analysis.

MEMBER SIEBER: Yes.

MEMBER POWERS: And I can't believe that licensees are not aware of those needs.

MR. SHERON: Right. And the other thing is the -- you know, I was asking John, I mean, the staff has had numerous interactions with the industry with regard to their guidance documents. So I -- you know, unless there are major changes, I think, you know, that result from, say, the ACRS review, I don't think the SER is going to be any real surprise --

MEMBER SIEBER: Okay.

MR. SHERON: -- to the industry.

VICE CHAIRMAN WALLIS: Well, we had a preliminary look at the NEI guidance two weeks ago, and we asked some questions about the zone of influence and whether or not air jet tests could be used to predict what would happen with the steam water jets, and so on, and it seemed as if the authors of the NEI guidance were not aware that there were questions of this type that needed to be asked and answered.

So I'm just wondering if these matters will all be resolved. I don't know.

MR. HANNON: Based on the interaction we had with the subcommittee a couple weeks ago, we are focused on those technical concerns and would expect to have them addressed in the safety evaluation. And I think we have a meeting scheduled to bring that to the ACRS, what, in the middle of September? I mean, middle of August.

VICE CHAIRMAN WALLIS: This is a subcommittee meeting in August.

MR. HANNON: August 17th, I think. So, and at that point we would expect to be in a position to explain the --

VICE CHAIRMAN WALLIS: I think we're all working on trying to resolve the technical issues. But you can't just hope that automatically that will result in success.

Okay. Now we want to hear from NEI. I guess NEI wants to make a presentation? Is there anything else that staff would like to say at this time? I'm very happy that we have senior members of the staff here to guide us today.

Thank you very much.

MEMBER SIEBER: Are we supposed to write a letter on this?

VICE CHAIRMAN WALLIS: We have to decide what we're going to do. We're going to discuss the matter.

Now, Tony Pietrangelo from NEI. I'm very happy to welcome you back here.

MR. PIETRANGELO: Thank you, Dr. Wallis.

CHAIRMAN BONACA: We hope that you have all the solutions to all of --

MEMBER SIEBER: Yes, solve all these problems, please.

MR. PIETRANGELO: We had no plans to present anything to the ACRS this morning, because we didn't know that the Generic Letter had changed so significantly. We still haven't seen it, obviously. But it looks like the first one a lot more. Given that, it dismisses the vast majority of the public comments that were sent in to the staff. Okay?

Just to step back for a second on this issue, I think with the exception of Davis-Besse, all licensees have --

VICE CHAIRMAN WALLIS: Excuse me. When you say "dismisses," do you mean that the public comments were made on that first draft?

MR. PIETRANGELO: Oh, yes.

VICE CHAIRMAN WALLIS: So what do you mean, it just pays no attention to them?

MR. PIETRANGELO: Yes, pretty much. And I advise you to look at the NUBAR comments on backfit, but I'll get into that in a second.

Most licensees have -- their licensing basis is this 50 percent blockage assumption. Okay. That's what has been there, and they have -- through the actions taken on the Bulletin have gone and looked at their sump screens, made sure it complied with what was described in the FSAR, and so forth. So they are complying with their current licensing basis. Okay?

I think it was noted before there isn't

anything in 50.46 that requires a licensee to do this mechanistic evaluation that we're all talking about. Okay? So now we have knowledge from the research done on GSI-191 that maybe the 50 percent blockage assumption isn't conservative. Okay? There are some doubts about that, okay? So let's go do some other stuff.

And we've developed an evaluation methodology to go do this in a mechanistic way that starts with debris generation and transport and accumulation on the screen and MPSH calculations. Almost like it was a whole new required design basis analysis. Okay?

MEMBER POWERS: When you say you're developing all this stuff, how is your database? I mean, experimental database.

MR. PIETRANGELO: Not very good. It's what has been published by LANL essentially, and we know that there is some draft reports by LANL on the reference plant at Comanche Peak that we don't have access to, which is --

MEMBER POWERS: You're not alone.

(Laughter.)

MR. PIETRANGELO: Right. So we have -- we agree with the conclusion of the research that it --

this is a plausible concern that we should do something about. The licensees are prepared to go do this analysis.

The reason we said in our comments not to make this a -- make this more like the Bulletin 96-03 that the BWR was performed was that it got through to the solution in the quickest way and in the most efficient way. You know, the legalistic hoops that were talked about before are legalistic hoops that both the licensee and the NRC have to jump through that divert you from getting to the solution in the quickest efficient way.

Okay. The staff can request anything it wants in a Generic Letter. There is nothing that says they can only request information. They can request anything they want. Okay? They can do it under 50.54F or not. There's nothing that says that every Generic Letter has to have 50.54F associated with it. Okay?

All we wanted to do was follow the model that has already been used for the BWRs to get to the quickest resolution of this issue.

Part of our comments on the Generic Letter was that this is more an additional assurance mode that the ECCS systems would work, because 50.46

doesn't go into this level of detail. Okay? To keep us out of this exemption space and JCO space, and all these other things that cause more work for other people, and divert you from getting to the solution in the quickest way. Okay?

We're prepared to go forward, but the evaluation methodology that we develop is tied to the language in the Generic Letter. They are not mutually exclusive things, because if you do the baseline evaluation methodology, given all its conservatisms that I thought the subcommittee saw a couple of weeks ago, that's not a demonstration of whether you're in compliance or not after you perform the baseline methodology.

You may pass, but with that level of conservatism it's unlikely you're going to meet the MPSH criteria at the end. Does that mean you're not in compliance anymore? No, it's indeterminant. So it got supplemental guidance. It tries to put more realistic assumptions based on the research that has been done in debris generation and transport and accumulation.

And we've got a risk-informed alternative that further refines the methodology. And we think most licensees will opt to use the risk-informed methodologies.

VICE CHAIRMAN WALLIS: Tony, I think what you're saying is that you liked what you saw in the last Generic Letter, which asked for these analyses, and so on, and you prefer it to the original draft, which appears to be more like what we're offered today.

MR. PIETRANGELO: That's correct.

VICE CHAIRMAN WALLIS: So that this is significant information from the committee, and I think that at the subcommittee meeting there seemed to be a real sort of agreement between the staff and NEI this was a good way to proceed. Now you're wondering if it is because --

MR. PIETRANGELO: No. In fact, given what I've heard today, I would urge you not to issue the Generic Letter, not to approve issuance of the Generic Letter. If we don't do chemical effects testing until the end of the year -- and okay, fine, we'll add some margin in. Then you're going to hold me in compliance to 50.46A(2)(i) based on that thing?

I mean, you're putting the licensees and I think ultimately the NRC in handcuffs if you do that. So I think there is a nexus between the -- what the Generic Letter requests you to do and how our evaluation methodology is set up.

VICE CHAIRMAN WALLIS: Well, this is what I was concerned about, this sudden decision to rewrite the thing and approve it without having some time to think about it. And I'm now learning that if you had time to think about it, you might learn that NEI didn't like this change, and maybe some accommodation might be appropriate. Is that what I'm learning?

MR. PIETRANGELO: Well, I think you are learning that. But I'll take you back to what the Commission requested you to do. Okay? And we said the same thing at the subcommittee two weeks ago. You're in a good position to really help on this issue. Okay?

And I think the Commission, both in the public briefing and in the SRM, are requesting you to work with the staff and make a recommendation for a practical solution within a reasonable period of time. And given all you've heard, I think you should respond to that request.

And we want to do this right. I think the industry has committed to do this right. All of the tools that -- you know, the orders and enforcement that Brian went through, if a licensee doesn't respond in a straightforward way to the Generic Letter, all those tools are still available. Okay? But you have to use them all at the front end in a compliance mode and create work for both the licensee and the NRC later.

If you could request any action you want in the Generic Letter, and if the licensee doesn't respond appropriately, then it's time to get more draconian with all of that other stuff. But we're willing to do it. We've put a lot of time into the evaluation methodology.

The chief nuclear officers in the industry are all well aware of this issue; they're briefed on it regularly. We've already taken the NEI guidance to do the containment walkdowns. There has already been actions and responses on the docket for the Bulletin, and we're ready to do the next step.

But trying to do all of this other stuff -- diverts from you resolving the issue in a timely manner.

VICE CHAIRMAN WALLIS: Now, you said that you urged us not to recommend issuing the Generic Letter in its new form?

MR. PIETRANGELO: Yes.

VICE CHAIRMAN WALLIS: And you made that statement?

MR. PIETRANGELO: I haven't seen it.

MEMBER ROSEN: Even though you haven't seen it.

MR. PIETRANGELO: Even though I haven't seen it, I think I know -- it looks like the first one. There's a lot of problems with it.

VICE CHAIRMAN WALLIS: It looks more like the first one.

MR. PIETRANGELO: Yes.

MEMBER KRESS: Tony, the thing that's bothering me is I thought I heard the staff say that they were more or less forced into this form by the Office of General Counsel.

MR. PIETRANGELO: I can't speak to that.

MEMBER KRESS: You can't speak to that either.

MR. PIETRANGELO: No. They are there to provide legal counsel. They're not there to direct the staff to do anything. The Commission directs the staff.

MEMBER SIEBER: Okay.

VICE CHAIRMAN WALLIS: Well, this is a bit like riding a bronco or something.

MR. PIETRANGELO: Well, it's certainly --

VICE CHAIRMAN WALLIS: We may say, well,

just go out -- put out this Generic Letter in whatever form the staff wants and thinks is legal, and then we'll deal with the consequences.

MR. PIETRANGELO: And I urge you not to just accept that argument on its face, because I think there is other ways to do this. It has been done already for the boilers. Okay? Things haven't changed that much, and we know that path. We know how to move forward with it. And if the requested actions aren't adequate, then the staff has many regulatory tools at its disposal to -- with an individual licensee.

VICE CHAIRMAN WALLIS: Well, I think the staff needs to comment on what you've just told us.

MR. SHERON: I think the -- I think where the difference of opinion is is with the word "compliance." Okay? If we invoke 50.54F, we're asking for the information to determine compliance with the regulations. I think NEI and the industry would argue that they are in compliance, because the guidance out there is -- says 50 percent blockage.

And if we just said, "Please analyze your plans," without invoking the compliance part -- in other words, just sent them a letter, a request, okay, "Dear Industry: We would like you to voluntarily reanalyze your plants against this new methodology, whatever, and tell us what you intend to do about it," okay? The problem is is that the first time somebody does an analysis using perhaps this most conservative method, this bounding method, and concludes they are not in compliance, then they are sort of in a little bit of a regulatory or a legal dilemma. Okay? In the sense of --

MEMBER ROSEN: I don't think I understand that. I mean, I heard Tony say it's an admittedly conservative screening tool. So you can do an analysis that says you don't pass the screening. It doesn't say you're in non-compliance. I think that's the difference.

MR. SHERON: Right. And I don't think we're saying that the minute somebody comes up with a conclusion using the most conservative method, for example, and concludes that they don't meet the MPSH requirements that automatically they are not in compliance. Okay?

They have a methodology in front of them which the staff approved? Okay? One of those methods presumably they will use ultimately to determine whether or not, you know, their sumps are operable or not.

MEMBER ROSEN: Okay.

MR. SHERON: And at that point, okay, as we said, they have an option. They can come in, and they can say either, you know, we've determined that our sumps -- we don't meet the MPSH requirements, for example. Okay?

Here are the proposed modifications we intend to take. Okay? And what we're saying is that and they need to then provide us with justification on why it is acceptable to continue to operate while you make those modifications.

MEMBER ROSEN: And that can be a risk-based justification.

MR. SHERON: Yes.

VICE CHAIRMAN WALLIS: So the difference is you --

MR. SHERON: Or with a combination of risk-based and compensatory measures.

VICE CHAIRMAN WALLIS: In the letter which we saw two weeks ago, you requested essentially this analysis. And in the new letter you're requesting that they submit information to confirm compliance -- a different tone altogether. And that is the problem that you have I think -- NEI.

MR. PIETRANGELO: Yes. I mean,

admittedly, 50.46 does not require you to do this level of examination. There is nothing in there that says how to do this. All right? And then you're asking me to take the results of this thing and tell me why I'm in compliance with 50.46.

MEMBER SIEBER: Well --

MR. PIETRANGELO: And you're going to go through all of these gymnastics.

MEMBER SIEBER: I think there's another issue here. It seems to me the 50 percent blockage assumption is built into Title 10.

MR. PIETRANGELO: No, it's not.

MEMBER SIEBER: It's not?

MR. PIETRANGELO: Nope.

MEMBER SIEBER: What is it, a Reg. Guide?

MR. PIETRANGELO: It's a Reg. Guide.

PARTICIPANT: Reg. Guide 1.82.

MEMBER SIEBER: So you can change that with relative ease.

MS. BLACK: That was changed several years ago.

MEMBER SIEBER: Okay.

MS. BLACK: And it said for future modifications you can no longer use that, or you should no longer use that.

MEMBER SIEBER: Okay.

MR. PIETRANGELO: Well, but that's what every -- the licensing basis at every facility except for Davis-Besse is.

VICE CHAIRMAN WALLIS: I wonder if we have learned enough now. Do we need to pursue this any more? I think the committee has to decide what it wants to recommend.

Thank you very much.

MR. PIETRANGELO: Okay.

VICE CHAIRMAN WALLIS: It goes back to, again, to -- as an interested member of the public here, I'm interested to see, you know, what happens and whether the agency -- how the agency and industry handle the situation where new research indicates that assumptions which were made in the past are no longer appropriate. And it seems to be extraordinarily difficult, and I don't quite understand why.

MR. PIETRANGELO: Well, I think --

VICE CHAIRMAN WALLIS: And you have all of this baggage of regulations and stuff that you have to deal with.

MEMBER ROSEN: I think what has happened now is, given all of that, the Commission itself, to which we are advisory, has asked us to weigh in very directly on June 30th in the SRM, to weigh in to recommend a practical solution, work with the staff and with others I guess to -- although it only specifically says the staff -- make a recommendation for a practical solution within a reasonable period of time. And so --

VICE CHAIRMAN WALLIS: But we're nowhere near a practical solution. We're just asking for information. That's no solution at all. It's just gathering information and figuring out what the situation is, not what the solution is.

MEMBER ROSEN: I think the Commission has handed us a mandate.

VICE CHAIRMAN WALLIS: But we can't get -- you know, this Generic Letter doesn't offer any solution at all. It just says, "Let's find out what the situation is."

CHAIRMAN BONACA: Right. I think we are being caught in a debate on the licensing approach to deal with this issue. That's what --

VICE CHAIRMAN WALLIS: Which is not our expertise.

MR. SHERON: This is a process issue that we're struggling with right now. Okay?

VICE CHAIRMAN WALLIS: We have been told

in the past not to get involved in process issues.

MR. SHERON: Yes. And, unfortunately, it's difficult. In the past, when we -- when licensees would come in and provide us with justification for something in their plant -- in other words, they said, "Here's a lot of data, here's some analysis to justify what we're doing," and the NRC reviewed it and we said, "Okay. Yes, we accept that," okay, and then we find new information.

We have typically gone out with a Generic Letter that said we are challenging this information you gave us. Okay? Steam generators are a good example where licensees when they first came in said, "Gee, wastage and thinning is the dominant form of degradation. And, therefore, the methods we'll use to examine our tubes will be just bobbin coils."

Okay? And then we found out that that degradation mechanism was no longer the dominant mechanism. Okay? They didn't give us complete information. Okay? The mechanism changed to stress corrosion cracking.

We went back to the industry and basically challenged them along the lines of, "You can't use a bobbin coil anymore." Okay? Because that's not appropriate. What you told us way back in the '70s is no longer true.

What's different here in my mind is the fact that the staff put in a guidance document, a regulatory guidance document, an acceptable way to analyze the sump. We said 50 percent blockage is an acceptable way to analyze the sump, and industry did that. So NRC sort of became part and parcel to this.

Now we've concluded that some of our guidance is no longer appropriate. Okay? And what we're struggling with is: how does one go about changing a guidance document, okay, in regulatory space, okay, and getting licensees to do the reanalysis? When you request a licensee to redo something, okay, you have to have a reason for doing it.

Why are we asking them to do it? Because we're questioning compliance. Okay? If it was we just want to make the plant safer -- you know, gee, 50 percent is still good, but we think it's cost beneficial to make the plant safer, then we would be in backfit space where we would be doing cost beneficial analyses and trying to convince you that the costs of fixing the sump and everything were with it from a risk standpoint. But we're not there. Okay?

