Official Transcript of Proceedings ACRST-3288

NUCLEAR REGULATORY COMMISSION

ORIGINAL

Title: Advisory Committee on Reactor Safeguards
514th Meeting

PROCESS USING ADAMS
TEMPLATE: ACRS/ACNW-005

Docket Number: (not applicable)

Location: Rockville, Maryland

Date: Wednesday, July 7, 2004

Work Order No.: NRC-1574 Pages 1-317

NEAL R. GROSS AND CO., INC.
Court Reporters and Transcribers
1323 Rhode Island Avenue, N.W.
Washington, D.C. 20005
(202) 234-4433

TR01

ACRS OFFICE COPY
RETAIN FOR THE LIFE OF THE COMMITTEE

DISCLAIMER

UNITED STATES NUCLEAR REGULATORY COMMISSION'S

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

July 7, 2004

The contents of this transcript of the proceeding of the United States Nuclear Regulatory Commission Advisory Committee on Reactor Safeguards, taken on July 7, 2004, as reported herein, is a record of the discussions recorded at the meeting held on the above date.

This transcript has not been reviewed, corrected and edited and it may contain inaccuracies.

1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

3 + + + + +

4 ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

5 514th ACRS FULL COMMITTEE MEETING

6 + + + + +

7 WEDNESDAY,

8 JULY 7, 2004

9 + + + + +

10 The above-entitled Committee Meeting commenced

11 at 8:30 a.m. in Room T-2B3 of the Nuclear Regulatory

12 Commission, 11545 Rockville Pike, Rockville, Maryland,

13 Dr. Mario V. Bonaca, Committee Chairman, presiding.

14 COMMITTEE MEMBERS PRESENT:

15 MARIO V. BONACA, Chairman

16 GRAHAM B. WALLIS, Vice-Chairman

17 STEPHEN L. ROSEN, At-Large

18 F. PETER FORD

19 THOMAS S. KRESS

20 DANA A. POWERS

21 VICTOR H. RANSOM

22 WILLIAM J. SHACK

23 JOHN D. SIEBER

24

25

1 NRC STAFF PRESENT:
2 LEE ABRAMSON
3 CHARLES ADER
4 STEVE BAJOREK
5 SUZANNE BLACK
6 NILESH CHOKSHI
7 JOSEPH COLACCINO
8 DAVID CULLISON
9 ANDRE DROZO
10 JOHN FAIR
11 FRANK GILLESPIE
12 THOMAS HAFERA
13 GARY HAMMER
14 JOHN HANNON
15 LAUREN HART
16 ALLEN HISER
17 B.P JAIN
18 BILL KEMPER
19 LESLIE KERR
20 MARK KOWAL
21 JOHN G. LAMB
22 JIM LYONS
23 MICHAEL MARSHALL
24 ROY MATTHEW
25 GEORGE MENCLINSKY

1 NRC STAFF PRESENT: (CONT.)

2 JOCELYN MITCHELL

3 KRIS PARCZEWSKI

4 LAUREN M. QUINONES-NAVARRO

5 JOHN SEGALA

6 DAVID TERAO

7 BRIAN THOMAS

8 EDWARD D. THROM

9 MIKE TSCHILZ

10 JENNIFER UHLE

11 JERRY WILSON

12

13

14

15

16

17

18

19

20

21

22

23

24

25

1 I-N-D-E-X

2 Page

3 Opening Remarks 4

4 Chairman Bonaca

5 Final Safety Evaluation Report AP1000 7

6 Draft Final Generic Letter on Potential 107

7 Impact of Debris Blockage on Emergency

8 Recirculation

9 Risk-Informing 10 CFR 50.46 194

10 Adjourn 317

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

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

2 8:29 a.m.

3 CHAIRMAN BONACA: Good morning. The
4 Nuclear Committee meeting will come to order. This is
5 the first day of the 514th meeting of Advisory
6 Committee on Reactor Safeguards. During today's
7 meeting, the Committee will consider the following:
8 final safety evaluation report associated with the
9 AP1000 design certification, draft final generic
10 letter of the potential impact of the pre-blockage on
11 the emergency recirculation during design-basis
12 accidents of PWRs, risk inform in 10 CFR 50.46,
13 acceptance criteria for emergency core cooling systems
14 for light weight nuclear power reactors, differences
15 in regulatory approaches and requirements between U.S.
16 and other countries in preparation of ACRS report.
17 Dr. John Larkins is the designed Federal
18 Official for the initial portion of the meeting. We
19 have received no written comments or requests to-date
20 for time to make oral statements from members of the
21 public regarding today's sessions. A transcript of
22 portions of the meeting is being kept and it is
23 requested that speakers use one of the microphones,
24 identify themselves and speak with sufficient clarity
25 and volume so that they can be readily heard.

1 I will begin with some items of current
2 interest. Mr. Leitch who has been with the ACRS for
3 four years will be leaving the committee after his
4 term ends on July 9, 2004. Unfortunately, Graham
5 could not be with us today for personal reason.
6 However we appreciate the outstanding professional and
7 technical commitment provided by Mr. Leitch in
8 reviewing several complex technical matters.
9 Mr. Leitch's expertise and knowledge have
10 contributed greatly to the Committee and to the
11 mission of the Agency. On behalf of the Committee, I
12 would like to thank him for his outstanding
13 contributions and wish him well in his future
14 endeavors. He will be with us probably in September
15 and we will have an opportunity to say goodbye to him
16 in person.
17 Also I would like to point out that Ms.
18 Gelina Monroe, she's not here right now, will be
19 receiving her advanced degree in Industrial and
20 Systems Engineering, Human Machine Systems from the
21 North Carolina ANT State University this summer. She
22 will be working for the ACRS until the end of the
23 July.
24 During this tenure, she will be performing
25 a study on the human factors, human reliability

1 analysis with emphasis on performance shaping factors.
2 She was working for the ACRS in the summer of 2003, as
3 you may remember, and prepared a report on "The Role
4 of Human Factors in Nuclear Power Plants and an
5 overview of NRC requirements of research activities.
6 This report will be provided to the members in the
7 near future.
8 Also we have Ms. Erin Alexander. She is
9 a student of George Apostolakis at MIT. She will be
10 receiving her B.S. in Nuclear Engineering this year.
11 When she graduates in September, she will be
12 commissioned as an ensign in the Navy and begin
13 working on nuclear reactors. When working for the
14 ACRS as a summer intern, she did research in safety
15 culture and possible performance indictors.
16 Finally, I would like to point your
17 attention to this package you have in front of you,
18 items of interest. In it, there are a couple of staff
19 requirements memorandums, one to do with issues
20 related to proposal making to risk inform requirements
21 for large-break LOCA and the other one, a staff
22 requirement memorandum resulting from the meeting that
23 we had with the Commission on Wednesday, June 2.
24 But there are also a number of speeches
25 and additional correspondence that are of interest and

1 under news articles, you see some articles regarding
2 Vermont Yankee safety margins, etc. and those are of
3 particular interest to ACRS because we will be
4 reviewing some of these issues. With that, I think
5 we'll move to the next item on the agenda and that's
6 the final safety evaluation report associated with the
7 AP1000 and Dr. Kress will lead us through that
8 presentation.
9 MEMBER KRESS: Thank you, Mr. Chairman.
10 The purpose of today's meeting is primarily to hold
11 discussions on the Staff's Final Safety Evaluation
12 Report and to hear about the resolution of all of the
13 issues that are unresolved. Just to comment, this is
14 pretty much ACRS's last shot at AP1000.
15 So if any members have any lingering
16 unanswered questions, I think now is the time to ask
17 them, now during this meetings anyway. With that as
18 a very brief introduction, I'll call on Ed Cummins of
19 Westinghouse to get us started.
20 MR. CUMMINS: Thank you very much. Our
21 presenter is Terry Schultz. Thank you.
22 MR. SCHULTZ: Good morning. I have about
23 eight slides to just give a brief summary of AP1000
24 and in addition, one of the slides has a little bit
25 more information on some screen design

1 characteristics. I think the last time I talked to
2 the subcommittee we ended with this slide. I'd like
3 to start with it now.
4 Obviously, that's the hopeful conclusion
5 of all the work that we've had going on the last
6 couple of years on AP1000. It starts with the process
7 AP systems design, approach to safety, the use of
8 systems that do not require pumps, diesels, fans to
9 work, one-time realignment of valves, reduced
10 dependence on operator action, design-basis met with
11 the passive systems without use or the need for the
12 active non-safety systems and the meeting of the
13 safety goals again without need for the non-safety
14 systems.
15 The active non-safety systems are in the
16 plant. They will be used during normal operations,
17 anticipated transients. They have redundancy.
18 Powered by onsite diesels. Reduce the challenges to
19 the passive systems and do participate in the PRA.
20 The AP1000 passive systems are essentially
21 identical to the AP600 systems in terms of
22 configuration. We have upgraded the capacity because
23 of the increase in power. Passive RHR. Larger pipes.
24 More tubes. Longer tubes to get the eight exchanger
25 capacity to essentially match the power increase.

1 Core makeup tank volume and the flow rate were
2 increased. The ADS flow capacity was significantly
3 increased with larger pipes and valves. The same with
4 RW's T injection and the containment recirculation.
5 We also did some other things in terms of increasing
6 the recirc water level more than in AP600 to again
7 provide margin and from a design point of view and our
8 safety analysis, we have maintained the margins in the
9 analysis results.
10 As promised, this is a little bit more
11 than the last time we talked about some of the
12 specific design features that AP1000 incorporates. We
13 provide a robust post-accident, post-recirculation,
14 debris, toleration type design. The initiation of
15 recirc is significantly delayed relative to an
16 operating plant. It's typically like five hours.
17 For DVI break, it can be as short as a
18 couple of hours which is still more than twice what a
19 typical operating plant has. So there's more time for
20 debris to settle. The flood-up levels are
21 significantly above the top of the screen so floating
22 debris tends to be well above the screen. So it's out
23 of the picture.
24 The velocities both in the pools and close
25 to the screens and at the screen faces are

1 significantly lower, maybe an order of magnitude lower
2 than operating plants. There's no spray to wash down
3 debris from the upper parts of the containment into
4 the sump so that kind of debris would not get involved
5 in recirculation. The screens are tall and they are
6 located well above the bottom of the floor. So
7 there's a lot of space for debris that gets down to
8 the floor. It's not going to get up and drug up into
9 the screens.
10 We have provided some protective plates
11 that are right above the screens that extend out to
12 about ten foot or so so that paint or any kind of
13 debris cannot get into the water stream right in front
14 of the screens. It has to be at least that far away
15 which provides a significant chance to have that
16 debris settle.
17 We have incorporated a sump recirc screen
18 design which has advantages in terms of not increasing
19 area but also tolerating debris. We've cross
20 connected these sump recirc screens so that even in
21 the worst accident location which is typically a break
22 in a DBI valve compartment, both screens are always in
23 service in a recirc situation so we get the advantage
24 of the area of both screens.
25 We have eliminated by design the

1 generation of fibrous debris from fiberglass
2 insulation through the use of metal-reflective
3 insulation. And we have provided a high density
4 coating inside containment so that if the coatings do
5 come off, then they will settle especially given our
6 long recirculation times.
7 So that's all from a design perspective
8 what we've done. We also have two COL items that
9 relate to this issue. One of them requires that the
10 owner/operator provide a cleanliness program so that
11 during shutdowns, he doesn't leave equipment and
12 debris inside containment that could challenge the
13 screens. And the second item is to address
14 anticipated new information specifically resident
15 debris data that doesn't exist right now. Being
16 collected, but we don't have it. And the chemical
17 corrosion precipitant tests that are going to be going
18 on later this year. For the COL, we would have to
19 analyze this data relative to AP1000 to demonstrate
20 that the plant is okay.
21 MEMBER POWERS: Let me ask a question on
22 a couple of things?
23 MR. SCHULTZ: Sure.
24 MEMBER POWERS: What makes your high
25 density coatings high density?

1 MR. SCHULTZ: We're talking specifically
2 about like epoxies which typically have a density
3 around 90.
4 MEMBER POWERS: Ninety?
5 MR. SCHULTZ: Pounds per cubic feet.
6 MEMBER POWERS: Can you translate that
7 into something civilized?
8 MR. SCHULTZ: Probably not.
9 MEMBER POWERS: Water is 64 pounds per
10 cubic feet. Right?
11 MR. SCHULTZ: Okay. So 50 percent more
12 than water. We're talking about a normal increase to
13 about 100 pounds or a little bit more percentage wise.
14 We've talked to coating manufacturers. I don't know
15 specifically what they would add.
16 MEMBER POWERS: So you've really never
17 tested to see if these things sink.
18 MR. SCHULTZ: They obviously will sink
19 with that density. It's a question of how fast.
20 MEMBER POWERS: A ship is made out of
21 steel with a density of seven and it doesn't sink. I
22 hope it doesn't sink anyway.
23 MR. SCHULTZ: It depends on --
24 MEMBER POWERS: It depends on what happens
25 in the ship. Yes. It probably also depends to you on

1 what happens to your coating, too.

2 MR. SCHULTZ: You would presumably have to

3 -- I can't see the coatings staying suspended. If

4 they had the right shape, they might float like a

5 ship, yes, on the water surface which presents no

6 problem. If they're not shaped like that, they will

7 sink because of the density.

8 MEMBER POWERS: Suppose they react a

9 little bit with the water and form hydrogen bubbles.

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

11 MEMBER POWERS: They're going to suspend

12 around.

13 MR. SCHULTZ: It would seem like it would

14 be pretty magical. If you would ask me to design a

15 paint particle that would stay just suspended, I don't

16 think I could ever convince you that that would

17 happen.

18 VICE CHAIRMAN WALLIS: The problem is that

19 it's a cyclic process. If it does form bubbles, it

20 rises to surface, releases the bubbles, falls, may

21 form some more bubbles, rises and so on. So there is

22 a concern that there are chemical reactions that

23 releases the bubbles. But I think that you assured us

24 that your coatings weren't the type to do this.

25 MR. SCHULTZ: The coatings are designed to

1 qualify for post-accident conditions. They would be
2 the same coatings that operating plants would use for
3 their qualified coatings that would stay in place in
4 the walls. So the only difference that we're doing is
5 making sure they are little more dense so they tend to
6 sink faster and we are not placing the QA requirements
7 on the application and inspection that operating
8 plants are.
9 MEMBER POWERS: I mean the problem is as
10 I see it is that we have hope and we have analyses,
11 but nobody ever tests these things to see if they, in
12 fact, do what they're supposed to do in the
13 environments that they are going to encounter. My
14 ability to predict what happens with strange, complex
15 chemicals in a strange and complex environment is
16 banishingly small.
17 Now that's a statement about me and not
18 about you. Yours might be higher, but I don't see the
19 kinds of sophistication that gets applied to polymer
20 materials in radiation environments here where they
21 swell. They do all kinds of weird-ass things.
22 MR. SCHULTZ: I can't answer or say
23 anything more about the coating materials.
24 MEMBER ROSEN: Well, let me try on a
25 couple other things on this slide. Why do you say

1 that 140 square feet each is a large surface area?
2 That is the kind of surface area we're currently
3 saying is not large. We thought 1,000 square feet --
4 MR. SCHULTZ: Well, it's relative to the
5 flow rate. We have like one-tenth the flow rate that
6 operating plants do. So in terms of velocities
7 through the screens, it's like having ten times the
8 area in the operating plants.
9 MEMBER ROSEN: Why is one-tenth the flow
10 rate?
11 MR. SCHULTZ: Because we don't have spray
12 pumps. Because we don't have low head safety
13 injection pumps. We do have RNS pumps which are
14 shutdown cooling pumps but because they are designed
15 as a non-safety system we don't put the margins on.
16 We don't have extremely high run-out capabilities that
17 our current plants require for large-break LOCA
18 protection.
19 It's the combination of not having spray
20 pumps, not having low head safety injection pumps, not
21 having the margins that the operating plants have to
22 put onto those pumps to make sure that they don't
23 degrade and line resistances and all that. So it's
24 kind of a by-product of the passive safety systems
25 that don't require or don't have these extremely high

1 flow rates.