That's what we're struggling with right now. The only other way we can do this is if we said we need them to fix the sumps, because then we go to the order. Okay? Or we fix it by now saying, "I've got to put sump blockage requirements in the regulations." Okay? Which I don't think anybody thinks is really -- you know, that's kind of an overkill.

So that's where we're struggling with this is the question of: why are we requesting licensees to do it? Because it raised a question of compliance. Okay? It didn't raise a question of, can I make the plant safer? Okay? But they were already safe enough.

MEMBER SIEBER: Well, the interesting thing, though, is that we questioned what makes the licensee, then, modify the plant? And a licensee is faced with the same situation here that he would be if he discovered a defect in the plant on his own. You have to comply with your license. You have to obey the rules in Title 10. You have to maintain the design and licensing basis and operate within those constraints.

And if you -- a licensee finds information that takes them outside the boundaries of those rules, he is obligated to correct the situation or shut down without further action by the NRC, by the staff. And so that -- that's how I would expect licensees to perform, and I think every licensee knows what the rules are.

And so I don't see such a big conflict between asking for information but not telling them to do anything because they're bound by the conditions of their license to do something once they discover that they are outside the licensing basis.

MR. SHERON: I think the guidance document -- you know, the evaluation guidance document gives them a flexibility, okay, for doing more sophisticated analyses. If a bounding one, for example, you know, gets them to -- an answer that they're not satisfied with --

MEMBER SIEBER: And I can still consider that the key document as opposed to the Generic Letter, and I think the timing -- you know, the rush to send this out to me isn't as important as is the timely completion of the guidance document. But, you know, there is an opportunity to send something out that might be different than you wished it would have been if you had waited until the guidance document was available.

VICE CHAIRMAN WALLIS: Well, I'm going to go back to what you said a little while ago, Brian. You said that this is a matter of compliance and not a question of safety. But what set this whole thing off was a LANL study which said that these plants are likely to be out of compliance, and some selected to be blocked, and this could have an order of magnitude effect on some of the CDF terms.

MR. SHERON: Well, I didn't say this was not --

VICE CHAIRMAN WALLIS: That's what set this whole thing going, so that essentially at the end the real criterion, it seems to me, for what you do has to be based in terms of the safety implications of it all, not some legalistic --

MR. SHERON: I didn't say that this was not a safety issue.

VICE CHAIRMAN WALLIS: Well, and that's what I found difficult about this whole thing from the very beginning is -- is it important to safety or not? I mean, are these things that they've done as a result of the Bulletin -- did they make the -- sort of the safety problem essentially go away, or not? So what's the measure of safety that's at issue here? That's something that has never been fully explained to us.

MR. SHERON: Well, LANL did risk assessments on this.

VICE CHAIRMAN WALLIS: The initial ones were very dramatic, let's say.

MR. SHERON: Right. But then the revised ones demonstrated -- and we used those as the justification --

VICE CHAIRMAN WALLIS: But are they right? Are these revised ones right? They rely on operator actions and alternative ways of cooling, and so on.

MR. SHERON: They took into --

VICE CHAIRMAN WALLIS: Now, as I understand, the plants haven't adopted all of these possible new actions, and so on? We also had a presentation on that. WOG made various suggestions. Some of the plants adopted some of them, some of them didn't, and so on.

Now, what effect has that had on the safety issue? We don't know.

MR. SHERON: Well, I think the risk assessments -- and, Ralph, you can chime in here -- but the risk assessments, the revised ones that were done, I think took credit for some of these compensatory measures and --

VICE CHAIRMAN WALLIS: But did the plants actually make these -- all these --

MR. ARCHITZEL: I'd like to just clarify. Ralph Architzel again. The LANL supplemental study took credit for existing operator procedures and actions that were in the existing procedure. So the first study that was done did not have any credit for operator actions.

LANL studied that situation and dropped it down to -- it was like an order of magnitude --

VICE CHAIRMAN WALLIS: An order of magnitude change, right.

MR. ARCHITZEL: With the operator actions that were on the books, the Bulletin requested additional operator actions that dropped it further. So the ones that were in the first study were existing ones that you'd find in procedures, that licensees would be expected to do already. That wasn't in the original study. The Bulletin requested additional compensatory measures that have been taken in a large --

VICE CHAIRMAN WALLIS: But this all has --

MR. ARCHITZEL: -- so it would reduce it further.

VICE CHAIRMAN WALLIS: This all has a big effect on the imperative to resolve the sump blockage problem, doesn't it?

MR. SHERON: And that's why we concluded that we could -- we provided the justification that said that's why we can wait until, for example, the end of calendar year 2007 for plants to actually do the analysis, design whatever changes they have to make, you know, procure the materials, and install them. Okay? That's why we felt that the industry had this amount of time, this three- or four-year period, to do that, based on these risk assessments.

VICE CHAIRMAN WALLIS: But they still need to come into compliance. Even though it's now --

MR. SHERON: Yes.

VICE CHAIRMAN WALLIS: -- not so significant from the point of view of risk.

MR. SHERON: Yes.

VICE CHAIRMAN WALLIS: Okay. Well, we've taken a long time. I think unless anybody wishes to say anything more, I'd like to hand it back to the Chairman.

Thank you very much.

CHAIRMAN BONACA: Any other comments?

Thank you very much.

Now I think we'll break and get back again at 10 of 2:00.

(Whereupon, at 12:48 p.m., the proceedings in the foregoing matter went off the record for a lunch break.)

VICE-CHAIRMAN WALLIS: Let's come back into session. I think the Chairman is caught up. The next item is a discussion of 50.46, as if we haven't had enough exciting issues today already.

We're going to start now. The Chairman is back. It's up to you. We are on the record. And Dr. Shack is going to get us started.

MEMBER SHACK: Well, we've been through a number of topics on 50.46. I think that the new thing today is that there is a new staff requirements memo that just came out July 1st. Brian Sheron will tell us about the staff's plans presumably to address some of the issues raised in that staff requirements memo.

MEMBER POWERS: Brian, are you just continuously drawing short straws? Is that all? When they give you straws, Brian, don't pick the short one anymore. Okay?

MEMBER SIEBER: Do you want to get a chair? Do you want to get a chair? You can sit down, then.

MR. SHERON: Good afternoon. My name is Brian Sheron. I'm the Associate Director for Project

Licensing and Technical Assessment in NRR.

It's kind of an honor. I haven't been up here in front of the ACRS for -- I don't know -- a long time. Maybe it's a good thing or a bad thing. I don't know.

VICE-CHAIRMAN WALLIS: It makes you feel younger.

MR. SHERON: Yes. Thank you.

What I would like to do is spend a little bit of time talking about where the staff is heading on risk-informing 10 CFR 50.46. Just for background, this is one of the regulations that we chose to risk-inform as part of option 3 with regard to the risk-informing our regulatory processes.

Remember, there are two other options: option 2, which was the special treatment requirements; and then option 1, which would basically on a plant-specific basis look at risk-informed submittals.

For background, recall that the Commission directed the staff to determine how best to proceed with risk-informing part 50 regulations. From June '99 through March of last year, the staff, primarily the Office of Research, performed feasibility studies and technical analyses basically laying, trying to lay, a technical groundwork for how one would modify 50.46.

The staff was supposed to be coming forward with a rule, a proposed rule. Now, as you can see, in March of '03 the Commission directed us to do that with a risk-informed alternative maximum break size.

Early in the year, this year, we kind of concluded that there were a number of policy issues that were really -- let me use the word "stumping" the staff a bit in terms of how to proceed. So we developed SECY-04-0037. And we requested that the Commission provide us with some additional policy guidance on this alternative break size rule, primarily with regard to the scope of the rule.

Nonetheless, the Commission spent a fair amount of time deliberating on that SECY paper that went up, but it was clear that we needed to keep moving on 50.46, that we just couldn't sit back and wait until the Commission provided the guidance. There was a lot of stuff that we can continue to do.

What I proposed to my supervisor, Mr. Dyer, was that we form an interoffice steering committee to give it some focus. Previously there really wasn't -- you know, there were a lot of different divisions and offices that were involved, but I don't think there was any clear one person, let me say, being held accountable. So I guess, as Dana said, I drew straws and got the short one again.

I proposed that we form an interoffice steering committee. And I said that I would assume the chairmanship of it, kind of basically shepherd it through. I put together on the steering committee senior-level managers.

Dave Matthews, Division of Regulatory Improvements, who is basically responsible for the rulemaking process, is on it. Suzy Black, Director of Division of System Safety and Analysis, is on it. Rich Barrett, Division of Engineering Director, is on it. Charlie Ader from the Office of Research is on it to represent the research interests, Joe Gray or substitute from OGC to make sure that we are being legally pure in what we do. NSIR is involved with regard to any security interfaces. And the plan basically is with this steering group to provide guidance to the staff on developing the framework for a rule.

The first thing we did was we had to assign lead responsibility for certain aspects of the rule. We established division leads. What I mean by that is basically each division director that was assigned to lead was held accountable for producing that part of the regulatory framework for 50.46.

Break size definition, Division of Engineering and the Office of Research were responsible for developing that. LOCA and PRA success criteria, again DSA and Research were responsible for that.

The rule framework was with Dave Matthews and DRIP, his division. Assessment of impacts and potential consequences, that was primarily DSSA and DE. We have used the term "tentacles" to describe that. In other words, obviously 50.46 has very far-reaching consequences in terms of the design of plants. And we wanted to make sure that we fully understood whatever changes we make, how they might affect the design of plants.

Assessment of impacts and potential consequences, again, this is the -- I'm sorry. I just talked about that. That is the tentacles, as they call it.

PRA quality and scope requirements. Again, that was DSSA, the PRA Branch, along with the Office of Research. Adequacy of reg guide 1.174 guidance. Again, that was DSSA. And in security impacts, we asked the NSIR to provide any input on that.

Next slide, please. The Chairman in his tasking memo had asked -- he wanted a proposed rule in a short period of time. I can't remember exact words. I think it was possibly within a year when he issued his memo.

So we put together a streamlined schedule. This is a very optimistic schedule. I want to emphasize this is something that we think is going to be very difficult to meet, but, nonetheless, we are going to try.

Basically we plan on meeting, well, with the full Committee today. We expect that there will be perhaps one, perhaps two more meetings with the full Committee later in the fall, when we flesh out this rule a little bit more and put some meat on it. We expect there will be several subcommittee meetings. I think there are some scheduled later this month on this to discuss some of the detailed areas.

Our plan, which we have already had a little bit of a slip, was we want to get a Federal Register notice issued this month, early this month hopefully, in which we will provide a conceptual outline and a summary description of what we are thinking about for a rule. And the reason is we want to get public feedback from stakeholders.

And we would propose holding a meeting. I think that July 26th date was originally what was scheduled. I'm going to guess that's probably going to slip a little bit.

But the plan is once the public had seen the Federal Register notice and it gets a better understanding of what our proposed concept is for the rule as well as describing what some of the elements are, we would get some meaningful feedback. And that could feed into both the formulation of the draft rule as well as the regulatory analysis.

The plan right now is we want to get a draft rule into the internal concurrence process I think by about early September. That would allow us presumably to get concurrences, resolve comments, and get a package to the executive director by the end of November and then a package to the Commission by December 15th. And that right now is essentially consistent with the SRM guidance that said to produce a rule in about six months.

We are going to request CRGR waiver of the draft rule review, mainly because it is not a backfit. It is a voluntary alternative. So there is no backfitting requirement associated with it.

Next slide, please. The SRM we received basically said we should select a maximum break size using the approach in reg guide 1.174, which would be a risk-informed approach. Use initiating event frequencies from the expert elicitation process, which I believe you are going to discuss after I am done here, and any other relevant information.

One of the first things we met on as a steering committee was on this break size. I don't have it on the slides here, but I was amazed. I was actually very optimistic because that seemed to be about the easiest thing we could agree on in terms of a break size, risk-informed break size.

I'm not going to get into details on it today. I think that's better left for a subcommittee. But we do have a proposed go forward approach for break sizes for both PWRs and BWRs and a basis upon which we selected those. They are smaller than a double-ended guillotine.

MEMBER POWERS: Could I just ask you a question, Brian? You come down, and you say, "We're going to use an expert elicitation process here"?

MR. SHERON: I'm sorry. We used the research expert elicitation process for developing break size frequency.

MEMBER POWERS: I guess what I'm struggling with is how many large pipe breaks in nuclear power plants have we had? Could that possibly generate experts?

MR. SHERON: I'm going to defer that to the Office of Research. That's obviously a key question in terms of the efficacy of the expert elicitation process and the absence of data.

MEMBER POWERS: It just seems to me that the approach that you are adopting that has been adopted on things like --

MR. SHERON: We did it in 11.50, in containment failure and so forth.

MEMBER POWERS: Yes. And what I --

MR. SHERON: It has generated a lot of controversy.

MEMBER POWERS: What I have liked a lot is the kinds of stuff that is being done for pressurized thermal shock, where they get the expertise into areas where you could have expertise, like flaw size distribution and things like that, in steel. There is a lot data on that, at least some data. And so you can have some expertise on that. But, actually, the break size problems, you don't have a lot of data.

MR. SHERON: Right. And that is why we are taking a risk-informed approach. You will see that the break sizes we're ultimately going to recommend are not frequency-based.

But there is some accounting for the fact that there is some uncertainty obviously in the expert elicitation process and that there are some initiating events that I think were not considered in the expert elicitation process that we wanted to make sure we accounted for.

MEMBER POWERS: Now, you took no interest at all in the German approach to these large breaks?

MR. SHERON: I apologize. I'm not familiar with the German --

MEMBER POWERS: Well, what they basically do is they say, yes, the biggest pipe breaks, it's really not a double-ended guillotine break. There's some reduction in the amount of flow area that steam and water can come out of because of the pipe breaks. And it kind of offsets, like this.

They spent a lot of time figuring out what that was and came up with a number. But they still took a big break. It's just that they took it as more realistically what they thought the break would look like.

MR. SHERON: Yes. And I think that the breaks that we are proposing I think have a -- there's a practical basis behind there. Okay? But, like I said, that's probably a whole separate meeting.

MEMBER SHACK: What's your criteria if it's not frequency-based for choosing the maximum break size?

MR. SHERON: Well, for example, you might pick a probability of a frequency, of a break size, and you look it up on a curve and you say, "Okay. That corresponds to a break of X inches in diameter." But then you say, "Okay. What are things that weren't considered?"; for example, heavy load, seismic, whatever, so forth.

Then you also might look and say, "Okay. From a practical standpoint, what are the largest pipe sizes in the plant once you drop below the main coolant pipes." Okay?

It's basically the pressurizer. All right? I think the largest one out there for PWR is like 14 inches, which is South Texas. The rest of them are I think around 12 or 13 inches.

So one might argue and say, "Well, if I pick a break size that is 12 inches or 14 inches or just say it's the surge line and that's some size greater than, say, a pure frequency-derived break size, then you can argue that that accounts for uncertainty. And there it relates to a practical limit within the plant." Okay?

And you can look at it and say, "Okay. Where does that really fall from a" -- you know, if you want to get into statistics, you could try to put confidence intervals or something on it. Okay? But it provides margin over and above just a pure frequency-derived break size.

One of the logic things, too, is that the Commission had said what they would like us not to -- for this reversibility argument basically that if down the road we get new data that says, all of a sudden, that this break frequency plot changes for the worst, becomes less conservative, they want to make sure the changes that licensees make are not irreversible in a plant such that if they had to go back and say they changed a piece of equipment or took something out of service and then the break size changed such that they would have to put that back in, it shouldn't be a major catastrophe for the plant.

You would like not to have the plant sitting right on a ragged edge of something where if it changed two years from now, all of a sudden, we would have to go out and make all of these plants redesigned and put stuff in. You want to have margin in there so that, even if that frequency number did change, you could argue that it's bounded.

Again, like I said, I think that's probably the subject of probably a detailed subcommittee meeting and by people that are a lot smarter than I am in fracture mechanics and so forth.

The Commission also wanted us to allow operational as well as design changes, which could be interpreted as things like, for example, allowed outage times, so forth, in tech specs.

Restrict changes where --

MEMBER SHACK: Power outages?

MR. SHERON: Yes, possibly, especially PWRs. If they change out their steam generators and they, all of a sudden, find themselves with 20 percent extra heat transfer area sitting around there, this could be a possibility.

Restrict changes where engineering margins are necessary to meet the reg guide 1.174 principles or security considerations. Let me hold off. And I'll discuss that in a little bit in a broader context.

And then mitigation of LOCA up to the

double-ended guillotine break should be required. And changes to this capability should be controlled by regulation commensurate with risk. Okay?

Basically what that means is that for breaks up to -- and I am going to use the term "transition break size." We have been struggling with a name or an acronym. Okay? You know, we called it "risk-informed" versus "deterministic" and didn't like that. And then I called it the "region formally known as risk-informed," and they didn't like that.

Then we called it region I and region II. So we're calling it right now basically breaks up to a transition break and then breaks beyond the transition up to the double-ended guillotine.

MEMBER SHACK: It's just a design basis break, right?

MR. SHERON: If you want to call it that, yes, because the Commission did say that breaks beyond this transition should be considered beyond design basis. And I'll explain that in a little bit.

Basically what they're saying is that for breaks up to this transition break size, everything is the same. Okay? You do a 50.46 analysis. Everything, all the equipment required upon its design base needs to meet all of the same requirements.

For breaks at the transition break size up to the double-ended guillotine, the guidance is that you don't want these breaks going to Carmill, for example, because they took out certain pieces of equipment and the like.

In other words, what you want to say is that up to the double-ended guillotine, the plant can still handle that break size. In other words, you're not going to melt the core. You're not going to produce fuel damage.

But, nonetheless, the way they analyze it maybe different commensurate with the lower risk significance. For example, you don't have to use an evaluation model with all the conservatisms. You can use the best estimate model because you don't have to use --

MEMBER SHACK: You have to do that now.

MR. SHERON: But you still have to, you know, I think, pick single active failure. And there still has to be a certain conservatism. I think the staff has been using like --

VICE-CHAIRMAN WALLIS: You just have to consider uncertainties

MR. SHERON: Right. And the staff has been using I think numbers -- I've seen like 95 percent. Okay? And so we may pick a best estimate model but with a lower probability, not 95 percent for something lower.

VICE-CHAIRMAN WALLIS: Are you going to define what you mean by mitigation, then?

MR. SHERON: Yes.

VICE-CHAIRMAN WALLIS: It seems to me we aren't talking there at the moment.

MR. SHERON: Well, right now I think one of the phrases we are considering is "coolable geometry"; in other words, that you have to maintain a coolable geometry.

Now, how you demonstrate that is a different story. Okay? Right now the staff would say that in the absence of any additional data, 2,200 degrees and 17 percent oxidation is sufficient to demonstrate coolable geometry.

What we don't want to do is we don't want to foreclose the opportunity for the industry if they want to produce additional data that says they can either go to higher temperatures, clad temperatures, or changes in the oxidation to restrict them.

So the thought right now is that if we kept it at coolable geometry and maybe in a regulatory guide or some other regulatory guidance, say, that today we can live with -- the staff feels comfortable with 2,217 percent, but if the industry wants to produce additional data to demonstrate that they could go to higher numbers or something, then we would consider it.

VICE-CHAIRMAN WALLIS: So you will define the confidence with which they have to get this coolable geometry?

MR. SHERON: No. I don't think at this point --

VICE-CHAIRMAN WALLIS: You said about 95 percent for the --

MR. SHERON: Well, what we have said is that, say, a licensee wanted to use their best estimate model out in that region or this beyond design basis region. The uncertainty in that model may not have to be as well-defined, you might say. It makes that more uncertainty.

VICE-CHAIRMAN WALLIS: Then you have to say what is acceptable and --

MR. SHERON: Yes. And we will do that.

VICE-CHAIRMAN WALLIS: Do you accept 95 percent confidence up to this transition break size?

MR. SHERON: Then maybe we would --

VICE-CHAIRMAN WALLIS: Would you accept 50 percent or 75 or what above it?

MR. SHERON: Right. We would pick --

VICE-CHAIRMAN WALLIS: We will pick something explicit.

MR. SHERON: Yes.

VICE-CHAIRMAN WALLIS: That's good. And if it will have a justification based on risk or something?

MR. SHERON: I can't tell you what the justification will be based on, but it will be based on something.

VICE-CHAIRMAN WALLIS: It's going to be not just picked out of the air?

MR. SHERON: Well, I'm hoping it won't be picked out of the air. Obviously any of these numbers is a little --

MEMBER SHACK: But it will have to be consistent with 1.174 and other such type arrangements.

MR. SHERON: Yes. Now, I will get into the 1.174 aspect of this in a minute. Okay? I think the point we want to make is that the approach we are taking right now is that we would expect licensees to still be able to demonstrate through an analysis that for breaks larger than this transition break size, they can still maintain a coolable geometry in the plant and mitigate the event.

VICE-CHAIRMAN WALLIS: With some confidence. They're never going to be sure.

MR. SHERON: Right. Again, in the SRM from the Commission, they told us that the backfit analysis should not be required to reverse changes needed to maintain compliance. Basically what this means is that we will basically write a waiver to having to deal with 50.109 if break frequencies, for examples, plot of break size versus frequency were to change based on new information. It is what I was talking about before, this reversibility thing.

The Commission also doesn't think we have to go through a complete backfit analysis in order to -- for example, if a licensee had to reinstall a pump or something like that.

VICE-CHAIRMAN WALLIS: So after the first large break LOCA really occurs, you won't require any backfits?

MR. SHERON: My guess is after the first large break LOCA occurs, we won't have to because most plants may not be running. I don't know. I don't even want to think about what the consequences would be if a plant had a break like that.

Use of best estimate code should be encouraged but not required. This was primarily in the small break region because most plants don't have best estimate small break analyses. I think the Commission did not believe that we should be forcing licensees to develop best estimate small break analyses just for the purpose of this rule.

VICE-CHAIRMAN WALLIS: Some of these codes haven't been approved anyway.

MR. SHERON: Your best estimate --

VICE-CHAIRMAN WALLIS: Some of these codes have been only approved for certain kinds of things.

MR. SHERON: Correct.

VICE-CHAIRMAN WALLIS: And you may have to do some more code approval work if it is any use for some of this --

MR. SHERON: It depends on how a -- for example, the issue came up of power uprate. Okay? And one could envision -- and I am just kind of speculating now, but we did envision that with licensees having to be able or being capable of doing a more realistic best estimate analysis in this beyond transition break region, that, in fact, the controlling peak clad temperature could, in fact become the small break, not the large break.

And if a licensee bumped up against, say, 2,200 degrees down in this below the transition break size, they may wish to move to a best estimate small break analysis just to get some increased margin or some increased flexibility.

But it's not a requirement. They would be something they would choose on their own voluntarily if they wanted to gain additional margin. But we're not going to require that best estimate codes be used in the analyses.

MEMBER SIEBER: Well, that sometimes requires some trade-offs in assumptions, like the decay heat curve and so forth.

MR. SHERON: Correct.

MEMBER SIEBER: You aren't going to do that piecemeal, I presume. Everything comes as a package?

MR. SHERON: As a package, yes.

MEMBER SIEBER: Okay.

MR. SHERON: They also told us to pursue requirements for future plants separately and I think on a longer scale. Let me just explain that one of the premises we sat -- when we first sat down to develop this as a steering committee, we set some ground rules. One of the first ground rules was the only way we were going to get a rule, a draft rule, in place in six months is we are not going to create any new information. We are not going to go off and forge new ground. We are going to basically go with what we have and develop it from there.

So from the standpoint of thinking this through for advanced plants, that was not part of our scope. We will do that on the longer schedule.

MEMBER KRESS: I'm trying to picture how that would work, Brian, because the way I interpret that is a new plant would have to conform to the current rules of the large break, double-ended guillotine break.

And then given that they put in the capability and show that they can meet that, then they can take the advantage of the same rule relaxation that this gives.

Is that the way you see this?

MR. SHERON: It's probably that is how it would be, but, like I said, I haven't really thought through it. I think maybe what the Commission had in mind -- and maybe I am reading too much into it -- is that somewhere down the road, I think there is a desire to move towards total risk-informing of part 50. That could even --

MEMBER KRESS: That would take a completely different form, I would think.

MR. SHERON: Right. And for advanced plants, that may even have 50.46 or something take an entirely different form. I will be quite honest. We have not put a lot of thought into that.

VICE-CHAIRMAN WALLIS: Go back to what we heard this morning. The NEI guidance contains a section on risk-informing the sun blockage problem. It looks something like this. It says there's a transition break size and above the break size, you have to define mitigation or you are allowed to show mitigative capability or something.

MR. SHERON: Yes.

VICE-CHAIRMAN WALLIS: Can they really do that until you have thought this stuff out properly or can you accept their guidance until you have solved this problem? Because they may not be compatible with what --

MR. SHERON: The plan right now -- and I have asked my staff that very question. I said, "Gee, how can we go forward with 191 when, in fact, it is really compliance with 50.46 and we're changing it?"

Basically the answer is that the break size that we would let the industry choose, for example, if they wanted to go risk-informed on resolving 191 would be bounded as a minimum by what we are considering for 10 CFR 50.46.

VICE-CHAIRMAN WALLIS: The problem is, though, you have an NEI guidance, which is setting these rules. Before you have made up your mind about what they should be. It says NEI will preempt your definition of these things.

MR. SHERON: No. The staff knows what break sizes we're considering here, and they know what NEI has proposed. Okay? And I was assured that --

VICE-CHAIRMAN WALLIS: But you have to go to the Commission with your new --

MR. SHERON: That's correct.

VICE-CHAIRMAN WALLIS: Are you going to approve NEI stuff before you go to the Commission with your stuff?

MR. SHERON: Yes. I mean, we've got to get -- I mean, we can't hold up 191 forever until we solve everything.

VICE-CHAIRMAN WALLIS: So there might be some inconsistency later on?

MR. SHERON: There's always that low potential, but we're trying to make sure that we think that that potential is minimized, namely that the breaks that we allow NEI to use from 191 we have reasonable assurance would be bounded by ultimately whatever we come up with on revising 50.46.

Let's see. Where did I get to here?

MEMBER SIEBER: You are down to BWRs.

MR. SHERON: The BWROG pilot exemption before including in the LOCA, LOOP in the rulemaking. And we are taking a look at that. This is the exemption to disassociate the assumption of simultaneous loss of off-site power with the LOCA. And so we will be looking at that.

I have actually asked the staff if we really need to look at that as a separate rulemaking and an exemption, as opposed to just is this something we can include within the scope for revising 50.46. But I just think there is more to come on that.

MEMBER ROSEN: So it's a two-step that you're suggesting. First, rope out maximum break sizes should be and let people use that. And whatever regulatory applications they seek, they try to use it with the staff review.

And then later on, disassociate LOCA from LOOP perhaps or some various intubation thereof, recognizing that anything that went before that might have been even more flexible if the LOCA-LOOP disassociation had been in place. But it wasn't. So when you finally get both pieces in place, then you kind of have the maximum realistic.

MR. SHERON: Right. And, like I said, I have asked the staff to take a look at whether we really need to deal with that on a separate venue, as opposed to just including it in our 50.46.

MEMBER ROSEN: Yes. I think it would be best if we could do it all at once, but I understand the practicalities.

MR. SHERON: Yes. So we'll look at it, and we'll see. If we can't do it, we'll certainly let you know and let you know what schedule we're going to work that on and probably be down here talking to you about it.

VICE-CHAIRMAN WALLIS: The LOCA/LOOP is requiring that you consider both of them happening simultaneously: the LOCA and the LOOP?

MR. SHERON: Yes, yes. And that pretty much says --

VICE-CHAIRMAN WALLIS: And you are backing off from that?

MR. SHERON: Well, that has been the proposal that you just --

VICE-CHAIRMAN WALLIS: But it seems now

that LOOPs are more likely these days with switchyard problems and --

MR. SHERON: Well, that is different. It is a matter of what is the likelihood that you are going to get a loss of coolant --

VICE-CHAIRMAN WALLIS: As the outside system becomes more fragile, --

MR. SHERON: Right.

VICE-CHAIRMAN WALLIS: -- it seems to be the case. It's more likely that the LOCA itself will initiate a LOOP. And then you will get both of them.

MR. SHERON: Well, that is what we need to look at.

VICE-CHAIRMAN WALLIS: If you took the grid, they can certainly with a LOCA --

MR. SHERON: Right.

MEMBER ROSEN: Most of the data to date shows that LOCAs or the surrogates for it, which is a reactor scram, which is what happens after a LOCA, you hope, that LOCA -- unless you have an ATWS, you have a reactor scram. You typically don't lose the LOOP. You don't lose the off-site power supply typically.

MR. SHERON: What Graham is referring to is that based on, say, for example, a blackout in August of '93 -- and we have had situations, for example, the Callaway Plant, where the plant itself, they were wielding so much power through its switchyard that when the plant tripped, it dropped the boltage.

So the concern is that if the plant itself -- if the grid is not stable, that plant could be holding the voltage up on the grid. If you get a LOCA, it trips the plant off. And that takes --

MEMBER SIEBER: Basically takes the switchyard.

MR. SHERON: -- takes the switchyard out.

MEMBER ROSEN: I understand. Historically LOCAs or trips didn't cause LOOPs, but the circumstances are changing as we speak due to deregulation and other forces.

MR. SHERON: Right.

MEMBER ROSEN: So you have to take that into account.

MR. SHERON: And that's what we need to --

MEMBER ROSEN: That is Graham's point, and I agree.

MR. SHERON: Yes. And that is what we need to look at.

MEMBER ROSEN: As I said, we plan to provide a proposed rulemaking package in about six months' time.

MEMBER SIEBER: Yes. Before you move on, I would like to just refresh my own memory about how we got from 1960 to today. And 50.46 is one of the original parts of title X.

MR. SHERON: Right.

MEMBER SIEBER: In 1974, I think, or '73, --

MR. SHERON: Right.

MEMBER SIEBER: -- there was an ASLB hearing that took about a year or two.

MR. SHERON: Actually, I think, Norm, when did that start?

PARTICIPANT: It actually started December '71.

MEMBER SIEBER: Yes. And it went on for a long time.

MR. SHERON: And then the Commission promulgated the ECCS criteria, I think, '73.

MEMBER SIEBER: Right. And up to that point and including at that point, everything was deterministic. A couple of things that were litigated were the peak clad temperature and the oxidation percentage.

MR. SHERON: Right.

MEMBER SIEBER: And so now I presume that what we're doing is risk-informing that deterministic set of requirements by saying, "I don't have to tolerate such a big break, and maybe there is some room in the final acceptance criteria for oxidation and peak clad temperature."

MR. SHERON: You don't have to assume bounding parameters.

MEMBER SIEBER: Yes. I could see where you could use best estimate codes and use a better decay heat curve and so forth, but it is not clear to me that what the criteria is for applying risk information to say, "I only have to consider this size break, and I don't need all of this extra equipment."

MR. SHERON: Let me --

MEMBER SIEBER: And so is the basis for that just the Commission's initiative to risk-inform the regulations? Is that the basis, saying that the risk to the public doesn't really change by more than 1.174 will allow?

MR. SHERON: We're getting a little bit ahead, but that's really where we're coming from. And that is that, regardless of what changes we make to 50.46 --

MEMBER SIEBER: The safety of the public

won't be affected?

MR. SHERON: Right. In other words, the overriding criteria is that -- and I am going to call this basically -- this is almost a risk rule. Okay?

MEMBER SIEBER: Absolutely.

MR. SHERON: We're not telling licensees how they can use whatever margin they get here. Okay? It is an enabling rule. Some licensees may choose to uprate power. Others may choose to increase peaking factors. Others may come in and say, "I want to change allowed outage times for equipment" and so forth. I don't know what they want to do.

MEMBER SIEBER: They don't want to put flow limiters in. They don't want to use --

MR. SHERON: What we want to make sure is that whatever changes they make, it doesn't result in any substantial increased risk to the public health and safety. And what our proposal is is that licensees when they come in with changes, any change they intend to make to their plant that emanates out of revisions to 50.46, that they would have to make a submittal to the staff telling us what that change is and provide a demonstration through a risk assessment that they meet the guidelines of 1.174 with regard to delta CDF and delta LRF.

MEMBER SIEBER: Right. No significant change in risk, as opposed to no substantial change in risk?

MR. SHERON: Right.

MEMBER SIEBER: Okay.