2 MEMBER ROSEN: All right. Well, at least

3 one would going in presumptions say "140 square feet

4 is not large compared to what we're used to" but I

5 understand your argument. Now let me try on a

6 different one on that same slide.

7 That COL item will address anticipated new

8 information resident to pre-data and chemical

9 corrosion tests results. But my understanding in some

10 of the subcommittee discussions was that Westinghouse

11 had agreed to do calculations in the same manner as

12 the operating fleet is doing and with the NEI

13 guidance. That will become endorsed by regulatory

14 guide.

15 To me, that was a full commitment that

16 made me comfortable because of you can take full

17 advantage of the thing, the fact that we have low flow

18 rates and all the rest and no calcium silicate

19 insulation in the containment. All those things will

20 be to the benefit of this design and then you'll

21 probably come out okay. But it was comforting to me

22 to know that Westinghouse intended and was willing to

23 take a commitment to do those calculations on a

24 broader scope of things than just the resident debris

25 data in the chemical stuff. Now I don't see that

1 commitment. I see a narrower commitment.

2 MR. SCHULTZ: No, you're misunderstanding

3 what I'm saying here. I didn't repeat the whole

4 thing. I can show it to you if you want to. I think

5 the Staff is also intending to show you the exact

6 words of the COL item.

7 It does point out these two issues

8 specifically so that they're not overlooked. It does

9 also require a performance analysis. I think it

10 references the reg. guide, Rev. 3. I don't think it

11 references NEI, but it's something that the Staff

12 hasn't reviewed any NEI guidance at this point in time

13 so it wasn't something we could reference.

14 But it does commit to doing a performance

15 analysis and showing that core cooling is adequate and

16 it's specifically not just with these two items but

17 including these two items. So what we mentioned in

18 the subcommittee meeting is in fact what we think the

19 COL item is and what we will do. Yes.

20 MEMBER ROSEN: Well, okay. That's good.

21 Maybe the Staff could comment on that as well.

22 MEMBER RANSOM: I have one question on the

23 statements two and four. What are low velocities?

24 How low are they and at those velocities, what are the

25 maximum size particle, I guess, that could be

1 entrained off the floor with that two foot clearance?
2 Are these based on actual engineering calculations or
3 are they just judgment calls?
4 MR. SCHULTZ: The velocities are
5 calculations.
6 MEMBER RANSOM: What are the low? What
7 are the maximum velocities?
8 MR. SCHULTZ: Let's see. I have a backup
9 slide that if I can quickly get to it. Let's see.
10 VICE CHAIRMAN WALLIS: So the area is not
11 much bigger than a typical --
12 MR. SCHULTZ: That's right. The real
13 difference is the flow rates. Instead of having
14 10,000 gallons per minute, we have 1600 gallons per
15 minute. This is the case with RNS pumps and here are
16 the velocities, at the screen phase, at the trash
17 rack, ten foot from the screen and even further. At
18 20 feet from the screen, it gets a little hypothetical
19 depending on this was assuming a uniform geometry
20 which probably doesn't exist in reality.
21 VICE CHAIRMAN WALLIS: But these pumps are
22 active systems, but there's a static recirculation,
23 isn't there?
24 MR. SCHULTZ: We can run various pumps.
25 The operators in fact were told to start them and if

1 the ADS goes off. We don't count them working, but in
2 this case they may the thing a little bit worse. So
3 we look at it to make sure that -- So this left-hand
4 column here is with the active system running with a
5 maximum type flow rate to maximize the screen
6 conditions to make it worse for the screen. This is
7 the backup core cooling system running all by itself
8 with a gravity recirculation. So the flow rate is a
9 bit less. So it's less severe from a screen point of
10 view, not greatly different but somewhat.
11 MEMBER RANSOM: Do you have calculations
12 to what size of particle would be entrained in this?
13 MR. SCHULTZ: These kinds of velocities
14 are well below the kind of velocities that would pick
15 up the metal reflective insulation debris. I don't
16 really know what this will move, but my feeling is
17 that if it doesn't pick up metal reflective
18 insulation, you're talking about something that would
19 have to be pretty light weight and of the shape that
20 could be drugged by very low velocities.
21 And again you have a screen that's -- One
22 of the screen is ten foot high. One of them is 13
23 foot high. So even if you got stuff up to the bottom
24 of that screen, it's not going to challenge anything
25 unless it plugs most of the screen up. So you're

1 really talking about a --

2 MEMBER RANSOM: And you have trash racks

3 that prevent larger particles of this reflective metal

4 --

5 MR. SCHULTZ: It's like a degrading type

6 of metal that's in front of the fine screens, typical

7 type design.

8 MEMBER RANSOM: What sizes are those? In

9 other words, how big could some of the reflective

10 metal insulation be that reaches these screens?

11 MR. SCHULTZ: I think metal reflective

12 insulation cannot reach these screens. There is no

13 way they can reach these screens.

14 MEMBER RANSOM: You mean it can't go down

15 through the trash racks.

16 MR. SCHULTZ: The screens have a plate

17 that extends out ten foot in front. The trash racks

18 are vertical against the wall. Metal reflective

19 insulation debris most likely will be generated during

20 the blowdown. Two to five hours later research

21 starts. That stuff is going to be sitting on the

22 floor.

23 MEMBER RANSOM: What are the spacings of

24 the trash racks though?

25 MR. SCHULTZ: The trash racks are a couple

1 inches wide, maybe four or five inches high. It's
2 like grating. It is grating.
3 MEMBER ROSEN: But to put that in
4 perspective, that's 0.0106 feet per second. This is
5 rather slow.
6 MR. SCHULTZ: Yes, it is very, very slow.
7 MEMBER ROSEN: This is like less than one
8 foot a minute. It's hardly moving.
9 MR. SCHULTZ: Yes.
10 MEMBER ROSEN: About half a foot a minute.
11 I think about half a foot, six inches, a minute. It's
12 just hardly moving at all is what you're saying.
13 MR. SCHULTZ: That's right. Yes.
14 MEMBER KRESS: Okay. We got all that.
15 MR. SCHULTZ: Okay. Good. Okay. Passive
16 containment cooling. Again same configuration as
17 AP600. We did add a third valve. It's a different
18 kind of a valve. It's a motor-operated valve from the
19 two air-operated valves AP600 has. This was a PRA
20 consideration. It added extra reliability to the
21 water cooling aspect because we had somewhat much less
22 T&H margin on air-only cooling. We adjusted water
23 flow rates in the longer term because of higher decay
24 heat and this, of course, made the tank larger and I'm
25 talking the containment.

1 MEMBER KRESS: Now on the containment when
2 you analyze the design-basis accidents, you used a
3 very hot day.
4 MR. SCHULTZ: Yes.
5 MEMBER KRESS: So that you minimize the
6 ability of this to cool.
7 MR. SCHULTZ: Yes, it's like 115 degrees,
8 120 degrees, so it's a very hot day and we assume the
9 cost in temperature.
10 MEMBER KRESS: That's another one of
11 conservatism.
12 MR. SCHULTZ: Yes, and the water is hot.
13 The distribution of the water is assumed to poor in
14 terms of coverage of the water on the containment.
15 The heat transfer through the containment on both the
16 inside and the outside is conservatively treated. So
17 there's a lot of conservatism in the heat transfer and
18 there's a lot of testing to back that up also.
19 Safety margins. Typical PWR plant. AP600
20 and AP1000. As you can see, the AP600/AP1000 had
21 significantly greater margins than operating plants
22 all the way through the spectrum here. We've
23 maintained or in some cases actually increased margins
24 for AP1000.
25 Moving on toward beyond design-basis

1 considerations toward the PRA, one of the things
2 that's important to realize is that the AP1000 has
3 many levels of defense. These levels of defense are
4 made up of primarily passive features, although there
5 are some active feature mitigations.
6 In some cases, there are combinations of
7 active and passive features. So we're not relying on
8 a single passive feature that is extremely
9 inordinately reliable. We have different passive
10 features. We have active features. The whole network
11 of that gives a lot of not only redundancy but also
12 diversity which then helps understand why the PRA
13 numbers came out well.
14 MEMBER KRESS: And on the PRA for the non-
15 safety systems, what did you do for the reliability of
16 these compared to the same component that would be a
17 safety related system?
18 MR. SCHULTZ: For the components
19 themselves, we basically used the same numbers.
20 MEMBER KRESS: The same numbers.
21 MR. SCHULTZ: Except we made adjustments
22 for maintenance unavailability. We increased that
23 somewhat because we figured that there weren't tech
24 specs on them. They didn't have to be maintained in
25 service. There is a strong incentive for utilities to

1 maintain almost all of these components in service
2 because they're used normally. So if they're
3 unavailable, you're going to have difficulties running
4 the plant. So there is that strong incentive, but we
5 really took no credit for that. So we start out with
6 the same basic component reliabilities, but we added
7 additional unavailability due to maintenance type
8 activities.
9 And we think that the AP1000 meets the NRC
10 safety goals with significant margin and low
11 uncertainty, both from a core damage and a large
12 release point of view. Here you can see the numbers
13 both for at power and shutdown conditions. We've
14 calculated those, the core damage and the large
15 release frequencies.
16 MEMBER KRESS: I notice you're calling
17 this a large release frequency. Does that
18 differentiate from a large only release?
19 MR. SCHULTZ: In AP1000, we have a few.
20 We assume, for example, if you have an at WITS event
21 that goes to core melt, it's pretty hard to figure out
22 how that event progresses in terms of what fails
23 first, what melts first. So we treat that as an early
24 release.
25 We pretty much have either an early

1 release or we don't have a release the way this goes
2 because of the effectiveness of in-vessel retention.
3 Whereas a plant without that kind of design where the
4 core goes on the floor, most likely the containment
5 will fail. It's just a question of when. So they end
6 up with more large, late releases. For that kind of
7 a plant making that distinction is very important. If
8 they just say large release, then almost all core
9 melts are large releases.
10 MEMBER KRESS: Do you have a success
11 criteria from in-vessel retention that you put into
12 the PRA? When was it successful? When was it not?
13 MR. SCHULTZ: It's treated -- The formal
14 hydraulic uncertainty is not part of the PRA. Things
15 that are counted are do we depressurize the reactor.
16 Do we have sufficient water at a timely fashion
17 outside of the reactor? I think those are the two
18 main criteria. Of course, containment cooling to
19 support that.
20 So in terms of talking about probabilities
21 and then of course there are some events where you
22 either bypass the containment and of course you're
23 going to have a release or the ATWS type sequences
24 which also tend to -- We don't worry about in-vessel
25 retention because we don't get there.

1 MEMBER KRESS: Those two make up most of
2 this release?
3 MR. SCHULTZ: Yes, bypasses and ATWS.
4 MEMBER POWERS: Then do I understand it
5 correctly that if you have water in a timely fashion
6 around the vessel you retain it.
7 MR. SCHULTZ: And the pressure is reduced.
8 Yes.
9 MEMBER POWERS: And the pressure is
10 reduced.
11 MR. SCHULTZ: In terms of calculating
12 large release frequencies. Yes.
13 MEMBER POWERS: And the Staff has reviewed
14 this and accepted it.
15 MR. SCHULTZ: That's my understanding.
16 Yes.
17 MEMBER KRESS: Maybe the Staff can speak
18 to this, but part of the basis was that they looked at
19 the effect of the stuff penetrating in terms of a fuel
20 cooling interaction to see if it would fail
21 containment and they did a sensitivity study on that.
22 The sensitivity study was sufficiently broad in super
23 heat and total mass and a percent of that mass enters
24 and you still have a pretty low probability
25 containment failure. That's my understanding of the

1 Staff's basis for accepting it. It was a sensitivity
2 study.
3 MR. SCHULTZ: And from that point of view,
4 in our PRA, we account if in-vessel retention for
5 mechanistic reasons. We assume that is a containment
6 failure.
7 MEMBER KRESS: Oh, you go ahead and assume
8 that.
9 MR. SCHULTZ: Okay. In terms of
10 probabilities and calculating large release
11 frequencies. So if we don't have sufficient water, if
12 we don't get the pressure down, we assume that that
13 will lead to containment failure even though there's
14 been calculations that show that the core leaves the
15 vessel and melts through that it probably won't fail
16 the containment. So there's margin from that point of
17 view.
18 MEMBER ROSEN: Before you leave that
19 slide, would you say a few words, maybe I missed them,
20 about why you say in your bullet "low uncertainty"?
21 MR. SCHULTZ: Well, the low uncertainty,
22 there's a couple of aspects there. One of them is the
23 nature of the process systems design. They are very
24 simple and so that if you compare that to an operating
25 plant that has a complicated network of things that

1 have to work including water systems, HVAC, during the
2 PRA of that, there's more uncertainty because of the
3 complexity. Is the plant operated the way it's
4 supposed to be? You have so many things that could go
5 wrong.
6 The other thing is the post core-melt
7 phenomenalogical issues. We have addressed many of
8 them by design. We have design features in there,
9 control hydrogen both by ignitors and locating of
10 vents from areas where hydrogen can be released. The
11 in-vessel retention, we think has uncertainty in what
12 happens after a core-melt. So it's those kind of
13 things.
14 MEMBER ROSEN: I understand that
15 qualitatively and would tend to agree with you. Now
16 have you a quantitative deal for it? Did you try
17 that?
18 MR. SCHULTZ: I can't answer that
19 question. Maybe one of our PRA experts could, but we
20 don't have one here.
21 MEMBER SHACK: Well, if you believe the
22 calculations, it's fifty in nine, 50 percentile. That
23 differs by a factor of about 30 which is pretty small.
24 MEMBER POWERS: I mean for -- frequency
25 that's not small.

1 MEMBER SHACK: That's right.

2 MEMBER POWERS: Well, your big

3 uncertainties develop there because of --

4 uncertainties.

5 MEMBER SHACK: Just to come back, you

6 actually rely on your active systems to handle many of

7 these accidents and it's always this transition from

8 the active control to the passive system. What's the

9 chances for some other operator commissioned there

10 during the time he's trying to handle this by an

11 active system when does he decide to stand back and

12 let the passive systems work?

13 MR. SCHULTZ: You're right that the active

14 systems are anticipated for a mild event, not a large

15 LOCA or bigger LOCA, but the loss of feed water, loss

16 of outside power, even a tube rupture. The active

17 systems are anticipated, the design, in fact, do come

18 on first and if they work properly, the passive

19 systems are not actuated. So the operator doesn't

20 have to block them or any of that.