MR. SHERON: And so that is really the whole underlying premise of this, that we're not telling them what changes they can or can't make to their plant. The only thing we want to make sure is that ultimately the risk to the public health and safety does not change appreciably, which is defined as the criteria in 1.174.

MEMBER SIEBER: Okay. I have to ask that question from time to time to make sure that I continue to remember that the risk to the public doesn't significantly change.

MR. SHERON: Right. And that is the whole underlying premise of how we are proceeding on this.

MEMBER SIEBER: So you don't anticipate another ASLB hearing or anything like that?

MR. SHERON: Oh, heavens, I hope not. Well, obviously your rulemaking, any rulemaking I think can be subject to --

MEMBER SIEBER: To a hearing, right.

MR. SHERON: Right. And I certainly don't have any control over that.

MEMBER SIEBER: Okay. But the technical basis and foundation for the changes that are proposed for the rule would likely hold up under hearing conditions.

MR. SHERON: We would hope they would, yes.

MEMBER SIEBER: Yes.

MR. SHERON: Could I have the next slide, please?

VICE-CHAIRMAN WALLIS: Presumably this is being done with the expectation that licensees will make use of this new space they have got.

MR. SHERON: Yes. And I think once we publish the concept and have our public meeting, we will probably get a better feel for whether the industry feels this is something that would be of benefit to them or not.

VICE-CHAIRMAN WALLIS: It seems to have turned around a bit because when we heard about this several years ago, it was the industry that was going to justify why it should be done. Now you seem to be doing it yourselves. And then they are going to come along and see if they want to use it.

MR. SHERON: The best I can say is that

the industry hasn't come forth with any justification --

VICE-CHAIRMAN WALLIS: I am surprised because they promised us all kinds of --

MR. SHERON: -- to support this. And I think as part of the Commission's initiative to risk-inform part 50, this is why we are taking it on.

Anyway, the rule concept I think I discussed will divide the break spectrum into two regions delineated by break size, which we call this transition break size right now. As I said, breaks in the smaller break region between basically zero and this transition break would still meet all of the current 50.46 criteria.

And then the criterion analysis assumptions in this region II area, which is the breaks larger than the transition break up to the double-ended guillotine, would be relaxed, but they still have to demonstrate mitigation capability up to the double-ended guillotine. Okay?

This is consistent because if you think about it, long-term cooling is part of that demonstration. Okay? So it says that, for example, the sumps still have to perform up through the double-ended guillotine. But they can use a relaxed methodology, you might say. In other words, they can assume more equipment is available. They don't have to assume single failures, et cetera.

MEMBER SIEBER: But even with region I breaks, you can still use best estimate codes and assumptions.

MR. SHERON: Consistent with 50.46, the way 50.46 is, you can use them.

MEMBER SIEBER: The way it is today?

MR. SHERON: The way it is today, yes.

MEMBER SIEBER: Okay. Well, the way it is today, you can't use a best estimate code, right, unless you approve it?

MEMBER SHACK: Best estimate and 95 percent.

MEMBER SIEBER: Yes. Okay.

MR. SHERON: Well, I don't think anybody has a best estimate small break code right now for that region.

MEMBER SIEBER: Right.

MR. SHERON: Okay?

MEMBER SIEBER: Okay.

VICE-CHAIRMAN WALLIS: Will this mitigation capability be spelled out in the rule or will there be reg guides that define what is meant and what is an acceptable approach and all that sort of thing?

MR. SHERON: We're still debating that internally, but I think the thought right now is that if we kept the criteria as general -- in other words, I said it is coolable geometry.

VICE-CHAIRMAN WALLIS: But still as vague as possible.

MR. SHERON: Well, we would say coolable geometry. And then we would define what would be acceptable in a reg guide, for example. What we don't want to do is preclude, for example, the industry to have the opportunity to provide something different if they wanted to that maybe gave them more margin and still demonstrated that they had coolable geometry.

VICE-CHAIRMAN WALLIS: Then you are putting a lot of burden on the reg guide to do a really good job of defining what you mean.

MR. SHERON: Yes. But right now I think that is pretty straightforward. The only thing the staff would accept would be 2,217 percent. Okay? But we don't want to preclude the industry --

VICE-CHAIRMAN WALLIS: You don't want the new fuel, for example. I mean, that's --

MR. SHERON: Well, yes. For the new fuel

for the small breaks, I don't want to get into like the peak cladding or something because there are differences in terms of oxidation.

MEMBER SIEBER: But there's plenty of margin built into the final acceptance criteria for peak clad temperature and oxidation. As I remember from the hearings, there is 100 or 200 degrees or something like that.

MR. SHERON: Yes. I know. Norm, help me. What was the margin on the --

MEMBER SIEBER: I think it was 100 degrees.

PARTICIPANT: I mean, certainly the criteria was set.

VICE-CHAIRMAN WALLIS: It's a good thing Norm is still around.

PARTICIPANT: Not for long, I'm afraid.

MEMBER SIEBER: I'm here.

PARTICIPANT: Actually, I don't want to say how much margin there is or is not because it's very plant-dependent. It's very design-dependent and so forth. But if you were to look at a typical PWR, it's also going to be very model-dependent. It's going to depend on what model you choose for metal water reaction and that sort of thing.

So right now you could arguably say that there may be 200 degrees difference between what the margin would be if you used a best estimate metal water reaction versus whether you used a big adjustment water reaction.

But I think the question is more how much -- so it looks like you have more margin if you use a better estimate model.

MEMBER SIEBER: Yes.

PARTICIPANT: So I wouldn't want to say. We have done some sensitivity studies that show that if you change the power by even less than ten percent, if you have a conservative model, you may not have very much margin at all between the embrittlement criteria of 2,217 percent and where you can't control the reaction anymore.

So I don't think you can say precisely where it is, but it may only mean that you have a slight, a very slight, margin, say maybe just a couple of percent in power or even less, depending on the models that you may use and the plant that you are analyzing for.

I don't know if that helps much or not, but it's very dependent on a number of things.

MEMBER SIEBER: Thank you.

MR. SHERON: Next slide, please. I think I've discussed some of this stuff already. We're going to select the break size. And I think I said we have already tentatively picked some numbers that we would propose.

VICE-CHAIRMAN WALLIS: Isn't there a 10^{-5}, which is appearing in --

MR. SHERON: The Commission said that that could -- I think they used that as an example.

VICE-CHAIRMAN WALLIS: I thought it was actually stated as being the case.

PARTICIPANT: "For example."

VICE-CHAIRMAN WALLIS: Oh, it says "For example"?

MR. SHERON: "For example." Okay.

VICE-CHAIRMAN WALLIS: I'm looking at the latest --

MR. SHERON: Yes. And I think we have actually used the 10^{-5} as a starting point and then, again, as I said, we accounted for uncertainties in margin and also practical considerations in terms of plant design to come up with a proposed break size.

VICE-CHAIRMAN WALLIS: Yes. It says, "For example," but then it says, "Frequency of 1 in 100,000 is an appropriate mean value." So that's not saying it's just for example. I mean, it is saying it is.

MR. SHERON: Yes. But they also said that we can pick the break size I think consistent -- what did it say here? -- with --

VICE-CHAIRMAN WALLIS: I mean, it's sort of an example of something already that is being decided. For example, here is what it is. It's not --

MR. SHERON: Selection of maximum break size should use reg guide 1.174 approach. Okay? So, again, it says, you know, if you want to pick a frequency associated with a break size, then what the SRM is saying is 10^{-5} is appropriate. But 1.174 says when you risk-inform a decision, you take into consideration a number of other factors: uncertainties, margin, et cetera. And so we will be doing that.

So it doesn't mean that you just go to the curb and go to 10^{-5} and then go up and see what break size that is. You then have to take an adjustment. You say, "Is that risk-based or is that frequency-based versus risk-informed?"

Anyway, as I said, we haven't cast anything in concrete right now. We've got some preliminary thoughts on it. And I said we will be down with the committee I'm sure discussing this at length.

Changes to proposed plan operations or design as a result of the rule must be reviewed by the staff. We don't expect --

VICE-CHAIRMAN WALLIS: That's a surprising new statement. That would be true of anything that changes to proposed plan operations or design. Well, maybe not.

MR. SHERON: No. I mean, for example, licensees right now I think could change. They could use different fuel in their design as long as it still is bounded by the current ECCS analysis without coming in, in other words.

MEMBER SIEBER: 50.59.

MR. SHERON: Yes, 50.59. And we're saying 50.59 doesn't apply here if you are going to make a change. We want to make sure this is the -- this is basically the concern. Let me call it the tentacles about unintended consequences. We want to make sure that licensees don't use any margin here inappropriately and inadvertently or whatever and increase --

VICE-CHAIRMAN WALLIS: What would be your standard review plan that will guide the staff?

MR. SHERON: I imagine we will eventually develop one for that. I mean, right now we would look at these as just any of the license amendments. And they would be reviewed under that basis.

MEMBER SIEBER: The key phrase there is "as a result of rule" --

MR. SHERON: Yes.

MEMBER SIEBER: -- because they are allowed to make changes if they meet the former acceptance criteria.

MR. SHERON: Correct.

MEMBER SIEBER: Okay? It's only when they use the new margin they get from applying this rule.

MR. SHERON: Right. And we want to make sure, for example, some licensees doesn't apply the rule and decide they can take both low-pressure pumps out of the plant for some reason or maybe they want to change their tech spec on a low-pressure pump and take it out of service for three months or something. We're not sure that's a smart thing to do.

MEMBER SIEBER: Right. I'm certainly not precluding that we might want to revise this down the road once we get some experience and familiarity with the implementation of the rule.

Submittals must be risk-informed. We

think if we are going to risk-inform our regulations, then PRAs and risk play an integral part, a much more integral part of our decision-making. So we would expect the licensee to submit a PRA analysis, demonstrating that whatever changes they are proposing to the plant as a result of using the rule, that the change in core melt frequency in LRF would be consistent with the criteria in 1.174.

We also think that the PRAs need to meet the appropriate PRA quality and scope requirements. And that will be, again, we could discuss that, probably at a different meeting, but consistent with the PRA quality plan and so forth.

MEMBER SIEBER: What the licensees currently submit to the staff is a reloaded safety evaluation, which is basically a letter that says, "We ran our appendix K model, and everything looks okay."

MR. SHERON: Right.

MEMBER SIEBER: And it will then say, "Here are some tech spec changes we may need and here are the peaking factors."

MR. SHERON: Right.

MEMBER SIEBER: Okay? A new submittal under the revised rule is going to have to have a lot more information for the --

MR. SHERON: If they're using this risk-informed 50.46.

MEMBER SIEBER: That's right. That's right.

MR. SHERON: If they're staying under the old 50.46, --

MEMBER SIEBER: It's still a letter.

MR. SHERON: -- then it's still a letter. Right.

MEMBER SIEBER: Okay. The new submittal would be a big document. It would be a report that described how the best estimate model was applied and what the assumptions were --

MR. SHERON: Well, I would assume --

MEMBER SIEBER: -- and what the risk information basis is.

MR. SHERON: We're certainly not trying to make this such an onerous rule that nobody wants to use it. In other words, if a delta risk is small, if this is just like, for example, a power uprate --

MEMBER SIEBER: Right.

MR. SHERON: You know, when we first started doing the measurement on certainly recapture uprates, the staff was taking like a year. We were just chewing up resources. And I looked at it. And

I said, "Wait a minute. 1.6 percent?" I said, "That doesn't even register on a risk scale." Okay?

MEMBER SIEBER: Tune in tomorrow morning.

MR. SHERON: And so we --

MEMBER SIEBER: We are going to be talking about that.

MR. SHERON: Well, I know on the --

MEMBER SIEBER: Right.

MR. SHERON: What I am saying is when we first looked at the measurement uncertainty uprates, the risk increase associated with a recapture, 1.6 percent, was negligible. And the question was, why was the staff spending so much time doing these reviews?

MEMBER SIEBER: Right.

MR. SHERON: So we streamlined that process. And now we can crank those out. And I think the goal is six months for those.

Again, I would expect that if a licensee would come and their changes were small and not very significant or controversial in what they were proposing -- I'm not expecting reams and reams of paper. Okay?

MEMBER SIEBER: On the other hand, one submittal that describes the code would have to be made to get the code approved, --

MR. SHERON: Yes.

MEMBER SIEBER: -- which would be separate from the reload safety evaluation.

MR. SHERON: Yes, yes, normally just the way we do code analyses.

MEMBER SIEBER: Right. Thank you.

VICE-CHAIRMAN WALLIS: While we are on this slide update, 1.174, this is all plant-specific at the bottom here. But the first bullet is generic, isn't it? The break size delineation is determined in some generic way, although, in fact, it does depend upon the sale of the plant. For a very old plant, it might well be that the likelihood of a break is bigger. It's not plant-specific, this break size delineation?

MR. SHERON: Well, right now what our analyses and our proposal is that we don't believe we need to identify plant-specific break sizes.

VICE-CHAIRMAN WALLIS: So there's nothing there about the age of the plant or the --

MR. SHERON: Well, we put --

VICE-CHAIRMAN WALLIS: -- particular temperatures or particular heat of the metal or surveyor material, metallurgical thing which is different between plants?

MR. SHERON: No because I think, first off, we're not smart enough to know what the relative susceptibilities are for plants based on different heats of material and so forth. Secondly, I think the way we're defining this new transition break size probably accounts for all of those variations.

VICE-CHAIRMAN WALLIS: So it's on the upper bound of something?

MR. SHERON: Okay.

MEMBER SIEBER: On the other hand, there is a difference in the transition break size between PWRs and BWRs.

MR. SHERON: Yes, there is.

MEMBER SIEBER: So that is the only exception that I am aware of.

MR. SHERON: Yes. I mean, right now, I mean, I'll just tell you right now. Right now for PWRs, we are thinking about 14 inches --

MEMBER SIEBER: Right.

MR. SHERON: -- and for BWRs 20 inches.

MEMBER SIEBER: Right.

MR. SHERON: Okay? Keeping in mind BWRs are not LOCA-limited. So this may not be a big impact on --

MEMBER SIEBER: Yes. And they're lower pressure, too. So you can tolerate a bigger break.

MR. SHERON: But, again, the staff will come down. And they will tell you ad nauseam about how they derived those break sizes.

MEMBER SIEBER: They have. They have already.

MR. SHERON: Okay. Good. Next slide. Again, we talked about this. I'm not going to dwell on it. Just the future estimates of the LOCA frequencies, validate the basis for plant changes. We may require plants to take compensatory actions, which means put equipment back in or whatever, change tech specs, whatever, without a formal backfit process.

And the other thing is that originally, I think the Commission was talking about having this LOCA frequency updated every ten years. I think that's not in there.

And the staff endorses that because why wait ten years? I mean, if there is new data that comes in two years later, you're not going to wait ten years or eight years later before you deal with it. You should deal with it when it comes in.

So the idea is that presumably we are going to monitor data. The Office of Research, NRR is going to monitor pipe break frequency data. And if we see anything that leads us to say we need to update this study, we will go ahead and do it. And if the answer comes out that we have to change something, then we will do it at that time. We're not going to wait ten years.

Use of the rule is voluntary, as I said. So this is really up to the industry.

VICE-CHAIRMAN WALLIS: They're not likely to change the design of the ECCS. They're not likely to take out a pump or do away with an accumulator or something.

MEMBER SIEBER: But they could.

VICE-CHAIRMAN WALLIS: But they could go to a power uprate. And you might say, "Oh, no. We have learned something. You have got to go back down in power." That would be the kind of backfit?

MR. SHERON: Possibly.

VICE-CHAIRMAN WALLIS: It probably wouldn't be a hardware backfit of an ECCS.

MEMBER SIEBER: They could.

MR. SHERON: One thing we have speculated -- we don't know if it's true or not. I mean, I have done analysis, but you could argue a plant does a power uprate. And it turns out that to mitigate the large break LOCA they now need both low-pressure pumps. They can't get by with one the way they had to. Okay?

Well, if they had an allotted outage time that takes one pump out of service, you know, in theory, you're saying, "I have an event that could be not mitigated by the design." Okay?

So we need to make sure of that, again, if things change, for example, maybe we may not let them take certain equipment out of service for the length of time that they're proposing maybe. Okay?

Next slide, please. This is us today meeting with full committee, with you all. And, as I said, I just want to provide a high level in terms of the concept and the schedule we are working on. We're proposing that we have staff meetings with the subcommittees as necessary in July and September to work through the details of a lot of these different issues.

And then depending upon I guess the subcommittees, the outcome of those, and your desires, we're willing to meet with you as necessary throughout the fall because we would like a letter from you ultimately to the Commission that hopefully would endorse the approach that we would take.

MEMBER SIEBER: You don't want that until the fall? You don't need a letter now?

MR. SHERON: Right.

MEMBER SIEBER: Okay.

MR. SHERON: If you want to write one that says we're doing great, that is always helpful, but --

MEMBER SIEBER: Well, we might write a different one.

MR. SHERON: Then we don't want a letter.

Next slide, please. This just kind of reiterates the letter you wrote, I think, the Commission. All I can remember is the Commission, the EDO. You know, you said you support a wide range of applications if they are criterion 1.174-satisfied. "Recommend explicit criteria for mitigative capability up to the double-ended guillotine." And I think we are going to try and do that.

"Recommend explicit criterion for late containment failure be included." Let me chat a little bit about that. That is basically late containment failure criteria.

We discussed that. And I think the concern is -- there are two concerns. One is timing. Okay? In other words, if we're going to get a rule out of here in six months -- you know, this is sort of breaking some new ground here and the like. And we're afraid that if we were to go off and develop a late containment failure criteria and try and promulgate it through the process, it would delay the whole approach here.

Number two is that it's probably not unique to 50.46, okay. It's just like LRF and 1.174 is applicable to the whole range of risk-informed submittals or applications that we deal with. We think that a late containment failure criteria would be better served if it were basically vetted through 1.174 revision. I think we're willing to consider taking that on maybe on a longer schedule, but we would think that it would be more applicable across the board, rather than to one particular rule. So that would be our proposal, is that we take that on under 1.174, maybe on a different schedule than what we're on with 50.46. But we recognize it's a legitimate concern, and there is some merit to it.

The other reason, too, is I want to point out is that, for example, security concerns. You know, one of the recommendations we had originally from NSIR was we should have explicit language in this rule about making sure that any changes they make don't adversely affect security. And we said, wait a minute. That's kind of generic to any licensing change that would come in, okay. It's not just unique to 50.46, so why stick all these different little requirements in these individual rules. Shouldn't we deal with that on a more generic basis? And so what we decided is we actually have set up a Steering Committee. Susie Black is the chair of it. I keep forgetting the name of it, but basically it's like a safety-security interface committee. And what their job is, is to look at licensing actions, licensing issues that may have security implications, and decide whether or not they deserve a full-blown security review. And so the plan right now is that the question of having a generic requirement on the books for licensees to be required to consider security matters when they make design changes, and vice versa is being taken up by Susie's committee in terms of where is the right place to put that in the regulations and make it across the board.

One of the things we're doing right now, for example, on just license amendments, non-50.46, is that the plan is to develop screening criteria. Any time a license amendment comes in, the Project Manager will basically screen that license amendment against these criteria, these screening criteria, to see if it trips any of those. And if it does, then there's a concern that the license amendment could affect security.

For example, manual actions - someone comes in and wants to substitute manual actions. Well, from a security standpoint, maybe that's not the right thing to do. So the point is, is if the Project Manager does the screening and it trips the criteria, then the Project Manager would forward that license amendment to Susie's committee, which is made of NSIR and NRR folks and stuff.

They would look at it in more detail, and they would make a determination whether NSIR, for example, needed to do a full-blown security review on it, and we would factor that in. So our proposal is that, for example, any security implication here be dealt with on the generic basis, and Susie's committee is going to handle that. And we would propose that for late containment failure criteria, that we deal with that more as a revision to 1.174 generically across the board.

MEMBER SIEBER: Well, late containment failure because of emergency planning is really not a health and safety issue, as much as it is a land containment issue, so I think it fairly lays outside of the primary responsibilities of the Commissioners right now.

MR. SHERON: And like I said, we're not adverse to taking it on. I think just on the time scale we would like to put that on a separate one.

MEMBER POWERS: Yes, I agree with that.

VICE CHAIRMAN WALLIS: While you're on security, your predictions for the frequency of a double-ending guillotine break of the biggest pipe in the plant is so low, about the only way to make it happen, you're going to have the largest breakdown in security.

MR. SHERON: Yes, somebody --

VICE CHAIRMAN WALLIS: That seems to be more important than this negligible frequency in a normal operation.

MR. SHERON: Yes. Except no one knows how to put a frequency on that.

VICE CHAIRMAN WALLIS: But it would seem that when everything else becomes absolutely minuscule, that's what you've got left.

MR. SHERON:: Right. The committee also recommended a metric for max break size should be LOCA initiating event frequency. And I think, as I said, we agree that that's something -- that should basically be a starting point, but we have reasons that we need to add some margin on that for other reasons; mainly because the event frequency, and you'll hear more about it I think this afternoon, but that didn't consider certain initiating events like heavy low drops and seismic and the like, so we put some margin in there, and we'll talk about that later.

Let's see. Next slide, please. I'm almost done. Additional criteria for guidance beyond Reg Guide 1.14 for tracking cumulative risk are not needed. We would agree with that. We believe that any time a plant comes in for a license amendment change, they'll have to give us initially their baseline risk. And if they've made changes previously, that will show up in that new baseline risk. So what we're looking at is, again 1.174, if you remember, sort of like the closer you get to 10 to the minus 4, the less and less you can do.

VICE CHAIRMAN WALLIS: Because we said should help provide, is there any other basis?

MR. SHERON: I'm sorry. You're on the second bullet?

VICE CHAIRMAN WALLIS: Yes.

MR. SHERON:: Oh, I'm sorry.

VICE CHAIRMAN WALLIS: Yes, the first one

I guess --

MR. SHERON: Okay.

MEMBER POWERS: Well, can I ask a question about the first bullet?

VICE CHAIRMAN WALLIS: Yes, go ahead.

MEMBER POWERS: Well, 1.174 asks for the risk of everything save sabotage accidents.

MR. SHERON: Well, it says when you make a risk-informed decision, here are the five factors that you need to consider, which go beyond just probability or frequency.

MEMBER POWERS: But just what it asks about risk, it asks you for the risk of shutdown, and the risk of seismic. Nobody ever provides that. We're really not interested in that for this study. Are you really interested in just the risk during power operations?

MR. SHERON:: Yes. But, I mean, again consistent with the PRA quality plan and so forth, which I think, ultimately, is supposed to get us to the risk of plants in other modes besides just power operation.

MEMBER POWERS: Yeah, but I mean why would you care?

MR. SHERON: Well, yeah. If it really

doesn't matter to the answer, then you're right. We wouldn't ask for it.

MEMBER POWERS: I mean, shutdown risk is -- I mean, you don't have double-ended guillotine pipe breaks during shutdown accidents, I presume.

MR. SHERON: Well, yeah, but they may more likely to occur because there's more people running around in the plant.

VICE CHAIRMAN WALLIS: There may be no pressure.

MEMBER POWERS: No pressure is what I would think would be --

MR. SHERON: But it may be more susceptible to sabotage. I don't know.

MEMBER POWERS: Yes, but there's no measure of that in Reg Guide 1.174.

MR. SHERON: Right. Last slide, please. I think we've talked about this. The next steps would be to finalize the conceptual basis for the rule, try to get a "Federal Register" notice out hopefully in a couple of weeks, which we'll discuss the rule framework and the conceptual basis for the rule. I think we have an ACR Subcommittee scheduled for July 23rd, and we have a public meeting scheduled -- well, I think that's going to slip to July 26th, because by the time we get the "Federal Register" notice out, I don't think it's going to leave enough time for people to really digest the framework itself. So we would probably reschedule that into August, but we will have a public meeting to gather input for the reg analysis. And I think once we get feedback from the Subcommittee meetings and so forth, and then we get I think a draft rule together, we'd probably be ready to come down to the full committee and make another presentation.

MEMBER SHACK: When is your "Register" notice going to go out?

MR. SHERON: Do we know? Do we have a schedule yet, Vic, for the "Federal Register" notice? Yes. Originally, we were talking like July 2nd or something, and we've -- do we have a new schedule?

PARTICIPANT: No, we don't.

MR. SHERON: Okay. Basically, what happened is we have a draft "Federal Register" notice. We have a draft package to go out with that on a conceptual basis for the rule and stuff, but we got the SOM, and we did have to make some changes to that package, both packages to make sure it was consistent with the SRM. And we had a meeting just yesterday with the staff, and the agreement was, is that the staff is going to revise their input to that package and get them to Dick Dudley by tomorrow. He's going to package it up, get it out to the staff on Friday, everybody gets the fun job over the weekend to look at it.

Next Tuesday, the Steering Committee is going to meet and go through that package. And I'm guessing if we're satisfied at that point, then hopefully it will be ready to move and go out.

Anyway, that pretty much completes my presentation, so if there's any other questions, I'll be glad to take them. Otherwise, I'll let you get on to your next presentation.

VICE CHAIRMAN WALLIS: I have a question. Which ACRS Subcommittee is this?

MEMBER SIEBER: Policies and procedures.

VICE CHAIRMAN WALLIS: Policy and procedure, because it impacts a lot of other subcommittees.

MEMBER SHACK: We've generally held these --

VICE CHAIRMAN WALLIS: Right. Thermal hydraulics, and materials.

MEMBER SHACK: PRA.

VICE CHAIRMAN WALLIS: Right. PRA impacts many subcommittees.

MR. SHERON: I would ask the Committee, I mean, if you would tell us what subcommittees want to discuss what aspects --

MEMBER SHACK: It will clearly be I think probably joint meetings.

MEMBER POWERS: The Pearson Committee doesn't think it needs to review this.

MR. SHERON: Okay.

CHAIRMAN BONACA: You said the meeting of July 23rd will be moved to August?

MR. SHERON: No, no. The July 26th public meeting will probably slip into August, because we've had a delay in getting the "Federal Register" notice out.

VICE CHAIRMAN WALLIS: Has anybody got a calendar or something and let us go on. We'll have to look at it internally about who goes to these meetings.

MEMBER SHACK: Well, I'm not even sure you're going to be ready to support a subcommittee meeting on the 23rd.

MR. SHERON: I'd have to ask the staff if they're going to be, because they're --

VICE CHAIRMAN WALLIS: Do we have the staff already?

MR. SNODDERLY: It's tentatively scheduled for right now.

VICE CHAIRMAN WALLIS: Is it on our schedule?

MR. SNODDERLY: Yes. We can talk about it at the PNP and work it out.

MEMBER SHACK: You're saying it's not on the schedule?

MR. SNODDERLY: It is. I was wondering, because it appears that the -- not it appears - the Commission also did not support the Committee's recommendation for late containment failure criteria at this time, but it did give the staff the flexibility to -- or the staff should include a requirement for containment integrity. Could you give the committee some, I guess, inkling as to what -- do you have any thoughts on that at this time, or do you want to put it off until later?

MR. SHERON: Well, I think the thought was that first of all, 50.46 doesn't address containment. And the plan was, as I said, that any changes that a licensee proposes to make to their plant, for example, containment leak rate or anything, would have to come to the staff for review and approval.

MR. SNODDERLY: So it would be more of a

status quo at this time as far as containment requirements, and it would be possibly looked at in the future as part of a revision to Reg Guide 1.174.

MR. SHERON: Yes. In other words, if a licensee came in and requested to change containment leak requirement or some other aspect of containment, we would look at it. I think if it dealt with a major policy-type concern, we'd probably vet it through the Commission and the like, maybe with the committee before we approved it or anything. But again, we would have to look at it from a risk-informed approach; in other words, were we violating, for example, defense-in-depth.

MEMBER SHACK: Wouldn't LOCA challenge the design pressure for the containment though, so they'd actually get a break if they got rid of the LOCA, I mean on a design basis.

MR. SHERON: Yes, but --

MEMBER POWERS: LOCAs don't change.

MR. SHERON: A steam line break is still going to be an event which challenges both equipment, as well as the containment. I mean, obviously one concern is that if you change -- if the LOCA is not as severe, the environment in the containment is going to be less severe, and there may be proposals to change environmental qualification to certain components. And again, that's something we're going to have to look at. You know, the thought is maybe in that -- beyond the transition break region, that the treatment of equipment in the containment might be consistent with, for example, say 50.69.

MEMBER ROSEN: I'm looking at our schedule, and I don't see it, the July 23rd meeting.

MEMBER SIEBER: It's a secret.

MR. SNODDERLY: Let's reassess it and PNP and decide.

MR. SHERON: We'll have to take an action to decide when we're going to be ready to come down and make presentations to the subcommittee. I mean, we're going to have each one of these topics, I think, probably have to go through at least some sort of a review, PRA quality, break size, et cetera. How you would like to do that, whether you want to do it with a combined committee/subcommittees, we'd like to know that, and then we can give you a better feel for when we'd be ready to come down and make those presentations. And then we can work with Mike and schedule our --

VICE CHAIRMAN WALLIS: July 23rd isn't very far away, and it's going to involve a lot of --

a high proportion of this committee to sort it out pretty quickly. I don't want you guys to say we're not ready.

MR. SHERON: I agree.

MEMBER POWERS: Brian, at the recent American Nuclear Society meeting I was tapped on the shoulders four times by people nominally associated with the industry, expressing concern about the SRM, saying they wanted to chat with me. And I successfully ducked them, so I didn't chat with them. But it clearly is a concern within the nuclear community about change, irrespective of what the change is. There's always changes. Do you understand what the concern is, and what you have planned to socialize this beyond just ordinary public meetings?

MR. SHERON: Well, all of our meetings are public where we discuss this. I mean, if we think that there's a need for further meetings with the industry, say after the public meeting and the like, we can certainly schedule those.

MEMBER POWERS: Well, I was thinking -- I mean, double-ended guillotine pipe break is so ingrained in the mentality of the reactor safety --

MR. SHERON: It's an emotional issue. There's no question about it.

MEMBER POWERS: I mean, is it appropriate to socialize this at meetings like the American Nuclear Society, and maybe no more detail than just what you've presented here sort of thing.

MR. SHERON: Oh, I'm sure that as we develop this, we will be making presentations at various society meetings, as well as other fora to explain it and the like. I mean, I'll be quite honest with you. I know some professors out there right now that have already called me and expressed concern about it. I've been invited up to give seminars on this in the fall in August.

MEMBER POWERS: Yes, that's the level of concern.

MR. SHERON: Yes, there's a lot of people that are very concerned. And hopefully, as I said, the thing that we are banking on primarily here is the fact that at least initially, we don't want licensees making any changes unless the staff sees them and convinces ourselves that we haven't unacceptably increased or changed risk to the plant, or that we've dug into our margin for defense-in-depth purposes.

Yes, defense-in-depth, that's kind of a nebulous area in terms of what is defense-in-depth, what's acceptable, what's not. And we'll just have to work our way through that.

MEMBER SHACK: Well, I mean, virtually any of these changes is going to reduce margin.

MR. SHERON: Right. But I mean, let's face it. You know, the staff does that all the time. Okay.

MEMBER SHACK: You made some comment about avoiding reducing margins. What --

MR. SHERON: No, no, no. I didn't say -- I said reduce them unacceptably. You don't want to reduce them unacceptably, and that's what 1.174 is geared to do.

MEMBER POWERS: Maybe we shouldn't -- and obviously not holding margin as religious. A lot of margin is built in when you're very, very uncertain. As you get more and more knowledgeable, you're willing to relieve margin. And surely, we must know more now than at the time when 50.46 was originally written.

MR. SHERON: I remember one time, an engineer from Westinghouse told me - he said if we had to design ECCS systems to a best estimate model, accumulated pressure would not be 600 pounds. There's stuff like that, so there may be benefits to be gained from this with more realistic analysis being allowed.

VICE CHAIRMAN WALLIS: But learning

something doesn't necessarily mean that you're now able to reduce margin. It may be that what you learned forces you to increase the margin.

MR. SHERON: That's true.

VICE CHAIRMAN WALLIS: You may be more uncertain than you were before. Your estimate of your uncertainty may actually go up as you learn more, as it seems to do in some areas of material science.

MEMBER POWERS: You're not increasing your uncertainty. You're just becoming aware of the magnitude of your uncertainty.

MR. SHERON: Well, I think 191 is a classic example of that. Anyway, we've got a lot of work to do. We appreciate the Committee's help on this, your thoughts and advice. This is a tough subject. You know the number of meetings our Steering Committee's had, and a number of animated - I won't call them arguments - but healthy discussion debating a lot of these issues. It's really kind of eye-opening. This rule is a major impact on the design of the entire plant, and we have to be very careful in terms of what we do, and how we do it.