21 If they don't work properly or if the

22 operator adversely intervenes on the active systems

23 and puts them in a mode where they are not doing the

24 right thing, the plant parameters would eventually get

25 to the point where the passive systems are

1 automatically actuated and if necessary, the active
2 systems are blocked. It depends on the type of event
3 whether or not you block the passive systems. But
4 because of the fact we don't need the active systems
5 to work, we don't take credit for them in Chapter 15.
6 The actuation logic is set up so that if the plant
7 conditions degrade to the point where you need the
8 passive systems, we can and do under certain
9 circumstances block operation of the active systems.
10 Now can the operator defeat that? Yes.
11 He can still do that. We've done a lot in terms of
12 sequencing operation and actuation of active and
13 passive systems. Obviously the operator has to be
14 trained in terms of emergency procedures, post trip,
15 post SI procedures on what he should do, what he
16 shouldn't do, what the key plan in the plant that he
17 should be monitoring. There will be automatic
18 displays to help remind him if he forgets which he
19 should never do. So I think it's extremely unlikely
20 that that kind of thing could happen.
21 Okay. We have about three slides now on
22 the iodine. This is the question that ACRS raised on
23 not having pH adjustment of water films.
24 MR. HAMMERSLEY: Good morning. My name is
25 Bob Hammersley and the organic iodine production issue

1 was one of the severe accident issues, no. 6, that was
2 included in the interim letter. The issue related to
3 the acidification or potential acidification of the
4 steam condensate draining down the containment shell
5 leading to increased production of organic iodine.
6 The AP1000 was judged to be able to accommodate
7 uncertainties in iodine production since it meets the
8 safety goals with significant margins which are
9 identified here in terms of the safety goals, both in
10 terms of prompt fatality and latent cancer fatalities.
11 Also there's an expectation that only a
12 small amount of cesium hydroxide which could be
13 released during the accident would maintain the film
14 pH at a value of seven or greater and should that
15 occur, then there wouldn't be any significant dose
16 impact because the pH would be high enough to avoid
17 the conversion of iodine deposited in these films from
18 cesium iodide releases neutralizing any acid
19 production in these draining films.
20 MEMBER POWERS: Suppose only a tenth of a
21 percent of the molybdenum inventory was released as
22 molybdic oxide, what would happen to the pH in the
23 film?
24 MR. HAMMERSLEY: As molybdic oxide?
25 MEMBER POWERS: Yes.

1 MR. HAMMERSLEY: Well --

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

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

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

15 MR. HAMMERSLEY: Right.

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

20 MR. HAMMERSLEY: I don't know. I don't
21 know what all the species are. Last time we talked we
22 --

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

1 MR. HAMMERSLEY: In a sense, we do a
2 sensitivity study where we're concerned about
3 controlling the pH. The point here is simply that
4 given that there is a possibility of some basic
5 materials being released only a small fraction would
6 be needed to neutralize it. We characterize that as
7 more of an expectation that there's going to be
8 countervening chemical species that would interject in
9 terms of the pH, but as the comment was made by Ed,
10 we're not relying on that as a way of controlling the
11 film pH.
12 There is no explicit mechanism in the
13 AP1000 design that attempts to control the pH of the
14 film draining which I think is the basis of the issue
15 no. 6 question coming up. This is just meant to me
16 our expectation that it's likely that there will be
17 some neutralization of acid that could be produced in
18 these draining films.
19 Then this is talking to our sensitivity
20 study that we did that given without any cesium
21 hydroxide, the deviate dose criteria are still met
22 which means that at that point we're independent of
23 the potential production or transport of pH affecting
24 chemicals to the film. Whereas, we're now going to
25 consider that the film's pH is not controlled as

1 acidic as it would want to be and look at the
2 consequence of the iodine deposited in it and convert
3 it into elemental iodine and therefore available for
4 organic iodine and look at the dose significance of
5 that.
6 When we do that, the organic iodine in the
7 containment serves as a source to a value of 0.15
8 percent. We evaluated impact as high as 0.33 percent
9 and our estimates are actually a little less than
10 that. They might possibly be converted such that the
11 largest impact on the dose would be on the control
12 room dose that shows an increase in the dose above the
13 source term inputs of about 5.6 percent.
14 MEMBER POWERS: Let me see if I understand
15 these numbers.
16 MR. HAMMERSLEY: Sure.
17 MEMBER POWERS: 0.15 percent and 0.33
18 percent are a percent of the initial core inventory of
19 iodine.
20 MR. HAMMERSLEY: The percent of the --
21 Yes, you start in terms of the core inventory and then
22 the source term is at least up to 40 percent of the
23 core inventory in the first two hours of the accident
24 and of that, five percent of the core inventory that's
25 viewed as being released as elemental iodine and three

1 percent of it is viewed as being converted to organic
2 iodine. That's how you get the 0.15 percent.
3 MEMBER POWERS: Okay. So we have 0.15
4 percent of the initial core inventory floating around
5 in the containment atmosphere.
6 MR. HAMMERSLEY: Yes.
7 MEMBER POWERS: And then you release --
8 MR. HAMMERSLEY: As an organic.
9 MEMBER POWERS: As an organic and then you
10 release that and some fraction goes into the control
11 room.
12 MR. HAMMERSLEY: Right. By containment
13 leakage.
14 MEMBER POWERS: Now how much iodine is
15 suspended in the containment after that release?
16 MR. HAMMERSLEY: The amount of iodine
17 suspended, of course, is being dissipated because of
18 deposition mechanisms that are on-going. The source
19 term release is over the first two hours. In other
20 words, released from the primary system to the
21 containment occurs over two hours, but approximately
22 ten hours from initiation of the release, the iodine
23 in containment has been reduced to a negligible amount
24 simply organic or, I should say, aerosol is deposited.
25 MEMBER POWERS: Yes, the aerosol part is

1 deposited.

2 MR. HAMMERSLEY: Right.

3 MEMBER POWERS: But doesn't, in fact, the

4 organic iodine concentration in the containment just

5 stay the same? No matter how much you leak, it's

6 continuously reforming and that if I had a pump on

7 this containment, I would eventually pump all of the

8 iodine out.

9 MR. HAMMERSLEY: The source term

10 calculates this 0.15 as the amount and it just allows

11 it to leak during the whole fuel accident sequence as

12 long as it takes. So the dose calculation, yes, it

13 continues to leak, containment leak. For the first 24

14 hours of accident, it assumed to leak at the maximum

15 and it would have that kind of a composition if you

16 will of organic iodine.

17 MEMBER POWERS: I guess what I'm driving

18 at is how much of the iodine gets to the great out of

19 doors.

20 MR. HAMMERSLEY: It gets to the great

21 outdoors?

22 MEMBER POWERS: Yes.

23 MR. HAMMERSLEY: Like I said, I don't

24 know. I don't have the interval number in terms of a

25 mass or something available. But the way the dose

1 calculation was done is it leaked at this 0.33 percent
2 for 24 hours, for example, at which point then it's a
3 different leak rate.
4 MEMBER POWERS: I think I understand.
5 MR. HAMMERSLEY: Okay. So this slide
6 talks about our expectation in terms of neutralizing
7 the acids. So we looked at a severe accident
8 sequence, this particular one. We looked at the film
9 residence time which is a function of the condensation
10 rate occurring in containment.
11 We looked at reduction of acids. In this
12 case, we looked at nitric acid and hydrochloric acid.
13 We looked at the deposition of the cesium iodine onto
14 the film and the number we've talked about in terms of
15 the amount cesium hydroxide that would neutralize the
16 film and if it's neutralized, we say that it wouldn't
17 be expected to be a dose impact. As we mentioned, we
18 looked at sensitivity case that without any cesium
19 hydroxide affecting the pH, what would be the impact
20 on a dose and we judge that to be small.
21 So here we allow that all the iodine
22 transported in containment film is assumed to
23 instantly convert into elemental. The elemental then
24 is partitioned instantaneously into the aqueous and
25 gaseous concentrations based on the water film

1 temperature which maximizes the amount of I_2 in the
2 gas and that's assumed to all be released to the gas
3 phase. Three percent of that is treated to be
4 converted to elemental and that's how we get this to
5 this 0.33 percent. The impact then on the doses is
6 shown here and so this is where we say that
7 significant margin exists so that we can accommodate
8 this kind of an increase in organic iodine
9 concentration produce doses that are still acceptable.
10 MEMBER POWERS: How did you arrive at the
11 three percent of the elemental iodine in containment
12 atmosphere is going to predict organic iodine?
13 MR. HAMMERSLEY: We followed the guidance
14 in the regulatory.
15 MEMBER POWERS: So it's one that imposed
16 on you from the outside.
17 MR. HAMMERSLEY: Yes. What we wanted to
18 do was to compare the design basis source term spills
19 consequence from an impact on that of not controlling
20 the film pH. So we used, if you will, comparable
21 assumptions or inputs to do that.
22 MEMBER POWERS: Yes.
23 MR. HAMMERSLEY: I think that's the end of
24 that subject. Yes. I think Ron wants to comment on
25 the last slide here.

1 MR. VIJUK: Yes. Our last slide just says
2 we've been maintaining the schedule with the Staff and
3 we hope to continue maintaining the schedule.
4 MEMBER KRESS: On your organic iodine, a
5 question again. Do you have a pH control in your
6 sump?
7 MR. HAMMERSLEY: Yes, there is a design
8 using trisodium phosphate to control the pH of the
9 sump. So waters collected post accident are
10 maintained at a pH of seven or greater.
11 MEMBER POWERS: In the sump soil lined?
12 MR. HAMMERSLEY: Sump soil lined?
13 MEMBER POWERS: Yes.
14 MR. HAMMERSLEY: Stainless steel.
15 MEMBER SIEBER: I take it these are
16 baskets of TSP there.
17 MR. HAMMERSLEY: Yes, it's a crystal
18 material in baskets that become submerged post
19 accident by the water that accumulates in the
20 containment.
21 MEMBER SIEBER: Okay. So there are some
22 on the floor.
23 MEMBER KRESS: But none of that would
24 affect the film.
25 MR. HAMMERSLEY: This isn't near the

1 floor.

2 MEMBER KRESS: But none of that would

3 affect the film or the airborne part.

4 MR. HAMMERSLEY: No.

5 MEMBER KRESS: But it would control the

6 sump.

7 MR. HAMMERSLEY: That's right.

8 MR. CUMMINS: Just a clarification.

9 Sometimes we use the word "sump" and they mean

10 different things. The sump behind the screen is all

11 stainless steel, but that's a small part of the

12 flooded volume. The flooded volume, if you consider

13 that the sump, has stainless steel, painted concrete,

14 painted steel, various different things because it

15 fills up to the containment quite high.

16 MEMBER POWERS: And you've looked at

17 things like calcium hydroxide leaking and things like

18 that nature because you don't turn all of your

19 trisodium phosphate into rocks.

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

21 PARTICIPANT: Could you repeat the

22 question please?

23 MEMBER POWERS: Well, you've looked at

24 things like leaching calcium hydroxide out of the

25 concrete surfaces to make sure that you don't start

1 precipitating out calcium phosphate, salts.

2 PARTICIPANT: I don't believe here there

3 are any uncovered concrete surfaces there or either

4 covered with a steel plate or covered with a painted

5 surface. And so we're going to inspect those surfaces

6 and make sure they don't become uncovered.

7 MR. SCHULTZ: I think the only -- This is

8 Terry Schultz. I think the only concrete surfaces are

9 floors so it's hard to imagine the thick epoxy on the

10 floor somehow falling off.

11 MEMBER POWERS: How much calcium does it

12 take before you start precipitating out calcium

13 phosphates?

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

15 that.

16 VICE CHAIRMAN WALLIS: This whole sump is

17 a big chemical experiment.

18 MEMBER POWERS: No, there's no experiment

19 there. We are relying totally on analysis here.

20 VICE CHAIRMAN WALLIS: I know, but it will

21 be an experiment if it ever gets called into use.

22 They might check out the analysis.

23 MEMBER POWERS: Your definition of

24 experiment is different from mine.

25 MEMBER ROSEN: I hope the current work the

1 Staff is doing on integrated chemical effects testing
2 will cover those subjects. I mean there really is
3 supposed to be some testing going on to see what the
4 current operating fleet. We haven't seen the program
5 yet, but we are going to look at that in another
6 context.
7 MEMBER POWERS: And this is to make me
8 sure that these issues that I can never raise again
9 once I sign them on the dotted line.
10 MEMBER ROSEN: Dana, no one is going to
11 ever tell you you can't raise another issue. They
12 would be fruitless to do that.
13 MEMBER KRESS: With that, I guess we will
14 now turn to the Staff's presentation on the FSER and
15 FDA. John Segala, I think, is our speaker.
16 MR. SEGALA: Yes, good morning. My name
17 is John Segala. I'm the lead project manager for the
18 AP1000 design certification review. The purpose of
19 this presentation is to provide an overview of our
20 review, to provide a current status of the project,
21 discuss major milestones and go over two of the ACRS
22 Center broader issues that at the future plant design
23 meeting, those would be the organic iodine issue and
24 the containment sump.
25 Previous milestones, Westinghouse. We

1 completed our pre-application review in March 2002.
2 March 28, 2002, Westinghouse submitted their
3 application. June 25th, we accepted it for docketing.
4 On June 16th, we issued the draft safety evaluation
5 report with 174 open items. On May 18th, we provided
6 responses to your interim letter issues. On May 25th,
7 we sent you an advanced copy of our final safety
8 evaluation report.
9 This slide just gives you an overview of
10 the meetings that we've had to support AP1000. It's
11 a total of 19 meetings including today. Touched all
12 the subcommittee meetings as well as the full
13 committee meetings. The remaining schedule milestones
14 is July 17th, that's our projected date of when we
15 would like to have your final letter by. August 6th,
16 we're going to get division director concurrence.
17 August 13th, OGC, no legal objection. August 30th,
18 EDO memo to the Commission attaching the FSER and the
19 FDA and then we issue the FSER and FDA on September
20 13th and the final design approval on December 2005.
21 MEMBER KRESS: Is this like an ordinary
22 rule that has to go out for public comment?
23 MR. SEGALA: Yes.
24 MEMBER KRESS: That's the difference in
25 those two times.

1 MR. SEGALA: Yes.

2 MEMBER KRESS: Okay.

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

10 VICE CHAIRMAN WALLIS: This includes the
11 managers as well.

12 MR. SEGALA: No.

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

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

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

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

23 MEMBER POWERS: Sounds like an oversight.

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

1 MR. SEGALA: They have plenty of work to
2 do.
3 PARTICIPANT: Yeah, the ESPWR.
4 MR. SEGALA: They have license renewal.
5 They have lots of things to do.
6 MEMBER KRESS: Those people weren't full
7 time.
8 MR. SEGALA: They were not dedicated.
9 This gives you a list of the contractors we had
10 working on the AP1000 and the areas that they helped
11 us on.
12 The next slide is a list. We issued 742
13 RAIs and this gives you a breakdown of the different
14 areas the RAIs covered.
15 In the DSER, we issued 174 open items as
16 compared to 1300 for AP600. Again, this gives a
17 breakdown of where we are. After we issued the DSER,
18 we issued five additional new open items. There were
19 four materials items that came out of the future plant
20 meeting in Pittsburgh and then we had one on the sump
21 which we'll discuss.
22 The next slide gives an overview over time
23 of how we closed out the open items. It took about 10
24 months to close the 174 open items. On May 19th is
25 when Westinghouse issues Rev. 11 of the DCD and that

1 allowed us to close out the confirmatory items that
2 still needed to be looked at.
3 In your interim letter, you identified
4 seven issues which we discussed at the last full
5 committee meeting on June 3rd and we also discussed at
6 the future plant design subcommittee on June 25th.
7 Based on the future plant meeting, they wanted us to
8 give additional presentations on the sump screen
9 performance and organic iodine production.
10 In your interim letter, you identified the
11 AP1000's robust design to prevent screen blockage and
12 that you recommend an ITAAC to insure compliance with
13 GSI 191 and as we pointed out before, we have an ITAAC
14 but the ITAAC doesn't insure compliance with the GSI.
15 I'll talk some more about that.
16 In conclusion to start off with, the Staff
17 believes that it's a robust design which is less
18 susceptible to debris blocking of the screens and we
19 believe we have a regulatory process to handle any
20 significant adverse findings that come out of the
21 continuing resolution of 191.
22 In the DSER, there were six open items
23 related to debris loading of the IRWST screens and the
24 recirculation screens. I think four of them are
25 related to that item and we have one open item on

1 debris through the reactor coolant system break and
2 then we had an open item, this was one of the new open
3 items, which was when Rev. 3 of Reg. Guide 182 was
4 issued. We asked Westinghouse about the chemical
5 effects.
6 This slide's going to be similar to what
7 Westinghouse presented. They have a folded screen
8 design of 140 square feet each. There's a cross
9 connection between the two recirculation screens.
10 They have tall screens. One is 10 foot. One is 13
11 foot. The bottoms of the screens are two feet above
12 the floor.
13 There's a horizontal plate above the sumps
14 screens to keep debris from falling in. The screens
15 are protected by a trash rack and they have low
16 transport velocities and pull and low flow velocities
17 at the screen surface. They have no safety related
18 sprays. The sprays are only used for beyond design
19 basis events so that they won't wash debris into the
20 sump. They use metal reflective insulation in the
21 LOCA blowdown damage zones. They use 20 inside pipe
22 diameters for those areas that have intervening
23 objects and 45 pipe diameters for those areas that
24 don't.
25 VICE CHAIRMAN WALLIS: That's the zone of

1 influence.