VICE CHAIRMAN WALLIS: One of my colleagues, Dana Powers, said you ought to be able to explain it clearly to an academic audience or a professionally competent audience at an ANS meeting, and there ought to be a really believable explanation. It goes beyond just sort of the internal NRC debates, and debates with industry.

MR. SHERON: Right.

CHAIRMAN BONACA: We have a second presentation.

VICE CHAIRMAN WALLIS: Do we have another presentation?

MR. ABRAMSON: Good afternoon. I'm Lee Abramson from the Office of Research. I'd like to acknowledge co-authors of this. Actually, Rob Tregoning would have normally given this paper but he's on a well-deserved vacation. And also, part of it will be delivered by Gary Hammer from NRR.

This is the outline of the presentation. We're going to just go over very briefly about the previous presentations we've made to this Committee and the various subcommittees, and we'll talk about the elicitation findings and the sensitivity analyses that we have done and are planning to do. And Mr. Hammer will talk about how NRR intends to use the results in the break size selection. And then we'll briefly go over what still remains to be done, the work schedule, and some concluding remarks.

First I said, we want to communicate the main purposes to talk about what we've done since the previous ACRS discussion which was last April, and to describe the use of the elicitation results. And finally, to discuss the technical working schedule.

You see there's a list of six bullets of various previous ACRS briefings. The most recent one was in March and April, to both a subcommittee and the main committee on our results. And since then, two main milestones since April. We concluded a sensitivity analyses, and we'll be talking to some extent about that. And also, what we have done is we have finished a preliminary NUREG report, and this was just sent last Friday to the elicitation panel members.

This slide is taken from the April report, so I'm just going to go over this very quickly. You see here the graph which just summarizes the results we had at that point. It's the total LOCA frequencies for PWRs. PWRs is the blue, and BWRs is the red. And they're summarized first with the mean values and the 95^{th} percentiles. The mean values are the lower ones, of course. The 95^{th} percentile is larger, so you can see there - this gives you a sense of it.

Now the horizontal axis is the threshold break diameter. And this was translated from the category sizes which the panel used. As the panel decided to break the LOCA sizes into six categories, from one to six. And then what we did -- and everything we did was in reference to that. And those category sizes were defined in terms of fuel rates, if there was a break. And then this was translated into break diameters which is more relevant, obviously, to the upcoming rule. And it's different to some extent for PWRs and BWRs because the category sizes were fixed flow rates applied to BW and PWRs since the pipes are different, and the pressures are different. There is a different translation, and you see this on the graph here.

VICE CHAIRMAN WALLIS: How many experts were there?

MR. ABRAMSON: There were 12 experts all together.

VICE CHAIRMAN WALLIS: So getting a 95^{th} percentile from 12 experts is relative magic?

MR. ABRAMSON: Well, there was a great deal of processing that went on of that. And I'll be glad to review that --

VICE CHAIRMAN WALLIS: Didn't you assume some sort of statistical form or something?

MR. ABRAMSON: We assumed -- that's right. The whole statistical model that was --

VICE CHAIRMAN WALLIS: That's what the ratios are the mean to the --

MR. ABRAMSON: That's correct.

VICE CHAIRMAN WALLIS: They're always the same.

MR. ABRAMSON: There was a great deal of processing of the expert responses, including the statistical models involving normal distributions and so on. I can go over that in a little more detail.

VICE CHAIRMAN WALLIS: You don't need to go into detail.

MR. ABRAMSON: Pardon me?

VICE CHAIRMAN WALLIS: You don't need to go into detail.

MR. ABRAMSON: Okay.

MEMBER FORD: Really just to check, threshold break diameter means there was a rupture of the throughwall crack?

MR. ABRAMSON: The category of LOCAs were defined in terms of flow rate. In other words, there was a pipe break which led to a flow rate or whatever there is - 1,000 gallons a minute, or 5,000 gallons a minute, something like that. And then these were translated -- if you want more detail, I'll have to ask somebody else to do that - into equivalent pipe break sizes, which would match those assumed flow rates. All of the judgments, all the responses by the expert panel were strictly in terms of these flow rates.

MEMBER FORD: Some had a history of going from cracking to flow rates. There's some calibration against the extensive database.

MR. ABRAMSON: Oh, yes. Well, just in a nutshell, we started with existing data, precursors, small pipe breaks, and so on and so forth.

MEMBER FORD: Right.

MR. ABRAMSON: A number of base cases were developed based on these. There were four. And then all of the judgments of the panel were relative to these base cases, which in turn were based on existing data, and model lines, and so on and so forth, so it was all relative. So, in effect, they had this foundation and we built up on the foundation to meeting in large break LOCAs.

MEMBER POWERS: Was the database for pipes in nuclear power plants?

MR. ABRAMSON: Yes, although I'm not sure -- Nilesh.

MR. CHOKSHI: Yes. This was a precursor database, and this was international CSNI, where SKI in Sudan had developed quite a bit of data, and so this was based quite a bit on that.

MEMBER POWERS: Yes, I remember SKI data is industrial pipes.

MR. CHOKSHI: Well, they also have done a lot of precursor type, internal break. But looking at the precursor leaks, that sort of thing, and calibrating to that --

MEMBER POWERS: Well, my real question is, were these pipes in nuclear power plants exclusively, or did they consider pipes in other kinds of situations?

MR. CHOKSHI: As far as I recall, this is mostly nuclear.

VICE CHAIRMAN WALLIS: The trend here is an inverse cubed law or something. Is there any critical evidence from other pipes for which there's a lot more data that this kind of inverse cubed law works, frequency versus time, with 10 to the minus 3 or something? Any kind of --

MR. ABRAMSON: As far as I know, the experts did not -- would not look at the --

VICE CHAIRMAN WALLIS: When you see a

pattern like this, you look for some evidence from some -- where you've got more data to see if it's the kind of thing you expect.

MR. ABRAMSON: I'm not -- I don't know. Maybe someone else can help. Have there been any very large pipe breaks in history enough to get any kind of a data? I don't know.

MEMBER SHACK: But, I mean, your fracture mechanics would predict that kind of a dependence.

VICE CHAIRMAN WALLIS: But I'd like to see the data.

MEMBER SHACK: Well, it's hard to get data when the --

VICE CHAIRMAN WALLIS: Experts in fracture mechanics always ask to see the data.

MR. ABRAMSON: Well, my general understanding of this, and I'm not -- I'm a statistician, is that the reason we went through this long involved, expensive expert elicitation process was that there is no data, relevant data, and no calibrated models. And we used what was available, fracture mechanic models and so on, to develop the base cases, so people used what they knew, what they had available. But in effect, they're extrapolating well beyond existing data because there isn't any.

VICE CHAIRMAN WALLIS: Well, you could do it for say domestic water supply. You have mains, and you have pipes coming into houses, and you have little pipes that go to the -- there are other situations where you have pipes with a range of size that goes over 20 to 1 or something.

MEMBER ROSEN: Not at 1,000 psi.

VICE CHAIRMAN WALLIS: I see. Okay. It would be reassuring --

MEMBER ROSEN: If we the data, the kind of data you want, we wouldn't be doing this.

VICE CHAIRMAN WALLIS: No, he would be doing this too, but you'd have some collaborative information.

MR. ABRAMSON: Is that the questions that were asked of the panel were extremely situation-specific. They dealt very explicitly with the degradation mechanisms, the materials, the geometry, and so on and so on, as they affected nuclear plants. So we tried to make this as specific as -- actually, the experts did, because they were the ones who devised to a great extent the questionnaire.

MEMBER POWERS: What is the empirical history of success of expert elicitations where there is not a great deal of data? I mean, the classic ones or the one comes to mind immediately is the Royal Academy that announced that based on an expert elicitation, that heavier than air flight was impossible, that the announcement of another academy with the completion and closure of the Maxwell Equations, there was no more physics to understand prior to the discovery of quanti-mechanics and relativity. In fact, there's a number of these, but what I'm asking is, why would we think that an expert elicitation in the absence of data would be of any use whatsoever?

MR. ABRAMSON: Well, that's the right question to ask, and the answer is very complex. There is some empirical evidence that ten heads are better than one; that if you give people enough - because there's quite a bit of empirical evidence for that, that if you give people questions, called them overnight-type questions, would you know the answer? But they don't. And you ask them to make a guess and to give their uncertainty values, and actually use this for the training purposes. That if you take the group opinion that it's definitely better, it encompasses reasonably well what the true answer is. So there is some kind of group wisdom that can be tapped by this. So that's the basis for say using an expert elicitation in the first place, but I think much more important is how -- you have to look at how this particular elicitation was structured, and the kinds of expertise we brought, and how the issues were decomposed and so on, to be able to make some judgment about whether this is useful or not.

We've gone over this in previous meetings, and of course, we'll continue to do this. We are intending to do, and I'm going to refer to it later, a peer review, an external review of part of this; namely, the whole processing information as to how we took the responses from the experts and processed them to come up with the answers we did.

MEMBER POWERS: When you say you're going to do a peer review, a peer review with whom?

MR. ABRAMSON: What we do is we're in the process now of setting up a panel of two or three people, one or two statisticians, and a decision analyst. And these are people who are generally familiar with how you deal with information of this sort, and how you might be able to process it to come up with some kind of a reasonable group response. In other words, by the processing I mean we took these -- literally I think it was sometimes hundreds of responses we got from each expert, and combined the panel and combined it with the experts in order to come up with the number that you see here, with the graph that you see over here.

MEMBER POWERS: My recollection is when they had to justify the Alaska pipeline, that they set up an expert panel to answer the question, the probability of a line break because of some concern about the mating habits of Reindeer that I don't pretend to understand or care to understand to be honest with you. But maybe whatever they did to peer review their prognostications and the probability of failure would be an appropriate thing to do. Considered at all?

MR. ABRAMSON: Well, as I said, is there are two aspects of this which certainly would be very useful to do an outside peer review. One I've already mentioned, that is the processing. And the second is the whole elicitation process itself - how we -- I should say that, as you know, the NRC has used this in a number of instances before, pressurized thermal shock perhaps is one of the more recent ones. They also used an 1150, another application uses this whole idea of expert elicitation, so that this methodology has been around and used in various forms for 15 or 20 years. So our plan to review, so we're setting this up already.

Another aspect, which we aren't planning immediately but we intend to do in the future, is to have a review of the expert elicitation process itself, how we set it up, how we set up the panel, how they decomposed the issues, and so on and so forth.

MEMBER FORD: In previous subcommittee meetings we have asked the question, the makeup of the panel, to assure ourselves that on the panel there's enough physics, understanding the physics and mechanics of the degradation - and you want to -- I very much hope that when you do your peer evaluation of this exercise, that there are similar experts, not just statisticians.

MR. ABRAMSON: Yes. Well, in the second -- for the one that we are planning, the reason that we're -- as I said, we have a small panel. The reason it's so small, we're doing this very, very quickly because we want the results to be available to be able to support the schedule we talked about before. We expect this to be done - right now if we can get all the contractual arrangements in place very quickly, by the end of August we'll have the final report of the panel, so we're only able to use a small panel.

As far as the composition of this panel is concerned, is there will be one or two statisticians. The reason for that is because what we're reviewing is essentially the statistical approach. We have this information, we have the responses of the panel, and they were combined using probabalistic statistical models. But that's the most appropriate kind of people to look at it.

We do also have a decision analyst because a lot of the expert elicitation methodology was developed to a large extent by people with background in decision analysis and psychology, so we have somebody like that, as well.

When we do the review of the -- we're kind of planning to do a review at some point in the future. The process itself will have other people. It won't be statisticians primarily.

MR. CHOKSHI: Dr. Ford, I think as Lee goes through the presentation, you will see the influence on the research or the processing, that is significant on how we process the data. So that, I think, is which meeting is the next, the review needs to be first. And as we have selected 12 experts, so at least our thinking is that we'll cover a broad spectrum of expertise, as well as the difference of opinion or the views which are -- the report part I think is much more solid because we have a large group of -- the processing part I think because it has influence on the final users. And you will see this.

MR. ABRAMSON: Thank you. I think the point is well taken, that the structure is based on things that have been done before, both by NRC and elsewhere, so we feel pretty comfortable about the general structure, how we went about it. More, I don't know if "controversial" is the right word, but perhaps questionable, people can question it, is the processing itself. And that's why we're having that particular review.

MEMBER KRESS: Do these frequencies depend at all on the quantity of that piping size that's in a reactor?

MR. ABRAMSON: Do they depend on what?

MEMBER KRESS: The quantity of the piping size that's in a given reactor.

MR. ABRAMSON: I'm sorry, what size?

MEMBER KRESS: Frequency versus size, pick any size. Does the frequency depend on the amount of that particular piping size --

MR. ABRAMSON: Oh, the number of pipes.

MEMBER KRESS: The number of pipes. The length.

MR. ABRAMSON: Oh, the length?

MEMBER KRESS: Or number, however dimension. Number of welds or something.

MR. ABRAMSON: Oh, yes, very definitely.

MEMBER KRESS: So that was factored into --

MR. ABRAMSON: Oh, yes. And I can tell you in general, I mean, it depends on -- we were extremely specific, tried to be as specific as possible in forming the questions so the experts knew exactly what they were comparing with what. And they went into the composition of the pipe, and the material, degradation mechanisms, and so on.

MR. CHOKSHI: The short answer is it was a system-by-system look.

MEMBER KRESS: Okay.

MR. ABRAMSON: That's right. We tried, in effect, it was broken down into the smallest components which they could reasonably make some kind of judgments about. So you have the system, sub-systems, and then gradually it would be -- and then the frequencies were built up from that just by addition, in effect. They were combined that way. That's right.

MEMBER RANSOM: Are these frequencies for a single plant?

MR. ABRAMSON: This is more kind of a generic BWR or PWR.

MEMBER RANSOM: So like in the U.S., you'd multiply this by 100 roughly, or however many PWRs and BWRs you have.

MR. ABRAMSON: If you wanted the total frequency, yes, for this - that's what you would do. That's right, because this is per -- actually, it's per reactor year is the -- per year rather is the unit, is the frequency. It's frequency per year for an operating plant under these generic conditions.

MR. CHOKSHI: And I think going back to an earlier question about the plant-specific differences, those are reflected in the uncertainty bounds. Experts were asked to think about this as a general way to look at BWR, for example. What other configurations and things might affect, so the idea was to capture this uncertainty bound variations.

VICE CHAIRMAN WALLIS: Well, I have another -- Brian Sheron was talking about the biggest pipe, so really what you care about is the right-hand end here.

MR. ABRAMSON: Correct.

VICE CHAIRMAN WALLIS: And those are the

points which are least consistent with the trends of the other points. You extrapolate the red points up to 20 inches, you go beyond, you get a factor about two or three different from the last two points. So the all about the last two points, which are the ones you're interested in.

MR. ABRAMSON: You should not -- I would not recommend at all any kind of extrapolation --

VICE CHAIRMAN WALLIS: But you see what I'm getting at. The only ones you really care about are the ones on the right hand end, and they're the ones which are least consistent with the trend. So you have to be a little bit more careful about --

MR. ABRAMSON: Well, I don't think the trend here is very --

VICE CHAIRMAN WALLIS: It doesn't mean anything.

MR. ABRAMSON: I don't think it means anything in the sense that this is not a mathematical trend or anything of this sort. This is just what the experts came up with.

I should also say what we've done, of course, is we've connected the points, as you can see, with straight lines. This is, of course, a long plot. Connecting the straight lines, but that was just for ease of being able to follow the curves. We make no claim whatsoever about the meaning of the lines between these points.

VICE CHAIRMAN WALLIS: But your academic student --

MR. ABRAMSON: No, we make no claim --

VICE CHAIRMAN WALLIS: Something odd about those last two points.

MEMBER ROSEN: Well, I think there's something odder about the ones on the left. I mean, really - look at the very top point. Eighty years I guess that may be, you're going to have a break that's tiny, less than half an inch, only once every 80 years. Well, anybody who has been in a power plant knows that's a significant under-estimate. We have many, many more breaks that are tiny, half inch or small, than once every 80 years. My gosh, every plant has had one every year.

MR. ABRAMSON: It's not quite that, because that top point is the 95th percentile. The mean value may be a little bit more relevant.

MEMBER ROSEN: It's even worse.