2 MR. SEGALA: Yeah.

3 VICE CHAIRMAN WALLIS: So they use 45 for

4 that zone of influence.

5 MR. SEGALA: The ones that don't have

6 intervening objects. They use high density coatings

7 inside containment made of inorganic zinc.

8 MEMBER POWERS: The previous speaker and

9 I discussed a little bit on the question of high

10 density and whether it was indeed going to sink in the

11 water or not given that the water is dosed and

12 chemically reactive. Did you look at that?

13 MR. SEGALA: I don't believe that we

14 looked into that.

15 MEMBER POWERS: What criteria do you use

16 in doing this review of the applicant coming in and

17 saying, "I've done an analysis and I've come to this

18 conclusion, but I don't have any external data to back

19 up my analysis. I've just done the best I can

20 analyzing it"? At what point do you say, "That's

21 great, but I'm know something about, say in this case,

22 epoxies, polymers, that in strange environment they do

23 things like swell and they form gases in other

24 environments and things like that and I need some

25 assurance that this idea is correct." Or is there

1 some criterion or is that just one of those
2 engineering judgment sort of things?
3 MR. SEGALA: I think it would fall into
4 engineering judgment, but this is just one criterion
5 that the Staff looked at in determining the
6 acceptability. You have to weigh everything, the
7 whole design, and when you look at the coatings, they
8 are a higher density than the water.
9 VICE CHAIRMAN WALLIS: What is engineering
10 judgment? Is that simply I refuse to consider the
11 possibility of gas formation and therefore I'll ignore
12 it or is it I have some basis for understanding
13 whether or not gas forms and it's based upon evidence?
14 What is this engineering judgment that's used?
15 MR. SEGALA: I don't have the particular
16 reviewer here right now. They're going to be giving
17 a presentation next for you on GSI 191.
18 MEMBER KRESS: One of the concerns is this
19 is not necessarily an AP1000 issue and it's being
20 worked by the Staff on a generic basis for operating
21 plants. It seems to me like this is a generic
22 question in how they deal with it and the final
23 resolution is important to us and it's an issue we
24 would like to, I think, not qualify as a confirmatory
25 question for operating plants as well AP1000. The

1 AP1000 is more or less putting this type of question
2 off to the COL stage where they have to do an
3 assessment following whatever guidance they are given
4 by the Staff. Our concern is how will the Staff deal
5 with this in the guidance and I'm sure that's not your
6 problem. It's somebody else's problem.
7 MR. SEGALA: Let me finish the
8 presentation. I think I'll at least discuss how we
9 plan to address that issue.
10 MEMBER POWERS: Well, the problem I have
11 on a larger basis is you go through this disk they
12 gave me. It's the one on those odd times in the last
13 month when I've actually been around a computer since
14 I was not given the hard copy that I said would be
15 useful. When you look at it, you can't look at
16 everything. So you pick out things that you know a
17 little bit about and you pick out one that's a current
18 issue here and you say, "Well, they ought do real good
19 about this" and you go through and you can't tell what
20 interrogation has been done on this.
21 This is a relatively obscure issue. I'm
22 not surprised somebody thought that this stuff is
23 more dense than other stuff so it must sink, but it
24 raises the issue of how to handle things that are
25 significant. You pick this one out that there ought

1 to be some developing understanding. In fact, Steve
2 tells us "Hang on. There will be developing
3 understanding on this" but we don't raise a lot of
4 questions. Second, we're going to get down to a tenth
5 of a percent of cesium hydroxide and we're going to
6 walk through the logic on that and we're going to find
7 the same that there are not a lot of questions I have
8 to ask you.
9 MEMBER KRESS: I understand. You might
10 continue or are you might -
11 MR. SEGALA: Well, just we did provide you
12 a 2,000 page document on --
13 MEMBER POWERS: No, you provided a 2,000
14 page disk.
15 MR. SEGALA: Well, that's sitting on the
16 desk right behind you. We provided that. You just
17 needed some staff to carry it for you. That's the
18 problem.
19 MEMBER POWERS: Yes. I asked for both.
20 I didn't get either.
21 MEMBER KRESS: I'm with you, Dana. My
22 eyes crossed when I tried to read those disks on the
23 computer after a while.
24 MR. SEGALA: I'll just go through the rest
25 of the slides. A long time, up to five hours before

1 recirculation allows settling of the particles or
2 debris. Deep containment flood-up levels.
3 VICE CHAIRMAN WALLIS: It also allows a
4 longer time for any chemical reactions which might be
5 occurring.
6 MR. SEGALA: Water level at beginning of
7 recirculation is about 10 feet above the top of the
8 screens which if there's floating debris it won't get
9 into the screens. There is short period of time when
10 you switch from gravity injection to recirculation
11 that you get a little bit of back-flow through the
12 screens.
13 With regard to the ITAAC, the ITAAC
14 verifies that the as-build screen design is in
15 conformance with the design certification design.
16 Location of the plates above containment of the screen
17 makes sure that they are properly located, that you
18 have the appropriate screen surface area. Location of
19 the bottom of the recirculation screens are a certain
20 height off the floor. Type of insulation and the dray
21 film density of the coatings which is greater than 100
22 pounds per cubic foot.
23 COL action items. There is a COL action
24 item that has the COL applicant perform a cleanliness
25 program to limit debris inside containment.

1 MEMBER SIEBER: What will that consist of?
2 I mean is this looking for gang boxes and tools and
3 rags and things or is it actually cleaning equipment
4 or do you know?
5 MR. SEGALA: I think it would be a look at
6 when they go into outages that they clean up all the
7 material that's left behind during outages.
8 MR. CUMMINS: This is Ed Cummins. I think
9 it probably covers all those things. Really you have
10 to satisfy the Staff that you process this sufficient
11 to address safety issues related to containment
12 cleanliness.
13 MR. SEGALA: The item says that the COL
14 applicant will develop a program to limit the amount
15 of debris that might be left in the containment
16 following the refueling and maintenance outages. The
17 cleanliness program will limit the storage of outage
18 materials such as temporary scaffolding and tools
19 inside containment during power operation consistent
20 with the COL.
21 Then there is a COL action item where the
22 COL applicant will perform an evaluation consistent
23 with Reg. Guide 1.82 Rev. 3 to confirm that they have
24 adequate long-term cooling and they are going to
25 consider site-specific resident debris, post accident

1 water chemistry and applicable research and testing.
2 With regard to this item, the Staff believes that the
3 outcome of this evaluation will be a programmatic
4 change where the COL will go back and improve their
5 cleanliness program. If new information comes out of
6 this that says that something more needs to be done,
7 I'll discuss this in two slides what the Staff plans
8 to do to address that.
9 The Staff review is based on the current
10 state of knowledge keeping in mind what's going on
11 right now with the generic issue. Just to give a
12 timeline again.
13 MEMBER FORD: Before you go into the
14 second bullet, during the various reviews it brought
15 up various materials degradation topics and we were
16 satisfied with the disposition of those with the
17 understanding that as we get more knowledge about
18 materials degradation. So something would change.
19 Now in the onset to our inquiries that
20 came back from the Staff, that particular item was
21 somewhat legalistic. It referred to various things in
22 the rules which quite honestly, I didn't understand.
23 Can you briefly reassure me that since this is the
24 last time that we'll be addressing this issue how
25 these materials degradation issues in the future will

1 be addressed?

2 MR. SEGALA: And the next slide I think

3 we'll go over that.

4 MEMBER FORD: Okay.

5 MR. SEGALA: And it will be applicable to

6 both issues or any new issue that comes up in fact.

7 The Staff plans to issue the FSER and FDA on September

8 13th. Complete design certification rule-making by

9 December 2005. According to the Staff's presentation

10 that you're going to get next, the total complete

11 review having everything done with GSI 191 is going to

12 be by December 2005.

13 VICE CHAIRMAN WALLIS: '07.

14 MR. SEGALA: I'm sorry. 2007.

15 VICE CHAIRMAN WALLIS: That's a long time

16 for something to come out.

17 MR. SEGALA: Yes. Just to give you a

18 timeframe of where we are in the completion of that

19 project. This slide is the regulatory change process

20 and up until the time we issue the FSER and FDA, we

21 can make changes fairly easily. If new information is

22 identified after we issue the FDA, there is a process

23 which the Staff can go back and have the Applicant fix

24 the issue or address the issue.

25 In the timeframe after the FDA, but before

1 rule-making is complete, Appendix O of Part 52 Item 5
2 and 50.109 which is the back-fitting rule is what we
3 would follow and that requires either adequate
4 protection or a compliance back-fit. What the staff
5 is proposing for the resolution of GSI 191 is a
6 generic letter with a compliance exception to the
7 back-fitting rule and a compliance exception basically
8 if you determine that the applicant is not in
9 compliance with the regulations that you don't have to
10 do a full back-fit analysis or a cost benefit
11 analysis.
12 If you can do that evaluation which the
13 Staff is going to do for operating reactors, that
14 would also apply for us to go back to Westinghouse and
15 tell them to address this issue. There's a COMSECY
16 paper 94-003 which says that if a new issue comes up
17 after FDA that requires a revision to the zoning
18 control document that we're to notify the Commission.
19 In the time period after the rule-making
20 but before we get a COL applicant come in, 10 CFR
21 52.63(a)(1) again is similar to 50.109, but it's a
22 generic back-fit that we would make to do a revised
23 rule-making and that would also be based on a
24 compliance back-fit type approach.
25 Post COL application. If a COL came in

1 and said they want to build an AP1000 and new
2 information came upon us at that point, we could issue
3 a plant-specific order in accordance with 52.63(a)(3)
4 and that would be based on compliance back-fit as
5 well.
6 MEMBER FORD: Could I ask a question? The
7 first bullet says if new information is identified.
8 Identified by whom? The NRC or Applicant?
9 MR. SEGALA: The NRC.
10 MEMBER FORD: So for instance, the
11 materials degradation issues, we came up with the
12 hypothetical, the possibility, the ADS valves could
13 prematurely activate because of materials degradation.
14 Is the NRC going to be following the development of
15 those particular designs that closely on a real time-
16 basis?
17 MR. SEGALA: If the NRC has found that the
18 materials that are being used are not adequate, that
19 would be something that we would go back and address.
20 MEMBER FORD: Okay. So there would be
21 somebody on the NRC staff who would be watching
22 evolution of the ADS4 valves for instance, the details
23 of that for the time basis.
24 MEMBER KRESS: We were given a description
25 of the inspection program with respect to that.

1 MEMBER FORD: Okay.

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

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

24 This is a curious circumstance, the one we
25 have now. We already know there's an issue with some

1 clogging in PWRs. We just don't know which plants it
2 applies to. We think it applies to some, but not all.
3 So we are devising ways to do plant-specific analysis.
4 Why would we consider that circumstance here something
5 that is post design certification rather than
6 something that's not a back-fit at all? It's not a
7 compliance back-fit. It's not any kind of back-fit.
8 It's a known issue in a new design that simply ought
9 to be corrected or dealt with now in the design.
10 Well, I understand it can't be because we
11 haven't finished exactly how to do the calculations.
12 Fair enough. Why don't we just condition the license
13 that says, "When we figure out exactly how to do these
14 calculations and endorse it by reg." It may be an
15 industry rule by Reg. Guide with whatever additional
16 exceptions the Staff feels necessary, just simply have
17 it as a matter of a license condition on the AP1000
18 that they'll have to go back and do the analysis that
19 way and make whatever changes, if any, that come out
20 of the analysis just like on operating plants. It
21 seems to straight forward to me.
22 And in fact, that's not what you're
23 suggesting here. As I understand it, what we're
24 talking about is when we finally get those rules
25 squared away and the revision to the Reg. Guide out

1 that has references to the rules, we'll go through all
2 of this Part 52 Appendix O if it's pre design
3 certification rule-making and Part 52.63(a)(1) if it's
4 post design certification rule-making.
5 I mean it seems so much more complicated
6 to do that than to simply state when the license is
7 sent out that it's a condition of your license. You
8 have to do this. Bang. That's just so much simpler.
9 Why not do it that way? But I admit I'm not a
10 regulatory lawyer.
11 MR. LYONS: If I could interject. This is
12 Jim Lyons. I'm a program director for the new
13 reactors. I think that really what we're doing is
14 what you're asking. If you look at the way we've
15 address this in the sense that we've taken the design
16 as far as we think we need to take, we've looked at
17 that and found it to be robust, we've put in there a
18 COL action item for them to relook at their debris
19 program and to make that the assumptions that we made
20 in finding this acceptable are still valid and those
21 COL action items are subject to review at the COL
22 timeframe, if there's something there that causes us
23 to either have them make programmatic changes to
24 change their programs to ensure that they have less
25 debris, if that's the issue or if there is a chemical

1 issue that they address the chemical issue, then we'll
2 do that at the COL. If it actually takes it to a
3 point where we see that additional design changes have
4 to be made, then those design changes, we can order
5 them at that time to do it or more likely, there will
6 be a give-and-take with the COL applicant and they'll
7 say, "Yes, we'll provide you a design that satisfies
8 this" because they're going to have to satisfy those
9 COL action items to show that the system is going to
10 operate the way we expect it to.
11 So I think we really do what you want
12 within the legal confines that we have of the ITAAC to
13 look at the hardware and then we have the COL action
14 items that's going to look at the program. I think
15 what John is trying to say here is if, in the
16 intervening time, we find out that there's no way a
17 140 square, two 140 square foot screens, are going to
18 satisfy us, then we can take action in the intervening
19 time. I think at this point, we're saying that we
20 have looked at that design and feel that it is robust
21 and that it will survive.
22 CHAIRMAN BONACA: How would you take
23 action? You said you would take action.
24 MR. LYONS: In the intervening time we
25 could --

1 CHAIRMAN BONACA: In the intervening time.

2 MR. LYONS: -- we could go through the

3 backfit process. I mean, that's why it's there.

4 CHAIRMAN BONACA: So you would treat on

5 the backfit process.

6 MR. LYONS: Yeah.

7 CHAIRMAN BONACA: And this design as if it

8 were --

9 MEMBER ROSEN: Twenty years old.

10 CHAIRMAN BONACA: -- an established plant,

11 you can do that?