VICE CHAIRMAN WALLIS: You're saying it should be off the scale.

MEMBER ROSEN: Oh, yes, of course.

MEMBER SHACK: How many steam generators do you think you've had?

MEMBER ROSEN: Well, on the average - ten.

MR. SHERON: That number tracks just about to the number of steam generator --

MEMBER ROSEN: But there are other tubes in this -- there's tubing, sway block tubing, and all kinds of other stuff.

MR. ABRAMSON: I believe this is category one. It's at least 100 gallons per minute. I think it's 100 gallons per minute. Can you help me with that, Nilesh?

MR. CHOKSHI: This graph may be somewhat misleading. It's a range of flow --

MEMBER ROSEN: Well, then the conversion to range is wrong, isn't it? Two-tenths of an inch in diameter gives you 100 gallons a minute at 2,000 psi.

MR. CHOKSHI: I can give a range in a second.

MEMBER ROSEN: I don't think so. It just seems awfully low to me on the left-hand side. I know it's of less import.

MEMBER FORD: I guess we're all going through these calibration exercises from our experience. The comment on the BWRs that it involves all plants makes you wonder, because there are a lot of those which are intermediate break size range there, which we haven't had, 316 ng. There have been no cracks, therefore, no leaks, therefore, no flow rate for many, many years. So I'm just wondering should that -- if it does include those, then the uncertainty range should be much higher.

MR. ABRAMSON: I can't respond to that. I don't know. We'll try to find out and check this.

MR. CHOKSHI: The categories, I think the first category is greater than 100 gpm.

MR. ABRAMSON: Hundred gpm is the range point right now. That's right, it is 100. The next one is 1,500 and so on. Just to point out some general qualitative conclusions, the last two you'll see up on the top two bullets, BW and PWR, so this was reviewed from the April meeting.

Just on the third bullet, the expected frequencies are roughly the same, at least approximately for effective break damage between 1 and 7 inches for both BWRs and PWRs. And then if you look at the ratios between the means and the 95^{th} percentiles, they're similar. It's a factor of about four.

I should point out too, that these numbers are the panel or the group opinions, and they were calculated using from the geometric means of the individual panel responses. So this is the summary value. There was a great deal of variability, diversity among the panel members, and we'll get into a little bit of that later on.

All right. This is a summary of the -- and again, this is just a summary of some of the points that were made in the April briefing. As I said before, we used a formal elicitation process, and it was done as a function of flow rate, and also operating time. The operating time was current day, which is about average of say 25 years of plant life, 15 years into the future, so that would be a total of 40 years of life. And then finally, 35 additional years in the future, 60 years, which I guess was chosen because it would be end of possible license extension. So these were the three time periods that we asked the panel about.

This was done separately for both piping and non-piping contributions, and then these were added up. And what you saw before was the total of these.

Then we developed the quantitative estimates for the -- it was done for piping and non-piping base cases, and these were based on -- there were four of these. Each one is developed by a member of the panel, and there were various -- two were based on data, two were based on models, probabalistic fracture mechanics models. And the experts were free to decide which of the base cases they would start as anchoring their particular responses.

And we asked them many questions about the -- we developed a long questionnaire, and asking the specific relative values, relative frequencies. That was the form of the numerical values we got, and we also asked them the qualitative rationale, and you'll see this in the report.

MEMBER FORD: Could you give an example of quantity of estimate supported by qualitative rationale? And what would be the question be that would illustrate that?

MR. ABRAMSON: Well, what we're asking for -- when they asked for the numbers they said well, why do you think that this is -- why did you come up with this number compared to this? And they might say well, most of these pipes are, for example, steam generator pipes, team generator tubes about which we have a reasonable amount of information. And then as you get larger pipes, larger breaks, they said well, the steam generators don't enter into it any more.

But the qualitative rationale, some of these were kind of obvious, or I wouldn't say obvious necessarily, but there was general agreement among them, others just had one or two people, one or two panel members who thought that this was important. I'm sorry. I can't give you any more specifics than that. If Rob were here, he would know. Do you have something maybe you can give an example?

MR. CHOKSHI: The question was whether you can correlate qualitative rationale with quantitative number?

MEMBER FORD: Yes.

MR. CHOKSHI: In fact, the base case - that was precisely the analogies -- what they did was there were four people, and two looked at the service-based, experience-based, predict two lines, took five different systems and predicted frequencies, and they wrote PFM models. And then we started looking at them, and they provided what was basis for the differences. And a lot of insights emerged, and then, for example, thermal fatigue, the pattern of crack behavior. You have many cracks, then a single crack, and larger area, and predicted more likely to lead to a large break. So those sort of rationale was provided to look at whether this makes sense.

MEMBER FORD: So the quantitative estimate -- the quantitivity of this would be from say the --

MR. CHOKSHI: There are a number of --

MEMBER FORD: The welds.

MR. ABRAMSON: Well, the base cases were developed using whatever codes they wanted to use. But then as far as the panel members were concerned, what they were asked to do is to say all right, here is the frequency for a small break LOCA, a category of this size. How do you think the frequency of a Category 2 or 3 would compare with this? How much less likely is this frequency for this pipe size, with this material, this degradation mechanism, under these circumstances. So we're asked, in effect, to extrapolate the frequencies on the basis of the changes in the physical condition or physical characteristics of the pipe. And all of the questions were in this particular mode.

And then as far as the qualitative rationale, they would say well, why do you think it was like this, and how does this compare with another judgment you made? What's driving this, and what do you think is important about this? And that's why we tried to get some specific details about what was driving, in their minds what was driving their particular answer.

MEMBER FORD: So the formulation of the question is crucial.

MR. ABRAMSON: Absolutely crucial. And the panel spent a great deal of time and effort. We spent a great deal of time in the meetings in developing the questionnaire. And we had a number of iterations in developing the questionnaire. The staff developed something, they sent it to the panel, revise this, so on and so forth.

We also changed things as a result of the first two elicitations were, in effect, like trial elicitations, and we did some changing as a result of that, so it was a very iterative procedure. We had a number of meetings. We had I think three meetings or so, three two-day meetings with the panel to do this. And we're having another one, a video conference in a couple of weeks where we've already sent out, as I said, we sent out the preliminary draft NUREG to the panel members, and we're going to try to get their feedback on that. So we try to involve the panel as much as we possibly could given all of the constraints.

MEMBER FORD: Will we be hearing much more detail of this when we have the subcommittee meeting in July, August, whenever the --

MR. ABRAMSON: Yes. You'll have -- I don't know at what point with scheduling. You'll have the report which we're now in the process of finishing up.

MR. CHOKSHI: I was under the impression that we had given an approach presentation earlier.

MR. ABRAMSON: We did discuss this in some detail in one of the previous meetings.

MR. CHOKSHI: But we can come back and give you more insight.

MR. ABRAMSON: We'll have to come back. That's right. I don't think you've received anything in writing yet. We're developing the NUREG now, which will have all of the details of the methodology and the results, and the qualitative rationale, so on and so forth.

MEMBER FORD: It's more the questions.

MR. ABRAMSON: You'll have the questions too. That's one of the appendices, definitely, the questionnaire. Absolutely.

Let's see. In the third bullet, I reviewed this already. The panelists divided the quantitative estimate, and then they said -- or they provided the relationship between the factors and the base cases. Everything was relative. All the questions we asked them were relative to the base case or other conditions, or the previous responses.

And a general summary of the results. There was relatively good agreement about the important factors contributing to LOCAs in the sense that in the qualitative rationale, they generally tended to agree on what was important, what was not important.

As could be very well expected, there was a great deal of uncertainty and variability. Uncertainty is uncertainty in each experts' judgment. What we did ask each expert, the general form of each response, we asked them to give us three numbers - what we call a mid-value, an upper bound and a lower bound. The mid-value was the -- you can call like a best estimate, but more specifically it was supposed to be the median of their subjective distribution in the sense that they say in your judgment, there's a 50-50 chance that the correct answer is above or below it, so that's their mid-value. And an upper bound was the 95th percentile, and the lower bound was the 5th percentile of the distribution. So everything we asked them, we always ask them these three numbers so they could express their uncertainty.

And what we did then is we propagated these uncertainties throughout, and as might be expected, there was a very large uncertainty in each individual experts' judgment. There was also a lot of difference among the experts. That's what we call diversity among the panel. And this is to be expected because of the nature of the situation. There is a great deal -- there's no data essentially, there are no validated models, and so there's a lot of scientific uncertainty about this. And this was certainly reflected both in the individual judgments and in the difference among the panel members.

I should say too that the results were similar to previous studies on NUREG's 57.50 estimates, were generally similar with the largest increase in the medium LOCA frequency estimates. This was a much more structured thing than the 57.50.

All right. These are some new results which we have not presented yet, because they weren't developed yet, we developed since April. I said what we did is we have what we call our baseline estimates, and these aren't things that we necessarily recommend, but these are just the assumptions, and the models that we used in order to develop as a starting point.

But clearly, there are, as you go through the various aspects of this, there are a number of elements of this where different choices could be made. And that's what we did when we looked at the sensitivity studies. And the main purpose is we want to analyze the effect of different assumptions on the LOCA frequencies to determine the full range of supportable quantitative results, so we wanted to make sure in doing our sensitivity analyses that whatever numbers we were going to come up with, at least will bound the range of possible results. We don't want to be too conservative in that point of view.

Then there are three general areas where we did the sensitivity analysis. The first one was the analysis of the individual responses. Our main approach was to take the individual responses. There are 12 experts, as I said, and what we did is we had a group of eight of them which presented enough information both piping and non-piping, so we were able to get estimates of total BWR frequencies. And there was another group, largely overlapping, of course, of nine experts who were able to get PWR numbers. So what you're going to see -- what you've seen already and what you'll continue to see for the total frequencies is based on a subset of 8 or 9 depending on BWR/PWR on this.

So what we did is we propagated these experts responses all the way through. We felt that this was the most reasonable thing to do because at least the experts are more or less self-consistent, and then we combined them afterwards. WE combined over the experts, and we had the bottom line numbers.

Now I talk about an over-confidence adjustment, and this is in bold because this is something that does make a difference. The question was how do we know that this has any value whatsoever? Well, a lot of work has been done, empirical work has been done this, and through say these Almanac-type questions. And what comes up time and time again is that the experts are more confident than we have a right to be.

We asked them specifically for these -- set these three numbers, the upper bound, the lower bound. The upper bound is 95^{th} percentile, the lower bound is the 5^{th} percentile, so between them you have 90 percent. So this says that if they are perfectly calibrated, 90 percent of the time the intervals we'll get from these experts are going to cover the true value.

Well, in point of fact, it only happens

between about 30 to 60 percent of the time. This is based on the Almanac-type questions, and we confirmed this again through the training questions.

MEMBER KRESS: This doesn't apply to ACRS members.

MR. ABRAMSON: No.

MEMBER POWERS: Notice the perfect correlation category. How do you think they established that?

MR. ABRAMSON: That's right, yes. So experts, anybody, they tend to be over-confident about it. And part of the training was we showed them this, we demonstrated this, we talked about the biases that people are subject to in a sense in trying to get them -- by being more aware of the biases that they could be subject to, to try to get them to be more accurate in their responses.

Nevertheless, we have our results. And so the question comes, well, we're assuming that the intervals the experts are giving us are 90 percent intervals; when in point of fact, let's say that the upper bound is the 95th percentile. Well, maybe it really isn't. Maybe it should be only 80th percentile, or 70th percentile. And this will really change. This can have dramatic effects on the underlying uncertainty of the answers, so we did a number of over-confidence adjustments of coverage intervals, and I'll tell you about some of the results later. And then does make a difference.

Then another aspect, which doesn't really make a difference, is a technical point about the variance of bounds. What we wind up doing is, as I said, we get responses for systems and sub-systems, and then we add them up in order to get the total frequencies. Well, the response is in order to be able to do this addition in a statistical way, you have to assume something about the distribution. Assume that they were logged normal distribution, so what you wind up doing is adding up logged normal distributions. When you add up logged normal distributions, the means will add, because when you add up distributions, it doesn't matter the correlation structure. The mean is always add. However, the variances don't. It depends whether they're independent on the correlation structure, if they're independent or not. And so what we did is there are two bounding cases. One is the independent case, where assume everything is independent. That gives you the lower bound on the variance. And then if you assume what we call the perfect correlation case, that gives you an upper bound on the variance. And what we used for our baseline calculation, we used the upper bound.

As a sensitivity study, we looked at the lower bound, and it really doesn't make any difference. We didn't expect it to, so what that says is since we don't know the correlation structure, it makes sense to us that they should be correlated because you're talking about similar kinds of systems and so on, similar kind of degradation mechanisms and so on, so we'd expect the answers would be correlated, but we have no idea how strong the correlation is. And so, we need to consider this, and it turns out using this approach it really doesn't make much difference.

Then as I said, what we do is we propagate each of the experts' response all the way down to a bottom line, to a total frequency of a BWR and PWR, and we aggregate these. And the question is, how do we do these? Well, there are a number of ways of doing this. We used as our baseline estimate the geometric mean, but you can also use an arithmetic mean. You could use what's called a trim geometric mean, which is Olympic-type scoring, you throw out the high and the low in an attempt so you won't have too much of an over-influence by the extremes. Another possibility is just to take the medians, so you have even less influence. So these are different ways of aggregating expert opinions.

MEMBER KRESS: Can I ask, NUREG 1150 what they did --

MR. ABRAMSON: I'm sorry?

MEMBER KRESS: NUREG 1150 was an expert opinion that --

MR. ABRAMSON: Yes, that's right. And I think I used addition for that.

MEMBER KRESS: Well, the answer I got at one time from somebody was that they used the minimum entropy. Do you know what that is, how that would be worked?

MR. ABRAMSON: No, actually maximum entropy. I think it might be maximum.

MEMBER KRESS: I think they said maximum entropy. Let's go maximum, yes.

MR. ABRAMSON: It's maximum entropy, yes. What you use in a maximum - that, I think, might have to do with the prior distribution. They'd use a kind of Baysian approach, and the question is, what you want to do to start out, you have no idea -- you're trying to come up with some kind of a distribution of a parameter, and you use a so-called Baysian approach. What you need is you have a prior to start with, and that what you have is then you have your data, your information, and then you combine the two to come out with a posterior. Well, the question is what do you with -- what kind of prior do you start with? What we can start with is called a non-informative prior. That was a flat distribution. Another way I guess of doing this to try to come up with an estimate, which is maximum entropy, which is the same philosophy. You try to be very conservative, and to -- so that your answer depends as little as it possibly can on the input assumptions.

Clearly, since you don't know what the input assumptions are, you want to try to be conservative about that, so I expect that's what they did at some point.

MEMBER KRESS: Thank you.

MR. ABRAMSON: And that's a procedure, they can do that.

Actually, what I just talked about was number 3, the measures of group opinion. That's right, for the mean, the 5th and the 95th percentile, and that's what was in bold. And how you do this, whether you do it arithmetically or geometrically, and so on, can make a significant difference.

MEMBER POWERS: When you talk about your experiments with Almanac-type questions, what would that experiential base suggest would be the appropriate common editorial technique?

MR. ABRAMSON: It doesn't. It doesn't, because those are individual questions. The appropriate common editorial technique I think here depends -- and this is why I think you want to have people with experience and sensitivity to these issues, and that often are statisticians. It has to do with the assumed structure we're assuming, because in order to do this, you have to assume some kind of probabalistic structure for saying that the experts' responses, although they come from a distribution, we pick log normal. And the reason we pick log normal is because all of the responses are on a multiplicative basis. They're a relative basis, and so you have a very skewed distribution of multiplicative basis, the log normal is the natural thing.

And I think, too, the geometric mean is a natural thing for that to do that. It all falls out of the structure, which ultimately is based on the kind of information we're getting, kind of responses we're getting from the experts.

MEMBER POWERS: I think I'm really asking you a question out of the psychological domain, maybe, because everything you said would be true if I had an inanimate process.

MR. ABRAMSON: This is done by a computer.

MEMBER POWERS: Yes. Done by a computer, done by a machine, something like that, everything would be true, but experts aren't like that. Experts are affected by lots of things, and not the least of all, who's paying the bill and what kind of way we hold these things are. And what I'm asking you is, is there a literature on this that one can consult?

MR. ABRAMSON: There is a literature on it. A lot of it I think is academic in the sense that people think of interesting models, mathematical statistical models they could use for doing this. But there isn't very much in the way of empirical.

MEMBER POWERS: It's the empirical base that I' most interested in.

MR. ABRAMSON: And you want to distinguish between the individual response that we're getting from the experts, and how we aggregate them. How we aggregate them is another aspect of this, and it really isn't expert opinion. What it is, it's taking this - I won't even call it data - this information that we get from the experts, and how do you combine it in such a way so as to come up with some quantitative results, which are useful for your particular application. And in this case, coming up with LOCA frequencies.

MEMBER POWERS: What I'm struggling with is, right now you said we assumed - we took this is natural. I mean, that's a very qualitative indication. And what I'm struggling with is there any hope, any possibility of substantiating any of these assumptions and plausibilities that you've listed out here?

I mean, nothing you've said is implausible. I mean, it's clearly thought out and whatnot like that. The question is, is it true for results which you might not like to word the label data, but results that are coming from human beings.

MR. ABRAMSON: All right. I think the best you can hope for is that you don't have any significant systematic bias in the result. If somehow, and I don't know it would happen, somehow the panel as a whole was systematically too high or too low, then your ultimate answer is going to be too high or too low. And probably the best way to judge that is to take a look at how this whole thing was structured, the qualitative results and so on and so forth.

MEMBER POWERS: Well, I mean, I can look at it, and I can see yes, this is what they did. I understand what was done, and I can even say gee, a lot of these things strike me as good practice. But what I don't know is whether that's the future reliable answer.

MR. ABRAMSON: I know. I'm coming to that. So the best you can hope for is that - and we believe we structured it - of course, that's the underlying assumption of this, you don't have any significant systematic bias that you don't know about, because if you did, then you're going to be biased high or low, and you won't even know which way it is. So you look at it, and you look at the responses, now the numerical responses. The rationales often differ, particularly numerical responses different a great deal. So if you make the working assumption that in effect there is no systematic bias, what you're getting then is a great deal of scatter uncertainty about the correct answer, which is somewhere in this cloud of answers.

And then question is, given that the answer is somewhere in-between there, how do you take your responses with all the uncertainty and diversity in order to come up with something? Well, we take a kind of a central estimate. That's the geometric mean or the arithmetic, whatever you're doing, with uncertainty about that in the 95th percentile, so what we're trying to do is to take this diversity and the basic assumption is - and this is where the whole expert elicitation process comes in - is that the panel response - there's some wisdom in the panel response that comes closer as a panel than any individual will to the true answer. And that's where the results of these Almanac-type questions come in. I said this has been demonstrated. You do get some very interesting useful results by looking at the panel response Almanac questions.

So if you assume the same thing will apply here, then what this says is you should try to get some kind of central estimate of the panel, not the extreme values but central estimate, and this is relatively close to what the correct answer is. So it's this kind of chain of reasoning that we're using, that you can use to justify that this has any applicability.

MEMBER POWERS: And I think I understand that. I'm just saying that you have this data point on the Almanac questions.

MR. ABRAMSON: Points, actually points. This has been done many, many times.

MEMBER POWERS: Right. And now with this stuff with aggregation, is there anything we can do to anchor that, other than its plausibility?

MR. ABRAMSON: I don't think so, because I think ultimately for something like this, as complex as this, it's going to be very elicitation-specific. You really have to look at it to see the kind of experts, how the questions would be composed, how they answered, and so on and so forth, to see if this really is worthwhile or not.

MEMBER POWERS: We went through all this agony over NUREG 1150, and it appears the field has not progressed much with respect to the empirical database. What you're doing is very much --

MR. ABRAMSON: Well, actually, you've anticipated this. These are some of the -- on this slide is this is the general philosophy, justification, rationale for this.

The purpose of the elicitation is we wanted to estimate the mean, the 5th, and the 95th percentiles of LOCA frequency distribution. This is our ultimate goal as far as the processing is concerned. Group estimate is more accurate than any single estimate. I've referred to that. That's based on this empirical information in these Almanac questions.

An implication of that is that the outlier should not dominate the result, because it's the group as a whole, which is more accurate. It's not the outliers. And it should be used as a measure of the panel's -- the outliers themselves, they're important, though, because it gives you the panelist variability, so you need to take account of this in some way.

MEMBER POWERS: I did see an interesting presentation in the course of doing NUREG 1150, in which the thesis of the presenter was that when you look at historical groups making judgments on things such as is heavier than air flight possible or not --

MR. ABRAMSON: Or the speed of light, for example.

MEMBER POWERS: That you were far better - if you were a betting man, you always wanted to bet on th outlier, because more than half the time he proved to be the correct one.

MR. ABRAMSON: I would suggest, though, that that kind of -- this is really well beyond that kind of estimate because this is a very structured thing, and I think in particular what's important here is you don't ask them a yes or no question. You ask them to decompose the question, and particularly what you're doing is you're asking about thing about which they are expert about; namely, degradation mechanisms, pipe materials and so on. And you're asking them to extrapolate from their knowledge and experience to that, so I think that that's a very important difference between these other examples which you may have cited, which you cited.

MEMBER SHACK: You're at slide 9. We're already six minutes over scheduled time.

MR. ABRAMSON: I'll try to --

MEMBER SHACK: Just keep that in mind.

MEMBER RANSOM: Just a quick one, is how in that process did the causes for the breaks come into play?

MR. ABRAMSON: Are you talking about degradation?

MEMBER RANSOM: In other words, water hammer, mechanical accidents. I mean, how do they come into this?

MR. ABRAMSON: Well, one of the conditions was degradation mechanisms, what degradation mechanism would be subject -- Nilesh.

MR. CHOKSHI: Yes. This elicitation primarily covered the normal operating type of transients. Very large water hammers, or pick earthquakes were not explicitly addressed. And in fact, there's a follow-on activity we are doing right now, is to look at how would those kind of consequential LOCA would impact the selection of design-basis. And I think when you hear Gary Hammer's presentation, he's going to address some of those considerations.

MR. ABRAMSON: On the third bullet, just again, this issue about the outliers. A principal benefit was to identify issues and variables other panelists may not have considered. And I said, we had a number of meetings with a lot of feedback to the panelists, so the panelists - and while all the elicitation sessions were individual sessions, everything else was in a group meeting. And in particular, all of the discussion. And also, we did it in our feedback meeting, which we had a two-day feedback meeting - what we did is we did extensively feedback some of the rationale for the answers to the panelists, so they had an opportunity to discuss these. And actually, they were also invited, if they wanted to, to change some of their judgments, if they wanted to.

And then as I already discussed briefly, the group mean, the 5^{th}, and 95^{th} percentile estimates - they were determined to be consistent with the structure and results of the elicitation process. I think what we did is we used a ratio, set a ratio structure, and there was a lot of variability among panelists' responses, and our final results do reflect that to the extent that we feel we can do that.

Now as I noted before, the purpose of the elicitation and sensitivity analyses is to bound the range of the plausible alternatives. We already discussed the first bullet, that these are various ways of taking the individual results and combining them to come out with the group estimates, or the panel estimates. And those are the ones that you've seen plotted previously.

The reason that this makes a difference is the arithmetic results and the highest frequencies, much more than the others. And the medium trim geometric and geometric mean are much closer to each other, and so on. You'll see more detail about this when you see the NUREG.

And I've talked about this, the over-confidence adjustment. Experts are generally over-confident. General rule of thumb is that the true coverage level is approximately half the nominal coverage level, so if they're -- say they're 90 percent confident - in other words, if 90 percent of their intervals were nominally covered, only about half of those do something. That's the nominal one.

And what we did is we evaluated the effect of adjusting the nominal coverage level. Well, first of all, the mid-values were not changed, because the over-confidence has to do with the upper and lower bounds. Then we did two kinds of adjustments. There was a broad adjustment where we adjusted everything, and then there were targeted adjustments. And the target adjustments, we looked at those experts who had a very -- some had very wide ranges of uncertainty, others had narrow ranges.

The ones with the relatively narrow ranges were the ones who adjusted. We felt that those were the ones that were most likely to have been over-confident. That's why their ranges were very narrow. The ones who were broader, we figured were more looser in thinking, so to speak, or well-calibrated. And the fact that they had larger uncertainty ranges to begin with means that they were probably better calibrated. And so we tried various different kinds of adjustments on that. And you'll see the details, we'll give you the details. But it did make a significant difference, as you might expect.

Again, continuing with this, the blanket adjustments and the more conservative target adjustments were very severe. In some cases, you got the means were bigger than the 95th percentiles, so that means you had a very, very skewed distribution, and we got very, very high frequencies, so we felt in those particular cases that there was an over-adjustment. It just really didn't make sense. And it turns out that a relatively modest targeted adjustment was relatively well-supported by the results. And essentially, what we did there is we took a -- we assumed the nominal 90 percent coverage to 60 percent for four to five panelists.

The four to five panelists were the ones who had chosen relatively low uncertainty ratios, less than a factor of 10. Some of the uncertainty ratios went up to 100, so some of them were very wide ranges. And the rationale for doing this is that the ones with large uncertainties to begin with, is they were pretty well calibrated. It was the small ones that needed to be adjusted.

I should say also, the increases in the

SECY04-0600, this was the SECY paper that was released in April with the preliminary results. And when you use the targeted adjustment, it's generally less than a factor of 3, so we felt that this is pretty consistent with the kind of results we were getting.

At this point, I'd like to call on Mr. Hammer.

MR. HAMMER: Again, my name is Gary Hammer. I work in NRR. And you'll have to pardon me, I'm not as smooth as Lee, but the good news is I have only two slides, and then I'll give it right back to him.

What we at NRR are doing, as Brian mentioned a little earlier, is we're working on the development of the rule for risk-informing ECCS, and one of the activities is to select a break size based on the work which Research has done, which Lee has been outlining. And there are several aspects of that that we wanted to do. And, of course, the elicitation results are a key part of it. But we wanted to be sure that we accounted for the variability and uncertainty that Lee has discussed, and the effects of the sensitivity analyses so that we try to make the best choice we can on a defensible size. And we're, of course, using a frequency metric, not really a risk metric per se, which just based on a frequency initiator.

The elicitation results, we kind of see as a starting point. They're not necessarily the bottom line because there are other considerations that we want to take into account. There are -- as Lee mentioned, the elicitation process attempts to predict frequencies based on degradation mechanisms for pipe and non-pipe components, but there are other sources of breaks, such as the things that we list here; rare event loadings, including seismic and other loads like severe water hammer pressures. There are consequential LOCAs that being the result of some other initiating event.

VICE CHAIRMAN WALLIS: The panel of the experts considered water hammer, didn't they?

MR. HAMMER: I beg your pardon?

VICE CHAIRMAN WALLIS: The experts did consider water hammer.

MR. HAMMER: Not per se. Right?

MR. ABRAMSON: No, there was a separate area where they considered seismic loads are the equivalent of water hammers, so there was a small group of about four of them. We asked them questions about this, but this wasn't part of the main elicitation.

MR. HAMMER: So there are these other things. Oh, and then there's active system LOCAs, and in that category you can include things like blown-out seals, interfacing system LOCAs, also stuck-open valves, things like that.

And all of those things, ultimately, if they're in a similar order of magnitude, they could add to the degradation-related, so that the composite curve could actually be a little higher than just the degradation-related by itself. And we want to -- in accordance with the SRM, we want to consider some defense-in-depth considerations.

There are a couple of things there. The ECCS, of course, has a low pressure mitigation capability if we pick the size very small. We could mitigate it completely with a high pressure mitigation capability. Recognizing the uncertainty in the whole process of making the selection, if we're reasonably close to a size big enough to result in a large break LOCA, which would require a low pressure system, then we want to make sure that we at least would incorporate that. And then there's the considerations of security and maintaining plant safety, which Brian mentioned earlier, some of the Reg Guide 1.174

considerations.

Let's see. Brian touched on this, the advantages of the process are that we're still maintaining a risk-informed approach consistent with the Reg Guide 1.174 framework. And that consistent with the Commission guidance, we're going to maintain the mitigation capability up to the double-ended guillotine break, even above the transition break size.

We still have a lot of work to do. We're still trying to finalize our selection, and include all of the additional contributions that we have. The graphic is merely to show you that we're not going to pick a very precise number off of a curve. It's going to be a starting point, and then the estimate that we end up with will have some range associated with it. And then as Lee mentioned, we have some work to do on quantifying the other considerations, particularly in the seismic area. We have some water hammer scenarios that we're looking at that may provide some contribution. That's basically all I have.

VICE CHAIRMAN WALLIS: This isn't a continuum, is it? There are pipe sizes of all ranges - you get to big pipes, there's only certain sizes which are there, so if you have a curve, you have to decide where is the cut-off in terms of what is really there.

MR. CHOKSHI: Yes. I think when Brian Sheron was discussing is there a plant-specific features or plant features which limits you or which makes sense. So if you come to --

VICE CHAIRMAN WALLIS: They're different for each plant.

CHAIRMAN BONACA: But you could have intermediate breaks of some type that are non-guillotine breaks. Right?

MR. CHOKSHI: Yes. I think the idea is once you pick the break size and it will be applied as if we are a design-basis currently being applied.

VICE CHAIRMAN WALLIS: So you could have a partial break then. Is that what --

MR. CHOKSHI: I think the current requirements - and Gary can --

MR. HAMMER: Yes. Essentially, that's correct. For the transition break size, you would apply that basically anywhere in the reactor coolant system so that you've got the worst location.

VICE CHAIRMAN WALLIS: Did the experts do this? Didn't they just look at actual full breaks of the pipe? Isn't there the possibility of a 40 inch pipe breaking with a 20 inch hole in it? Did they look at that?

MR. CHOKSHI: Yes, they did look at the radius of the pipe --

VICE CHAIRMAN WALLIS: They looked at a whole spectrum of --

MR. CHOKSHI: But then if I remember right, for the smaller pipes where the full breaks, I don't remember, but they looked at those questions, and there were some insights for getting --

MEMBER SHACK: What they did find was you are much more likely to get a break of a 4 inch pipe than you were to get the equivalent of a 4 inch hole in a 22 inch diameter pipe. You're almost always dominated by the pipe break of the smallest pipe that gave you that size. And that's not unreasonable, again if you look at those kind of fracture mechanics documents.

MR. ABRAMSON: Okay. I just have two more slides to finish this. First, the remaining work and schedule. As I earlier said, we are doing this external review to confirm the elicitation analysis. The schedule is to complete it by August 31st, and that will depend, I guess, on whether we can get all the contractual arrangements in place. I think we're on track for that at this point.

We're planning to have a panel meeting on the first week in August, and then to get immediate feedback, instant feedback from the panel so we have an idea of where they're going, and then to ask them for a written report by the end of August.

Then finishing the NUREG report, we've completed doing that report. It was mailed out last Friday to the panel members, so we're having a review meeting with the expert panel. There's some video conferencing on July 20-21. Then we're applying a draft for NRR review August 6th, in about a month. Then we will have the results of the external review, and also NRR comments, and we'll incorporate that into the NUREG by the end of September, available for your review about a week later, October 4th. And then incorporate the ACRS comments November 30th. And then finally available for public dissemination under the rule. We're trying to be consistent with the SRM in December, so this is our current work remaining and the schedule.

And just to conclude with a few remarks - the frequency estimates can be sensitive to the method used to analyze the panelists' input. And the key elements that they are most sensitive to are the over-confidence adjustment and the estimate of group opinion; that is, how we go about aggregating the results.

Our whole approach with our conceptual methodology for the risk-informing, it was consistent. We tried to make it consistent with the previous risk-informed practice and policy. I said this, we just adapted the particular elicitation procedure from other things which have been done, both for NRC work and elsewhere. And we still need to do some work to finalize the selection criteria. In a sense, we're doing a lot of study. We have the baseline, we have the sensitivity results. And it's going to be up to ultimately NRR to choose to see which of these they're going to use as the basis for the proposed rule. And I said, we're doing this all in parallel with the proposed rule development. So that's -- anybody has any further questions, I'll try to respond to them.

MEMBER SHACK: Well, we're running a little late so it's back to you, Mr. Chairman.

CHAIRMAN BONACA: I thought we had also some representative of nuclear industry may want to provide some --

PARTICIPANT: No.

CHAIRMAN BONACA: None? Okay. Well,

thank you, and we'll take a break now and be back at 20 of 5. We don't need the transcript any more. We're going to be off the record now.

(Whereupon, the proceedings in the above-entitled matter went off the record at 4:25 p.m.)