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

13 capability.

14 MEMBER ROSEN: But you see, Jim, the

15 question is why hobble yourself so much from a

16 regulatory perspective.

17 MR. LYONS: Well, because the design

18 certification process is to resolve these issues at

19 this time. You know, there's always issues that are

20 coming up, and there's always issues that you say,

21 "Well, why don't we wait a little bit longer to

22 address this issue or wait a little bit longer to

23 address that issue?"

24 And the process is to take a stand, to say

25 this is a good design at this point and that as we

1 learn new information in any area, we can apply that
2 to these plants if it really makes a safety
3 difference.
4 And so, you know, it's the same thing as
5 if you look at we have rulemaking going on in 5046
6 that we define large break LOCAs. Well, we're not
7 waiting to see what happens there to find this
8 acceptable. or to try and apply, you know --
9 CHAIRMAN BONACA: But it just seems to me
10 that, I mean, a defining issue is if you intervened
11 before the COL, it would have to be a conceptual
12 design issue, a deficiency that is in the design
13 itself that you want to have corrected because you
14 will not have a provided permit on this design if you
15 had known that it was a conceptual flaw.
16 MR. LYONS: Right.
17 CHAIRMAN BONACA: So is this the
18 distinction you're making? I mean, the whole design
19 process you have a phase of conceptual design. You
20 have the implementation phase, and so on and so forth,
21 and so trying to understand to what extent you would
22 exercise that. That's an important issue because, you
23 know, this may sit on a shelf, and hopefully it
24 doesn't, but for a number of years without being used,
25 and then you have almost an obsolescence coming to the

1 package due to new issues that are being raised and
2 dealt with.
3 MR. LYONS: You're right, and it requires
4 discipline on the staff's part to, as new issues come
5 up and we address them for the current fleet of
6 operating plants, that we also take at the same time
7 and say, "Oh, how does it affect the designs that we
8 have certified and address them at the same time.
9 There is an amount of discipline that we have to do to
10 do that.
11 And I think the other thing that I wanted
12 to just kind of mention, Peter Ford had asked a little
13 bit about if materials issues come up, you know, you
14 ask who would identify those. Obviously if we
15 identify them, then we would bring them forward.
16 But the combined license holder, I mean --
17 excuse me -- the design certification holder is also
18 obligated under the regulations that if they come up,
19 if they find information, if they come upon
20 information that would call into question the adequacy
21 of the design, I think it's still under Part 21 that
22 they would be required to advise us of those issues so
23 that we could then evaluate them. So it's not just us
24 having to identify them. The industry would also
25 identify those to us also.

1 CHAIRMAN BONACA: I think it would be good
2 to have a clear distinction so we understand it. It
3 seem to me, again, that, you know, issues that really
4 should be dealt at the implementation level because
5 they have to do with the specifics of how you connect
6 a certain component and possible corrosion that may be
7 caused by a specific feature. they could be dealt
8 with, it seems to me at the ACOL stage. Probably they
9 should.
10 MR. LYONS: Right.
11 CHAIRMAN BONACA: And there are others
12 which are of a real conceptual nature that should be
13 dealt before that. I think you have to have some
14 clear understanding of how you're going to intervene
15 on whatever you approve now.
16 MR. LYONS: And I think, you know, we have
17 the processes in place to do that, and so, you know,
18 as you can see, some of them you jump around the
19 regulations to find them, but that's our job. Nowhere
20 to look and where to go.
21 MEMBER SIEBER: Well, I think materials
22 degradation is a little bit different issue than the
23 other aspects of an application that we've talked
24 about. For example, the applicant really doesn't have
25 to tell you what materials he's going to use. All he

1 has to say is, "I will build this system," which
2 includes piping and pressure vessels, "in accordance
3 with the ASME code."
4 And the code now specifies what the
5 strength of the materials, what special processes are
6 involved and so forth, to define that. The code also
7 requires an inspection program, and this is where
8 degradation shows up, and the code also specifies
9 repair methodology.
10 So the idea of the staff saying, "Gee, I
11 don't like this alloy. I like this one over here a
12 little bit better," is not relevant because it's the
13 applicant that chooses the design and applies that
14 design to the requirements of the code, and it
15 inspects and repairs the facility in accordance with
16 the code.
17 So this is where the degradation issue
18 comes in.
19 MEMBER FORD: The only snag I have with
20 that, I agree with what you're saying factually, of
21 course, Jack, but our history in the last 20 years has
22 not been that good in terms of inspecting to prevent
23 an unfortunate incident.
24 MEMBER SIEBER: I think the failure rate,
25 with a couple of exceptions though, has been pretty

1 good, and so the inspection and repair process has
2 worked, and that's what we rely on.
3 The staff is the regulating authority
4 under the code, and so they can impose additional
5 requirements as the need arises. For example, control
6 rod drive mechanism cracking, pressurizer penetration,
7 and so forth, they can do that as the regulating
8 authority because they're named by the code as that
9 person.
10 And I don't think that -- if you wanted to
11 do more than that and be more proactive so that you
12 could tell licensees what to do as opposed to allowing
13 licensees to design to meet certain engineering
14 criteria, that you'd have to come up with new
15 rulemakings to give the staff that authority. At
16 least that would be my interpretation as to how things
17 work now.
18 And whether it's good or not, I'm
19 satisfied that it's good. Perhaps the staff would
20 like to comment on that if they see things differently
21 than I picture them.
22 MR. LYONS: This is Jim Lyons again.
23 Yeah, we agree with you.
24 MEMBER SIEBER: Okay.
25 MR. SEGALA: And this is what I started

1 off with, that we believe it's a robust design and
2 that we have a regulatory process for addressing
3 significant findings from the GSI 191.
4 CHAIRMAN BONACA: Could you just step back
5 a moment?
6 MR. SEGALA: Sure.
7 CHAIRMAN BONACA: I want to look at that
8 slide.
9 Okay. So, I mean, your second bullet says
10 that this plant would comply with the resolution of
11 GSI 191.
12 MR. SEGALA: No, the second bullet is
13 saying that if issues come out of the resolution of
14 the GSI 191, that we have a process for going back and
15 having Westinghouse address it.
16 CHAIRMAN BONACA: Yes, and I agree with
17 the "if." Of course, if there is no problem --
18 MR. SEGALA: Yeah, then they determine
19 that Westinghouse doesn't need to address it.
20 CHAIRMAN BONACA: All right. That's fine.
21 MEMBER SIEBER: But that would not be
22 under the backfit rule. That would be a compliance or
23 adequate protection issue.
24 MR. SEGALA: It is under the backfit rule,
25 but it's a compliance exception to the backfit.

1 MEMBER SIEBER: So that, yeah, you don't
2 have to do the backfit calculation. Okay.
3 MEMBER SHACK: But, I mean, that's the
4 regulatory process they're going to use on the
5 operating plants also.
6 MR. SEGALA: That's right.
7 MEMBER SIEBER: That's right.
8 MEMBER SHACK: So it's the same one.
9 MEMBER SIEBER: Yeah.
10 MEMBER SHACK: But I guess what I'm
11 missing here is how do you force them to evaluate
12 whether they meet the conditions that are set up in
13 the resolution of 191.
14 MR. SEGALA: Well, the compliance backfit,
15 we'd send them a letter that would say that you need
16 to address this issue.
17 MR. CUMMINS: This is Ed Cummins.
18 We have the COL item at the COL stage,
19 and we have to satisfy the staff that that COL item is
20 the best, which says take into account all of the
21 chemistry experiments and recalculate your screen
22 performance.
23 MR. LYONS: This is Jim Lyons again.
24 John, it might be helpful for you to show
25 your back-up slide number 26. Do you have that?

1 VICE CHAIRMAN WALLIS: Why is this
2 Westinghouse's problem? The compliance backfit is
3 plant specific. It goes to the plant specific. The
4 plant makes the calculation based on the details of
5 the plant. It's not generic. Why is it
6 Westinghouse's problem? Isn't it the plant's problem?
7 MEMBER SIEBER: It's their application.
8 So they've got all of the problems that come with that
9 application to solve.
10 MR. SEGALA: The last page of your slides
11 handout is a background slide that gives the detailed
12 description of what is the COL item.
13 MEMBER ROSEN: Does that mean that first
14 bullet that the COL applicant will perform an
15 evaluation system is Reg. Guide 182, Rev. 3? Is that
16 the revision that references the NEI guidance?
17 MR. SEGALA: I don't believe that
18 references the NEI.
19 MEMBER ROSEN: Right. So they can do
20 anything they want. See, this is my whole problem
21 with it. You're basically giving them a free pass, is
22 what you're saying.
23 MR. SEGALA: Well, down here we have that
24 statement about applicable research and testing. They
25 need to take that into account.

1 MEMBER ROSEN: A very weak basis is my
2 conclusion, and hobbled yourself with all of this
3 regulatory stuff when you could just simply say it in
4 a condition of the license that you have to do the COL
5 or whoever, the applicant has to do a calculation
6 consistent with the known, the best guidance
7 available, and that's been endorsed by the staff, and
8 demonstrate that the recirculation cooling will meet
9 its design objectives.
10 And all of this is a way to avoid that,
11 and to narrow the scope and to put it in the future,
12 and I'm just so puzzled by all of that. This is the
13 stage when you tell Westinghouse and any potential
14 COLs that here are the rules of the game. If you want
15 to play and get a license, you have to do these
16 things, and then they could decide whether they want
17 to do that or not.
18 And you have all of these ways of getting
19 around the problem as if you just didn't want to touch
20 it, and I'm just so puzzled by it that I don't -- I'm
21 just very puzzled by your seeming reluctance to
22 grapple the issue.
23 MR. CUMMINS: This is Ed Cummins.
24 I think maybe it's helpful to clarify the
25 review process. We didn't start at this point. We

1 started with Westinghouse performing calculations and
2 the staff reviewing calculations, and I'd suggest that
3 the calculations meet what probably is the current NEI
4 guidelines, though there's a lot of interpretation and
5 disagreement about what the input terms are.
6 And so how do you review that? Well, you
7 try a series of input terms and see what kind of
8 answers you get, and the staff decides. That helps
9 them create an engineering judgment that these screens
10 are robust because regardless of the inputs, we still
11 pass. That's not regardless of any inputs. It's
12 regardless of the ones that we jointly pick.
13 So it's not a case of no technical review
14 being accomplished. It's a case of that we tried to
15 do the technical review completely, but we've come to
16 a point where it's pretty clear to all of us that we
17 haven't established the rules for the technical
18 review, and so that's what leads to this.
19 Now, if you talk about design
20 certification and what the industry wanted with it,
21 the industry wanted from design certification
22 certainty similar to the plants in a backfit situation
23 where they certainly didn't want a piece of paper that
24 says except for all of the generic issues, you know,
25 you have approval because how do you pressure the

1 staff and the NRC to decide whether it's acceptable or
2 not?
3 And we think it's important to pressure
4 the staff and the NRC and the ACRS to decide whether
5 things are acceptable with the information that they
6 have today.
7 CHAIRMAN BONACA: Going back to the second
8 bullet, why don't you have somebody who applies, and
9 still have some that works to the degree to which it
10 is defined by the resolution of GSI 191?
11 MEMBER KRESS: I think we can move on to
12 the iodine.
13 MR. SEGALA: Okay. This was Issue 6 from
14 the interim letter that you guys issued to the staff.
15 The issue regarded the water film pH determines the
16 iodine behavior. A pH less than seven leads to
17 production of elemental iodine, some of which is
18 converted to organic iodine.
19 MEMBER POWERS: But is it true as it
20 implies there that if I'm at seven or less I can get
21 organic iodine, but if I'm at greater than seven I get
22 none?
23 MR. SEGALA: I believe that -- I mean,
24 Chris can check me if I'm wrong -- but I believe even
25 a little bit lower than seven you're still okay. It's

1 maybe --

2 MEMBER POWERS: Okay is a question. I'm

3 sure we're going to --

4 MR. SEGALA: There's a point at which the

5 curve drops off and you have significant production.

6 MEMBER POWERS: I think that's probably

7 true if I was talking about molecular iodine. If I'm

8 talking about organic iodine, doesn't it fall off

9 fairly slowly?

10 MR. SEGALA: I think the staff feels

11 comfortable if it's above seven that we are okay in

12 terms of organic iodine re-evolution.

13 MEMBER POWERS: Where does that comfort

14 stem from?

15 MR. SEGALA: i believe it's from the

16 NUREGs that we have.

17 MEMBER SIEBER: Well, the current plants

18 have the same --

19 MR. PARCZEWSKI: Kris Parczewski, NRR.

20 We did audit the licensee analysis. We

21 did not perform our independent. We did audit the

22 analysis, and we found to us it was acceptable.

23 MEMBER POWERS: Okay. Well, he's made the

24 contention that if he can keep his pH greater than

25 seven he doesn't have an organic iodine problem. Why

1 are we so confident of that?

2 It seems to me there were sump tests done

3 in irradiated solution in England by Howard Simms in

4 which he saw even at pH nine that he was getting

5 organic iodine coming off.

6 MEMBER KRESS: Dana is correct. The pH of

7 seven -- I had something to do with that -- was

8 intended to keep from getting too much elemental

9 iodine released from the sump water at the time, and

10 it really didn't address organic iodine at all, other

11 than the fact that organic might have been produced

12 from elemental iodine while the iodine ion is in

13 solution.

14 But the pH of seven really didn't address

15 organic production I don't think. Is that your

16 understanding, Dana?

17 MEMBER POWERS: Yeah. Well, I mean, it's

18 been an article of faith, and it moves around. It's

19 seven. Sometimes it's eight. Other times it's six

20 and a half, and it gets small for elemental iodine.

21 But when we look at the radiolytic

22 solution process and think about what's happening to

23 the organic materials that might be in that solution,

24 you come away and say, well, you know, there's nothing

25 really too magical about pH here. It doesn't have the

1 strong pH of the dependence of the equilibrium that
2 you have with elemental iodine.
3 And Howard Simms reported some stuff at
4 one of the iodine conferences that I'll admit
5 attracted a lot of attention, shall we say. He was
6 getting fully ten percent of the organic iodine coming
7 off at pH nine that he was getting at pH five. Okay?
8 And it was a puzzlement to him and
9 everyone else, and I'm just wondering why are we so
10 confident. I mean, we've audited the licensee's
11 calculations and found them reasonable. So surely the
12 licensee must know why we're confident about pH seven,
13 or the applicant in this case since he doesn't have a
14 license yet.
15 I mean, somebody has got to be confident
16 in this number that you're not very confident about,
17 and it has been a long time since I've looked at it.
18 So I'm not very confident in it. Who's confident in
19 this number?
20 MEMBER KRESS: Well, I think the problem
21 is we're thinking in design or people are thinking in
22 design basis space, which has almost ignored the
23 question of elemental or organic iodine. I mean, it's
24 been ignored completely. So they threw something in
25 there, and it's based on -- the amount that they threw

1 in there was based to some extent on calculations and
2 to some extent on the findings they had years and
3 years ago at Hanford in their containment, which
4 didn't have an exact chemistry. It didn't have the
5 right things, but it's the age old problem of in
6 design basis space you're told what to deal with, and
7 if you can deal with that, the assumption is that in
8 severe accident or PRA space you're all right, even
9 though you may be producing a lot of organic iodine
10 that you didn't count on, that you designed the system
11 robustly enough in design basis space, and combine
12 that with the low probability or low frequencies of
13 severe accidents, that you probably meet the safety
14 goals even though you've put in a lot of iodine.
15 So I don't know how to deal with it,
16 frankly. I think it's an issue that we haven't dealt
17 with very well. I think like you I believe there is
18 an organic iodine pump; that if you have organics
19 present to react with the iodine, it will continue to
20 put organic iodine in the containment indefinitely.
21 And the question is: is that an issue or
22 problem? I don't know.
23 MEMBER POWERS: Well, what it will come
24 down to is sooner or later we'll come down to this
25 one, .15, .33 percent concentration in the

1 containment, which turns out to be numbers I really
2 have no objection to.
3 But we have all of these ancillary
4 statements that show up. Now we get into this problem
5 that people seem to roundly decry lately, where we put
6 these things in, and now somebody else is going to
7 come along and grab this and say, "Ah, there's a cliff
8 at pH seven," and --
9 MEMBER KRESS: I agree with you. I think
10 the pH seven is a bit of a perversion of its use.
11 MEMBER POWERS: I mean, this is an area
12 where there has been a huge amount of research, and we
13 see people standing up at ANS meetings profoundly
14 saying that, well, nobody has gone and corrected the
15 understanding of iodine.
16 There's been a huge amount of work here,
17 but we're grabbing hold of things. I mean, this is,
18 I think, a problem that, boom, here's the answer, and
19 we've done tests at RTF facilities in Canada. We've
20 done tests in strangely named facilities in France.
21 We've done these tests in Great Britain, and here's
22 the answer, but that's not what we get.
23 MEMBER KRESS: And I think in my mind this
24 is a potential research issue that needs to be
25 addressed.

1 MEMBER POWERS: It has been addressed. I
2 mean, we have beaten this thing half to death.
3 MEMBER KRESS: I mean research from the
4 standing of research needs to look at what the
5 findings of these tests are with respect to organic
6 iodine and maybe come to some sort of a finding of
7 whether we have a generic problem or not.
8 VICE CHAIRMAN WALLIS: Well, the concern
9 is that there's an incorrect statement being made,
10 that decisions are being based on this magic number?
11 MEMBER KRESS: well, we don't know if it's
12 incorrect or not. It's just that the pH around seven
13 was meant to control the partitioning of elemental
14 iodine.
15 VICE CHAIRMAN WALLIS: That's a different
16 question.
17 MEMBER KRESS: It didn't deal with --
18 VICE CHAIRMAN WALLIS: That's a different
19 question.
20 MEMBER KRESS: But it does impact
21 elemental and organic because it's a chemical process
22 that --
23 VICE CHAIRMAN WALLIS: Well, it was an
24 unsubstantiated statement.
25 MEMBER KRESS: It hasn't been

1 substantiated for production of organic iodine.

2 VICE CHAIRMAN WALLIS: Well, we should

3 probably point that out because someone else may use

4 this for the wrong purpose.

5 MEMBER KRESS: Yeah, it's something worth

6 pointing out.

7 VICE CHAIRMAN WALLIS: Even though it may

8 not impact the safety issue with this plant.

9 MEMBER KRESS: It may be a lessons learned

10 type thing, that we want to put in a lessons learned

11 letter.

12 VICE CHAIRMAN WALLIS: I had a question on

13 the next slide.

14 MR. SEGALA: Okay.

15 VICE CHAIRMAN WALLIS: What do you mean by

16 a minimum of 270 grams were sufficient to keep the pH

17 above seven?

18 MR. SEGALA: Westinghouse -- the three

19 bullets are the three --

20 VICE CHAIRMAN WALLIS: Yeah, but would you

21 explain what this means? I mean, there's a film

22 running down the wall?

23 MR. SEGALA: If you look --

24 VICE CHAIRMAN WALLIS: Where is the

25 ground? Where are these applied when and how? How

1 does this stuff get into the film and where and when?
2 Does it get in in one stop? Does it get in over a
3 long period of time? Does it get in in one place?
4 Does it get in in the form of a rock? Does it get in
5 in the form of vapor or what is it?
6 It's not a meaningful statement as it
7 stands.
8 MEMBER POWERS: Well, just to go on
9 further, if you accept the statement at face value and
10 say a tenth of a percent of the cesium hydroxide until
11 it gets in there keeps the pH above seven, it means
12 that film, as you would well guess, is extremely
13 sensitive to a certain amount of contamination. It
14 doesn't take very much to change its pH.
15 And we have assuredly looked at cesium
16 hydroxide, and I can assure you that most of the
17 material coming out of the core is not cesium
18 hydroxide in this. Most is something else affected
19 the pH.
20 VICE CHAIRMAN WALLIS: That's a broader
21 question which you raised earlier. All kinds of stuff
22 influences the pH.
23 MR. CUMMINS: We did the calculation
24 independent of pH.
25 MEMBER POWERS: We understand that.

1 VICE CHAIRMAN WALLIS: Maybe that's the
2 answer we need.
3 MEMBER POWERS: It is. It is.
4 VICE CHAIRMAN WALLIS: It's other things.
5 MEMBER POWERS: It's all this ancillary
6 stuff, that if you just threw that out and said,
7 "Look. I varied the amount of organic iodide from ten
8 to the minus ninth percent up to a tenth of a percent
9 or up to one percent, and it didn't change my boundary
10 conditions very much, and I don't know very much about
11 this, but I don't see it getting beyond that," I would
12 probably shake my head and say, "Well, I could do a
13 better job here, but this is good enough."
14 What we're taking in here is all kinds of
15 things, that people are going to come along later and
16 say, "Oh, a tenth of a percent of cesium hydroxide
17 inventory is present in cesium hydroxide, and I'm
18 going to use that for some other calculation."
19 And in fact, right now people have a very
20 hard time understanding how any of the cesium would
21 ever be in cesium hydroxide form, and the cesium
22 hydroxide can't get out of the primary piping system
23 without reacting and forming something else.
24 And some of us are around saying, "I don't
25 understand why this stuff isn't chromic acid

1 solution."

2 But I mean, -- well, --

3 VICE CHAIRMAN WALLIS: So what we're

4 learning is that the staff didn't ask the kind of

5 questions which would occur to a reasonably informed

6 technical expert.

7 MR. SEGALA: I think staff had

8 Westinghouse perform these evaluations, and when they

9 performed their sensitivity study where they assumed

10 no cesium hydroxide was present and they still met the

11 DBA dose criteria, that's the point where the staff

12 felt comfortable that they've adequately addressed

13 this issue, which is the third bullet on the slide.

14 MEMBER POWERS: Your understanding of what

15 Westinghouse did is they came along and said, "Look.

16 I've got up to as much as 81 grams of organic iodide

17 suspended in this containment over some period of

18 time, and I'm leaking it out of the containment at the

19 design basis leak rate. It's" --

20 MEMBER KRESS: Point, one percent, I

21 think.

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

23 MEMBER SIEBER: Per day.

24 MEMBER KRESS: Per day.

25 MEMBER POWERS: "And it always has 81

1 grams suspended in the containment. During that leak
2 rate nothing drains down."
3 MR. DROZO: This is Andre Drozo.
4 The only constant value is the leak rate
5 about in 24 hours. The amount of airborne is changing
6 in time calculated by simplified equation with so-
7 called removal rate or lambda.
8 MEMBER POWERS: The lambda applies to the
9 IRSL (phonetic) fraction.
10 MR. DROZO: We also apply to some extent
11 to organic iodine.
12 MEMBER POWERS: Oh.
13 MEMBER KRESS: The reason being that that
14 lambda is mostly thermal phoresis and diffusial
15 phoresis, and most of it is diffusial phoresis?
16 MR. DROZO: That is correct, and there are
17 some other studies indicating that one way or the
18 other gaseous iodine is being removed, and we came to
19 the conclusion that the rate of it is similar to that
20 of removal of aerosol. Therefore, we don't
21 distinguish one from the other.
22 MEMBER POWERS: I guess I'm unaware of
23 those studies. In fact, to the contrary, I am aware
24 of experiments that show we reach a quasi steady state
25 concentration of organic or elemental iodine and the

1 containment just holds there because you've got a
2 dynamic process of partitioning out of the water phase
3 and destruction in the gas phase.
4 MR. DROZO: So for better or worse, that's
5 what we do. Unless somebody would tell us we are
6 totally wrong, that's what we do.
7 We are kind of limited by a set of
8 regulations and NUREGs that we can work with, and as
9 regulators we are kind of blindfolded. Unless
10 somebody tells us that NUREG 45 or some other NUREGs
11 are wrong, that is our basis.
12 VICE CHAIRMAN WALLIS: So if there's some
13 other scientific evidence which doesn't happen to be
14 in the NUREG, it's ignored. Is that the case?
15 MR. DROZO: Well, I wouldn't put it that
16 way, but --
17 (Laughter.)
18 VICE CHAIRMAN WALLIS: That seemed to be
19 what you were saying, that you only look at NUREGs.
20 MEMBER KRESS: That is the nature of
21 design basis specs.
22 PARTICIPANT: I mean, I think that's a
23 correct statement.
24 MEMBER POWERS: I mean, the trouble the
25 regulator quickly gets into is that alternative

1 evidence is so equivocated relative to the absolutes
2 of the regulatory process that even if he was aware
3 of, there's not a real good mechanism for using it in
4 a generic sense.
5 VICE CHAIRMAN WALLIS: Well, the other
6 problem you have then is if the new evidence shows
7 that the NUREG was wrong, what is the mechanism for
8 changing it.
9 MEMBER POWERS: well, I mean, the thing
10 for them to do is to flag it and say, "Fix it." I
11 mean, if they feel handicapped and blindfolded and
12 whatnot, just put a codicil on the thing and say, "Fix
13 this damned thing."
14 But, I mean, here I think we've got a
15 fundamental divergence in what we think is going on
16 with respect to iodine. I mean we concede the first
17 24 hours most of the iodine in containment is always
18 going to be particulate iodine in the normal reactor.
19 Here you've got a more interesting situation because
20 of the diffusial phoretic component, and suddenly the
21 organic and the molecular become much more interesting
22 here because you are removing a lot of the
23 particulate.
24 And I haven't gone through the simple
25 exercise of saying at what point does organic become

1 dominant here, and shame on me for not doing that, but
2 at some point it does.
3 But the organic material, I think most
4 people, based on a bunch of tests that were run up in
5 Canada, and I think the committee got exposed to that
6 when the ACR700 folks came down and gave us a preview
7 of the science behind their application, discussed
8 this, believe that what you're seeing in the
9 containment atmosphere as far as these volatile
10 species is dynamic equilibrium holding you at a quasi
11 steady state, and, yes, material is being removed, but
12 it's promptly being replaced because the solution is
13 madly trying to maintain an equilibrium concentration
14 in the atmosphere.
15 And so it becomes an issue of how much
16 driving force do you have for leakage. Now, the
17 numbers we see on the dose calculations and a .1
18 percent per day leak rate means that a host of sins
19 can be committed here on what the driving force is,
20 and you're not going to change that site boundary
21 dose. It looks like maybe the control room dose is a
22 little more sensitive to it, but not a great deal.
23 VICE CHAIRMAN WALLIS: So the consequence
24 there is that there's all kinds of uncertainties, but
25 it doesn't affect the conclusion about AP1000?

1 MEMBER POWERS: That seems to be the
2 answer that one of the previous speakers was giving
3 us, and gets whispered into my ear about every 30
4 seconds here. I'm a good student of back seat
5 drivers.
6 But nevertheless, we've got a problem, it
7 seems to me, and we need to keep our viewgraphs, if
8 not our documentation, clean.
9 MEMBER KRESS: I think that's a good
10 message.
11 MEMBER POWERS: I mean, for instance, just
12 saying, okay, a minimum of 270 grams of cesium
13 hydroxide keeps the pH at seven, my conclusion from
14 that if I was doing a review is the pH of this film is
15 extremely sensitive to contamination from the stuff
16 coming in in the containment, and so I don't care what
17 pH this guy says it's going to be, unless he can
18 demonstrate it in an experiment, it's going to be the
19 bad pH. So show me a sensitivity calculation much as
20 he's done.
21 And this is the only thing I'm going to
22 pay any attention to, and the question is: did he go
23 over a big enough range here? And like I say, .15,
24 .23 percent inventory doesn't sound like a bad number.
25 MEMBER KRESS: And did he hold it forever

1 at that level.

2 MEMBER POWERS: Yeah. Well, that's the

3 other question. Did he treat gaseous iodine as

4 distinct from a particulate iodine because different

5 physical process is affecting it.

6 MEMBER KRESS: Okay. Could you go to your

7 conclusion slide?

8 MR. SEGALA: Yeah. This is all of our

9 DSCR open items are resolved, including the five new

10 open items. We believe that we've addressed all of

11 your interim letter issues.

12 VICE CHAIRMAN WALLIS: You mean you've

13 resolved them, too? You can address things without

14 actually doing anything at all.

15 MR. SEGALA: Well, it's up to you to

16 determine whether we have resolved them.

17 (Laughter.)

18 VICE CHAIRMAN WALLIS: You mean you

19 believe you have resolved them.

20 MR. SEGALA: Yes.

21 MEMBER KRESS: Address unknown.

22 MR. SEGALA: And we're on schedule to

23 issue the FSER.

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

25 I think we can come back to one that you

1 did not touch upon, and that's -- maybe you did touch
2 upon it -- and that's the in vessel retention. The
3 previous speaker said, "Gee, I think I get in-vessel
4 retention, successful in-vessel retention if I just
5 depressurize and get water around the vessel in a
6 timely fashion."
7 Do you accept that argument?
8 MR. SEGALA: The staff -- I don't believe
9 I have the reviewer here, but the staff believes that
10 in-vessel retention is going to happen, but we had our
11 Office of Research do an evaluation to look at what
12 happens if it does get ex vessel, and the staff has
13 determined that looking at that, that the containment
14 would be in tact and you know.
15 MEMBER POWERS: Isn't, in fact, the amount
16 of radioactivity suspended in the containment
17 atmosphere if it was ex vessel?
18 MR. SEGALA: In terms of dose to the
19 public or --
20 MEMBER POWERS: Well, that's where we're
21 going to go eventually.
22 MR. SEGALA: Yeah.
23 MEMBER POWERS: I mean, you're going to
24 fix the leak rate so that what it does to the public
25 is totally dependent by the inventory suspended in the

1 containment atmosphere as a function of time.

2 MEMBER KRESS: I think the staff only

3 looked at the potential for failure of containment

4 with the ex vessel. They didn't deal with fission

5 products.

6 MEMBER POWERS: Well, that's remarkable,

7 isn't it?

8 MEMBER KRESS: I think they might argue

9 that a lot of the diffusial phoresis has cleaned the

10 vessel atmosphere before you get an FCI, although I

11 haven't seen the relative timing of that. But you

12 know, that would be my thinking, except for this pump

13 process where you keep the iodine, some gaseous form

14 of the iodine airborne indefinitely.

15 MR. SEGALA: One of the interim letter

16 items was that you wanted us to provide you a copy of

17 the evaluation that the staff did, and we provided

18 that, I think, before the June 3rd meeting. I don't

19 know if you've had a chance to look at that.

20 MEMBER KRESS: I have looked at it, and

21 basically I think the rest of the committee has not

22 had a chance to look at it, and I don't know what

23 mechanism at this point to do that with other than to

24 say that I looked at it, and what they did was a

25 sensitivity analysis on the amount super heat that the

1 melt would have coming in, the content of the super
2 heat of the metal, that is, metal fraction; the total
3 amount of mass entering the water, and the actual
4 subcooling of the water.
5 Using those as sensitivity parameters,
6 they looked at what might be considered a delayed
7 trigger. Normally the trigger in this Texas code they
8 use is when it hits the bottom, they delay that so
9 that by delaying it that creates more mass entering
10 into the system.
11 Then given that total mass and the super
12 heat and the metal content and the subcooling in the
13 water, they just applied texas directly, and --
14 VICE CHAIRMAN WALLIS: What does Texas do?
15 MEMBER KRESS: First, it assumes a pre-
16 size for this metal or for this mass. At the trigger
17 point, it sets off a shock wave that goes through the
18 total amount of mass and --
19 VICE CHAIRMAN WALLIS: Makes the energy
20 available to the water.
21 MEMBER KRESS: No, it puts the energy into
22 the -- drop it into the mass, the melt mass, converts
23 it to very small particles that have a rapid heat
24 transfer process, creating a thermal shock that goes
25 out and damages -- it hits the containment and bounces

1 back and forth. It actually reverberates and does
2 whatever damage and impulse --
3 VICE CHAIRMAN WALLIS: It's a pressure
4 shock. It's not a --
5 MEMBER KRESS: It's an impulse shock, and
6 the calculated loads were such that they did not fail
7 containment over this sensitivity rate.
8 Now, that was my understanding of what the
9 staff did, which is fairly robust, I think. You have
10 to believe the Texas code calculations. You have to
11 look at those, and you have to look to see whether
12 they delayed the initial, the trigger long enough to
13 get a significant mass, and it also converts a certain
14 fraction of that mass into energy.
15 I don't know how else t. I've got the
16 reports. You can read those.
17 MEMBER POWERS: It's neither here nor
18 there to me because the issue is whether you violate
19 the rules on the dose site boundary.
20 Saying it's neither here nor there is too
21 strong. We don't fail containment. Okay? Now, do we
22 change the inventory of material to release? Hard to
23 believe that you don't change it some. So now it's a
24 question of do we change it enough to change that
25 conclusion.

1 MR. CUMMINS: This is Ed Cummins.

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

13 So that's just how PRA works.

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

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

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

1 MR. SCHULZ: Yeah, Jim Scobel from
2 Westinghouse is really the right person to answer
3 that, but he's not here.
4 MEMBER POWERS: Well, right now I'd really
5 like to have the staff answer that question. To be
6 honest with you, they're the reviewers, and they're
7 the ones that have this faith.
8 MR. SEGALA: I don't have the cognizant
9 reviewers here right this second. We could try to get
10 them for you.
11 MEMBER POWERS: We get a lot of those
12 answers.
13 MR. SEGALA: Well, we have 80 -- we have
14 90 reviewers. I couldn't fit them all in this room.
15 MEMBER KRESS: They wouldn't all fit in
16 here.
17 MR. SEGALA: Eighty-eight, whatever.
18 MR. CUMMINS: We did include focusing, but
19 I'm not sure that we can answer the next question
20 because how did you include focusing; we need to
21 really get the experts here.
22 MEMBER KRESS: I think we're running a
23 little over time, and at this point I'd like to close
24 off this FAS presentation and ask if there are members
25 of the public present that wish to make any comments

1 before we move on.

2 PARTICIPANT: Tom, Dr. Sterret wants to

3 make a statement.

4 MEMBER KRESS: Yes, please come up to the

5 front. She'll introduce herself.

6 DR. STERRET: Can you hear me?

7 MEMBER KRESS: Yes, please introduce

8 yourself.

9 DR. STERRET: Hi. This is Susan Sterret.

10 I'm an Assistant Professor of philosophy at Duke

11 University.

12 I've previously raised some concerns about

13 the AP600 design certification, and the NRC had said

14 that they would respond in a letter, which they did

15 recently, and what I've done is I've prepared -- I

16 realize you're short on time here -- so what I've done

17 is I've prepared a chart of a summary of the questions

18 I've asked and the response.

19 I have also with me the entire letters if

20 anybody wants them. I have packets of the entire

21 letters for you if you'd like.

22 What I've done here is shown why a lot of

23 questions still -- some weren't addressed and some

24 were addressed but I felt not adequately answered.

25 So first I want to say I appreciate very

1 much that the NRC went to the trouble of writing this
2 very long letter. I think it's very helpful, but I
3 feel there are still are some pretty serious questions
4 in my mind.
5 Do you want me to go over these or do you
6 want me to just let you look at it and you ask me some
7 things about it?
8 MEMBER KRESS: I think it might be well
9 for you to just go over it.
10 DR. STERRET: Okay. If you're willing to
11 give me the time, I appreciate that. Okay. I wasn't
12 expecting it, but thank you.
13 Okay. The first topic was on the heat of
14 solar radiation. The idea is that at different
15 latitudes certainly the radiation from the sun is
16 going to have some effect on the concrete temperature.
17 So my question was: was the effect on the concrete
18 temperatures which are used in the analysis for the
19 containment cooling accounted for?
20 The answer that was given me only
21 addressed the water temperature in the PCS tank. So
22 that question wasn't addressed.
23 I'm not saying I know it's a problem.
24 It's just that you'd like to see the climactic
25 condition of the latitude come in. The reason that my

1 attention was drawn to it is I don't see it in one of
2 the site parameters, and you'd think that this is a
3 different kind of cooling than the other means used on
4 active plants.
5 So then in terms of the water temperature,
6 the answer I was given was that it was just judged
7 negligible, and I don't know if that was quantified or
8 what, again, since the answer didn't appeal to site
9 latitudes.
10 When I say "latitude," I mean geographical
11 latitude. I can't really tell how in depth that
12 analysis was.
13 The second part of the answer was that
14 tech spec requirements and actions will bound any
15 possible solar radiation effects, and what they meant
16 there is that if water in the tank gets too high, we
17 have tech specs. We're constantly monitoring it, and
18 we'll shut the plant down.
19 Okay. Really the question is: is the
20 plant designed to operate under the site parameters,
21 not that it will be safe because we can shut it down?
22 And then I point out that, of course, if
23 we consider what happened in France recently where
24 15,000 people died because of the heat, the one thing
25 you don't want is when it gets in the middle summer

1 that the plant is safe because you can shut it down
2 because people are going to need the electricity
3 during then.
4 Okay. So that was the first issue. So I
5 think that that question -- I'm not saying I know that
6 it's a problem. It's just that I feel that that
7 wasn't answered to my satisfaction.
8 The second question had to do with fluid
9 systems designed. I asked this question very, very
10 early in the process, over a year and a half ago, I
11 think. Two key question were: have signed off fluid
12 system performance calculations been done? And the
13 answer that has been consistently given is, no, that's
14 not expected either because Westinghouse is using the
15 approach of DAC, design acceptance criteria.
16 I believe -- and I think the people here
17 who know for sure are here, so this is good -- I
18 believe that this answer is based on a
19 misunderstanding because the DAC areas, design
20 acceptance criteria, fluid system performance is not
21 one of them as far as I understand.
22 MR. SEGALA: The design acceptance
23 criteria is for piping, I&C, and control room human
24 factors design.
25 DR. STERRET: Okay. Then when I asked the

1 question on, okay, suppose there are some things that
2 aren't going to be far enough along, well, then the
3 answer is then my question is maybe you have to have
4 L/D criteria, and that's length over diameter. It's
5 a criteria of piping resistance that you use to
6 specify how constrains on the piping layout so that
7 your fluid system performance won't be adversely
8 impacted.
9 And the answer I was given is that the NRC
10 will verify calculations through, quote, appropriate
11 use of ITAAC of design and construction activities,
12 and the NRC will review adequacy of licensee design
13 engineering during construction phase.
14 And my feeling, and this has been sort of
15 consistent, we have sort of had this stance
16 consistently over the year and a half. I guess I felt
17 ITAACs were supposed to provide a check on an as-built
18 design, not eliminate the need for doing the basic
19 design prior to the FDA milestone final design
20 approval.
21 And an overall comment on this is that
22 this seems to me to be missing one of the points that
23 the Kemeny Commission stressed wasn't emphasized that
24 much at the time of TMI, but they did point it out and
25 I think now it become salient. They cited the dangers

1 of a licensing process where the NRC attention is
2 really focused on the primary safety systems in great
3 detail, and then when problems are found at the later
4 stage that require design changes, there's a lot of
5 economic and political pressures not to make those
6 changes.
7 Okay?
8 VICE CHAIRMAN WALLIS: I'm trying to think
9 of what system you have in mind for the criteria.
10 DR. STERRET: Oh, well, yeah. It's very
11 simple. If you look, for instance, Chapter 15, look
12 at the accidents they consider, a lot of them start in
13 the secondary system: how heat is removed from the
14 RCS, how extra heat is put in over cooling. Those are
15 all secondary side systems. Okay?
16 So all of these things matter to the
17 safety analysis, and so if I ask does your safety
18 analysis depend on some of these fluid systems
19 requirements, the answer is yes.
20 Then I say: okay, what gives you
21 confidence in your analysis then? ITAACs. I don't
22 think that's appropriate. I think that ITAACs are
23 supposed to just check that your as-built is as
24 designed, not that your as-built meets --
25 VICE CHAIRMAN WALLIS: Will work.

1 DR. STERRET: Yeah, yeah. The third basic
2 category was on design control. The question that I
3 asked in the letter to the ACRS was for AP600
4 documents referenced in the design certification
5 submittal, who decides or what process is used to
6 determine or declare these are applicable to the
7 AP1000?
8 And when I said that, I meant is it the
9 group or person or whatever that was responsible for
10 authoring it initially or is it, you know, whoever is
11 putting together the submittal, say, the project
12 manager or is it the same kind of group?
13 And the NRC response I got was -- I'll
14 just quote here -- "Westinghouse has stated that they
15 have a continuous QA program spanning the AP600 and
16 the AP1000," and that is Westinghouse's QMS, quality
17 management system, and the NRC reviewed that in 1996
18 for conformance with 10 CFR 50, Appendix B.
19 The other comment, the AP1000 was derived
20 from the AP600, but there's an AP1000 project specific
21 design control process -- actually the AP600 change
22 control process -- specified all documents generated
23 for the AP1000 design are subject to independent
24 review.
25 Okay. That answers a question about how

1 new documents that are generated for the AP1000, how
2 they're controlled, but it doesn't answer the question
3 about do they control over claims that appeal to AP600
4 documents. And I looked for some specific examples in
5 the DCD, and here's an example.
6 For the adverse interaction report, if you
7 know what that is, that's a question here there's
8 unintended consequences of things that interact with
9 each other and new changes that are made.
10 The answer that's given in the DCD is
11 referral to the AP600 adverse interaction report and
12 a statement that because of fluid system design it's
13 the same. It's applicable to the AP1000.
14 Okay. Maybe that's true, but the question
15 is was that done by the people who designed the
16 systems and originally wrote the adverse interaction
17 report or should have written it, or is that done by
18 the three people who signed the DCD who are the
19 project management types of people?
20 Another example that I think is salient,
21 which was actually relevant to the discussion today,
22 is about incorporating industry experience. If you
23 look at the justification there, it says, well,
24 engineers are always paying attention to things that
25 are coming from the NRC.

1 But then it also says, well, the utility
2 requirements document incorporated a lot of industry
3 experience and the utilities who oversaw the AP600
4 design incorporated a lot. That is true. The thing
5 is that that's, again, for the AP600, not for the
6 AP1000.
7 Okay. Who oversaw that? Was it technical
8 people who were actually cognizant of things like
9 material degradation issues, for instance, things like
10 that?
11 Okay. So what I'm saying is that the
12 answer that was given doesn't address the question
13 about referral to AP600 documents. Who decides how
14 that's applicable?
15 It also doesn't describe a process of
16 comprehensive review to determine which things need to
17 be changed in deriving the AP1000. It says if you
18 make this change and you're going to have an AP1000
19 document, you know, make sure it's consistent with the
20 plant parameters, but as far as I know, the answer
21 doesn't talk about a process where you do a
22 comprehensive review to determine what needs to be
23 changed.
24 Okay. The last thing. What was the
25 process for generating overall plant parameters for

1 the AP600? And the answer to that was the AP1000 is
2 not an operating of the AP600. So it wasn't an
3 operating process, and as far as NRC review, the NRC
4 prepares the safety valuation report for the AP1000,
5 and that is independent of the AP600. The scope and
6 contents of the design application were supposed to
7 be equivalent to the level of detail found in a final
8 safety analysis report for current operating plant.
9 Since the SER is not publicly available
10 and, in fact, it is not going to be publicly available
11 before FDA is granted, I can't really review it to
12 tell much more. All I can say is that it would seem
13 that the question of how all the plant parameters are
14 interrelated -- and here I'm talking about something
15 like, say, the consistency of the plant heat balance,
16 overall plant heat balance with plant system
17 parameters and site parameter envelope. That should
18 figure in the NRC review in various ways I would
19 think.
20 So this is a summary. I guess I'm asking
21 you to look at it.
22 MEMBER KRESS: Are there any questions of
23 Ms. Sterret at this time? Or do we want to take time
24 to read this letter and cogitate on it before we --
25 well, we thank you --

1 DR. STERRET: Thank you.

2 MEMBER KRESS: -- for your input. It is

3 always useful.

4 DR. STERRET: Thank you.

5 MEMBER KRESS: And we will take a look at

6 this and think about it and try to digest it a little

7 better.

8 Thank you.

9 DR. STERRET: Thank you very much.

10 MEMBER KRESS: With this, Mr. Chairman,

11 I'll turn the program back to you.

12 CHAIRMAN BONACA: Okay. Thank you.

13 I think we need a break, and so we will

14 break until ten after 11.

15 (Whereupon, the foregoing matter went off

16 the record at 10:53 a.m. and went back on

17 the record at 11:12 a.m.)

18 CHAIRMAN BONACA: Let's get back into

19 session.

20 On the agenda, the next item is the Draft

21 Generic -- Final Generic Letter on Potential Impact of

22 Debris Blockage on Emergency Recirculation During

23 Design Basis Accident at PWR. And Dr. Wallis will

24 walk us through this presentation.

25 VICE CHAIRMAN WALLIS: Well, I'll try to

1 run you through it.

2 CHAIRMAN BONACA: Hope so.

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

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

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

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

25 In essence, it asks the plants to make

1 mechanistic analyses and to take appropriate action,
2 but the details of this letter have changed through
3 various drafts. The actual requirements on the
4 plants, and the actions asked for, have changed. And
5 we have, in fact, just been handed a new version that
6 appears to contain many differences from the version
7 that was presented to the subcommittee a couple of
8 weeks ago.
9 We wrote a letter in February 2003 on the
10 original draft Generic Letter, and we wrote another
11 last September on the associated Regulatory Guide 1.82
12 Rev 3. And I'll just repeat some of the points we
13 made.
14 The phenomena are many and complex, and
15 there is considerable uncertainty about how to analyze
16 them. There is very little evidence at all about
17 chemical effects. We suggested that alternate ways to
18 ensure long-term cooling should be explored, and we
19 also suggested that a risk-informed approach should be
20 investigated.
21 The staff and the industry have followed
22 up on these points. NEI has prepared guidance for
23 performing calculations. The staff is reviewing this
24 guidance and preparing a safety evaluation report,
25 which the Thermal Hydraulics Subcommittee expects to

1 see in August. The ACRS itself has not yet reviewed
2 either the NEI guidance or the SER.
3 Various steps have been recommended -- for
4 example, by the Westinghouse Owners Group -- to
5 improve the likelihood of achieving long-term cooling,
6 for instance, by certain operator actions. Response
7 has been plant-specific, and there do not appear to be
8 any measures of its success. The subcommittee asked
9 for these measures, and we didn't get them.
10 Both the staff and the industry have
11 proposed some risk-informed alternatives. I don't
12 know if these are part of the latest Generic Letter or
13 how the staff intends to treat them in any future
14 version of this letter or how it will react if a
15 licensee uses such an approach in its response to the
16 Generic Letter.
17 Now, my understanding is that the staff's
18 presentation today, and any letter that we write, is
19 expected to concern only the Generic Letter and not
20 some of these broader questions, although they
21 obviously are going to influence what the staff says
22 and what we do.
23 So without more ado, I welcome the staff
24 to make its presentation.
25 MR. HANNON: Good morning. Thank you. My

1 name is John Hannon. I'm the Plant Systems Branch
2 Chief. I have with me Suzy Black and Dr. Brian Sheron
3 from the Office of NRR. In a minute I'll introduce
4 David Cullison, who will be walking us through the
5 Generic Letter.
6 I just want to, first of all, thank you
7 for the opportunity to work with us as we move
8 forward. We are interested in getting your comments.
9 We did meet with the subcommittee a couple weeks ago
10 on an earlier draft of the letter. As you pointed out
11 Dr. Wallis, it has gone through considerable revision
12 as we try to fine-tune it.
13 But we do have today the current version,
14 which has the benefit of OGC's comments already
15 incorporated into it. And, hopefully, we'll be able
16 to address some of your ancillary concerns as we go
17 through the letter.
18 So with that, let me turn it over to Dave.
19 MR. CULLISON: Good morning. I'm Dave
20 Cullison from Plant Systems Branch, and I'll be going
21 through the Generic Letter.
22 Next slide.
23 We had a media problem. That's why the
24 presentation is not on the computer, and we're having
25 to use slides.

1 The purpose of this presentation is to
2 obtain ACRS endorsement of the GSI-191 Generic Letter,
3 and the staff's conclusion is that the issuance of
4 this Generic Letter will confirm the continued
5 compliance with the long-term cooling requirements of
6 10 CFR 50.46 for our addressees in light of the new
7 information coming from the efforts to resolve
8 GSI-191.
9 VICE CHAIRMAN WALLIS: Can I ask you what
10 we're going to endorse? Are we going to endorse the
11 latest version that we see in front of us, or are we
12 going to give an endorsement of something yet to be
13 written?
14 MR. CULLISON: The version that you
15 received this morning is considered to be the final
16 version.
17 VICE CHAIRMAN WALLIS: It is considered
18 the final version. Thank you. That's very good.
19 That's very useful.
20 MR. CULLISON: Next slide.
21 The first Generic Letter was issued for
22 public comment the end of March of this year. The
23 comment period ended June 1st. These are the external
24 stakeholders who provided comments. I'll give you a
25 minute to take a look at it.

1 Next slide.

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

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

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

18 MR. CULLISON: The new version is changed.

19 VICE CHAIRMAN WALLIS: Is it still action-
20 oriented?

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

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

25 MR. CULLISON: Based on comments from OGC

1 that the Generic Letter should be an information
2 request and not requesting action, the -- what you saw
3 before sounded more like an order than a Generic
4 Letter.
5 VICE CHAIRMAN WALLIS: But essentially
6 50.46 is very clear that if you find out you're not in
7 compliance you're expected to do something. And I
8 think it's actually referred to in Section F in your
9 new version, that -- whatever the 50.46 --
10 MR. CULLISON: What we have done is we
11 took out the action -- the requested action, which was
12 requesting that analysis be performed and request that
13 they implement all corrective actions.
14 VICE CHAIRMAN WALLIS: Item 2 essentially
15 is a request for a corrective action. They're calling
16 to the -- oh, it's not 50.46. Isn't it 50 -- oh, I
17 see. There is a 50.46F, which says, "If you find
18 you're not in compliance, you must fix it."
19 MR. CULLISON: This is 50.54.
20 VICE CHAIRMAN WALLIS: It's something
21 else. Okay. So I'm not sure what the action is. It
22 may be you have to tell us that.
23 MR. CULLISON: And also, we had comments
24 that the draft Generic Letter that was sent out for
25 comment was -- emphasized too much on compliance, and

1 we had comments from the Union of Concerned Scientists
2 and from industry, and also comments on the backfit.
3 The draft Generic Letter was not a backfit.
4 VICE CHAIRMAN WALLIS: Well, they kept
5 saying it wasn't a backfit, but it seemed to imply a
6 backfit.
7 MR. CULLISON: Well, that was that
8 version.
9 VICE CHAIRMAN WALLIS: The subcommittee
10 went through this with you with a different cast of
11 characters from --
12 MR. CULLISON: Right.
13 VICE CHAIRMAN WALLIS: -- the agency, and
14 we were assured that this was going to be a compliance
15 backfit.
16 MR. CULLISON: Again, based on --
17 VICE CHAIRMAN WALLIS: Have you backed off
18 from that?
19 MR. CULLISON: We've backed off on that.
20 VICE CHAIRMAN WALLIS: So it's a complete
21 reversal of what we heard two weeks ago, essentially?
22 MR. CULLISON: I wouldn't say a complete
23 reversal. What we've done is gone back more toward
24 the draft Generic Letter that was sent out for
25 comment. Because it's an information request, the

1 comments from OGC were that it's not a backfit.

2 VICE CHAIRMAN WALLIS: So you're now

3 saying it's not a backfit. It doesn't require them to

4 do anything?

5 MR. CULLISON: Well, it doesn't meet the

6 criteria for 50.109 for a backfit. We are requesting

7 that they provide us information under 50.54F.

8 VICE CHAIRMAN WALLIS: That's all?

9 MR. SHERON: Excuse me. Dr. Wallis, this

10 is Brian Sheron from the staff. Maybe I can try and

11 clarify a little bit. The guidance we got from OGC

12 was that if we were to impose fixes to the sump -- in

13 other words, revisions to the sump screens or whatever

14 -- that -- in the form of a backfit, that a Generic

15 Letter or a Bulletin, either one, which is issued

16 under 50.54F, is not appropriate.

17 When you're requiring a licensee to do

18 something, they believe that either you should do it

19 through regulation or through an order. If we did it

20 through regulation, first off, we kind of scratched

21 our head because there is really no regulation right

22 now that talks about the specifics of the sump model,

23 for example, and the blockage. That's all in a Reg.

24 Guide.

25 And so that would basically force us to

1 basically put the sump blockage requirements into the
2 form of a regulation, which it currently isn't in it
3 -- that detailed.
4 VICE CHAIRMAN WALLIS: Doesn't 50.46
5 already do that, though? It says they have to assure
6 long-term cooling. And if they can't --
7 MR. SHERON: Yes, but it doesn't --
8 VICE CHAIRMAN WALLIS: -- comply, then
9 they have to fix it.
10 MR. SHERON: Yes, but it doesn't provide
11 the details of -- you know, for example, it doesn't
12 specify 50 percent blockage, and the like. If we went
13 with an order, the concern is is that if an order is
14 used it implies that there is a -- a very high urgency
15 associated with the issue, almost to the point that if
16 we are requiring license -- if we have to go out with
17 an order ordering licensees to take some action, that
18 there appears to be an immediate safety concern, i.e.
19 you're in adequate protection space, and we do not
20 believe we are in adequate protection space with this
21 issue.
22 So an order is probably not the right
23 mechanism at this point to use. The only other
24 generic mechanism we have is a request for
25 information. And so what we've done is we have

1 reformulated this to request licensees to tell us
2 that, based on this new information that we have from
3 the Office of Research regarding GSI-191, they need to
4 tell us either why they believe their sumps are still
5 in compliance with the -- with 50.46, okay, or if
6 based on reanalysis that they believe they are not in
7 compliance they need to tell us what actions they
8 intend to take to come into compliance with 50.46.
9 Okay? Which could involve making physical changes to
10 their sump design.
11 Some plants obviously will analyze their
12 sumps and may conclude that their sumps still meet
13 50.46 and don't require any modification. That's been
14 the whole dilemma with this generic issue from the
15 start, and that is we do not know which plants do or
16 do not meet the requirements of 50.46 based on a
17 reanalysis.
18 So what we're doing is we're asking
19 licensees to submit the information to us. It's a
20 request for information. Tell us whether or not you
21 are in compliance. And once they decide whether or
22 not they're in compliance, then they would take
23 appropriate action, you know, as required by the
24 regulations.
25 CHAIRMAN BONACA: By when do they have to

1 respond to this request?

2 MR. CULLISON: Their response is due by

3 September 1, 2005.

4 MEMBER SHACK: But even now, I mean, your

5 requested information says guidance for performing the

6 requested evaluation, complete the requested

7 evaluation. But you've stripped out the request for

8 the evaluation, so I'm not sure what you're asking

9 for.

10 If you look at the latest revision of the

11 Generic Letter, page 10, bullet one of the requested

12 information, what's the requested evaluation now,

13 since you've stripped out the request for the

14 evaluation?

15 MR. CULLISON: The first bullet of

16 Section 2?

17 MEMBER SHACK: Bullet one.

18 MR. CULLISON: Bullet one?

19 MEMBER SHACK: Requested information.

20 Within 60 days, for performing the requested

21 evaluation -- but the requested evaluation has now

22 disappeared from the requested action.

23 MR. CULLISON: Well, that's true. I will

24 take fault on that. I didn't clarify that when I made

25 the revisions to the letter, because --

1 MEMBER SHACK: But this is the final.

2 MR. CULLISON: Right, and that's my fault.

3 It's a typographical error, because what it is --

4 MEMBER SHACK: What is it supposed to say?

5 MR. CULLISON: Well, what we're here --

6 what this section is is within 60 days of the issuance

7 of the staff guidance for performing evaluations,

8 mechanistic evaluations. It wasn't for the request.

9 I should have placed that with a more general term,

10 because the -- the staff will be issuing the guidance

11 in September. And I obviously didn't catch this.

12 MEMBER SHACK: "To complete the

13 evaluations that are no longer requested" -- in the

14 next sentence, at the end of the sentence?

15 MR. CULLISON: Well, earlier in the letter

16 we reference the methodology for performing an NRC-

17 approved methodology performing sump evaluations. And

18 there's actually -- you're looking at the redline

19 strikeouts, so the pages aren't the same. But the --

20 there's a footnote in I guess an earlier page that you

21 have.

22 The NRC is currently reviewing evaluation

23 guidance developed by the industry -- the NRC staff

24 insists the documents reviewed on a safety evaluation,

25 which licensees can reference in regulatory guidance.

1 And earlier on in the Generic Letter we reference this
2 as guidance for addressees to use in confirming their
3 compliance with 50.46, in light of this new -- the new
4 information coming out of GSI-191. And that's what
5 the methodology is for.
6 And what I didn't do was, when I went
7 through to make all of the changes to reflect the OGC
8 comments, I obviously did not make the correct
9 correction here. And we're still going to tie it to
10 -- this response to 60 days after the issuance of that
11 methodology, because that's when the addressees will
12 know what our approved methodology is.
13 VICE CHAIRMAN WALLIS: We're told this
14 methodology is very, very conservative. That's what
15 NEI told us at the subcommittee. And, therefore, it
16 would seem to me it's going to give more conservative
17 results for all of it in the study, and, therefore,
18 the conclusion will be that almost all of the plants
19 have to take some action.
20 And I wonder if you've thought about how
21 you're going to do this. You've got 64 different
22 plants, we were told, all doing different analyses and
23 all proposing different actions. It's going to be a
24 nightmare to figure out how to resolve it.
25 MR. CULLISON: John?

1 MR. HANNON: You're correct that the
2 baseline in the industry guideline is conservative.
3 However, they also have refinements to that baseline
4 that take out much of that conservatism, which we have
5 under review right now and would intend to endorse, to
6 the extent we find acceptable, in the safety
7 evaluation report we issue in September. So some of
8 that conservatism will be allowed to be removed.
9 VICE CHAIRMAN WALLIS: So it seems there's
10 a major technical issue here about how good these
11 refinements are, and how the different plants are
12 going to implement them. And you're going to have as
13 we -- again, as the subcommittee was told, sort of 64
14 different versions of analyses, which the staff has
15 somehow to be wise enough to evaluate with all of
16 these different choices of refinements here, there,
17 and everywhere.
18 Are you sure that your folks can handle
19 that?
20 MR. HANNON: One of the things that we do
21 have in the plan is to do an audit after the
22 modifications -- or as the modifications are being
23 made, in addition to the review of the submittals that
24 come in. Yes, we do think we can -- we have the
25 resources to handle it.

1 VICE CHAIRMAN WALLIS: Do you have some
2 idea of the order of magnitude of the actions that
3 these licensees might need to take, or is that just
4 something you are waiting to see?
5 MR. SHERON: Are you referring to analysis
6 or actual modifications to the plant?
7 VICE CHAIRMAN WALLIS: Well, there's
8 already been some analysis made, and there's -- you
9 know, certain plants in certain countries have made
10 changes already. Have you got some idea of the order
11 of magnitude of the actions that would be -- probably
12 be required from these licensees two or three years
13 from now?
14 MR. SHERON: I mean, I -- my opinion is
15 that probably there is going to be a number of plants
16 -- and I couldn't venture a guess, maybe it's, you
17 know, a dozen, two dozen -- that may have to make
18 modifications to their sumps, increase the screen
19 size, or the like. Others may conclude that they can
20 change out insulation, for example, and eliminate the
21 debris source, and, therefore, their sumps would
22 analyze as acceptable.
23 How they go about -- how licensees go
24 about meeting this requirement, okay, for
25 demonstrating compliance is really kind of their

1 decision. Okay?

2 My understanding, too, is some of them

3 could -- you know, if they don't want to get into a

4 refined analysis, could just use a -- go up to the

5 double-ended guillotine break, do the analysis. If

6 their sump doesn't perform, you know, as John said,

7 they can do a more refined analysis, maybe a more

8 risk-informed one, and the like, and demonstrate that

9 it is acceptable under those conditions.

10 Other plants may say, "I don't want to go

11 through that process of going through a more refined

12 analysis, maybe more detailed justification." Maybe

13 they just decide they're going to bite the bullet and

14 revise their sumps -- you know, modify their sumps.

15 It's really hard to say. I think each

16 licensee has to evaluate their particular design and

17 decide what is the safest, most economical way,

18 whatever criteria they use, to demonstrate compliance.

19 VICE CHAIRMAN WALLIS: So you're going to

20 -- excuse me.

21 MEMBER FORD: Well, I think -- I'll take

22 another attack of the same problem. I think the

23 problem that Professor Wallis has got is that a little

24 over two days earlier this month -- or last month --

25 we went through a whole lot of technical problems --

1 definition of zone of influence, the chemical effects,
2 downstream effects -- and there was no resolution to
3 those technical questions.
4 And yet those are basic -- the resolution
5 of those problems are basic to coming up with any
6 methodology that you're going to use to satisfy the
7 information that's really being asked in this Generic
8 Letter.
9 And I also I think mirror Professor
10 Wallis' concerns. I just don't see how anybody can
11 review the whole raft of different answers you're
12 going to get back, if you don't know the fundamentals
13 or the physics of the process.
14 And we were told that these would all be
15 sorted out by August of this year. That's crazy.
16 CHAIRMAN BONACA: But among this issue,
17 one that I have not participated in in subcommittee,
18 but reading material, you know, one statement is that
19 the industry doesn't believe that our chemical effects
20 -- that we have to worry about it, and that would be
21 defined later in time.
22 We do believe as a committee there are
23 chemical issues, and I'm sure that -- so, therefore,
24 they are not ready to address those issues in the
25 context of the response. So it's an open-ended -- I

1 mean, I understand you are waiting for the industry to
2 address individually plant by plant how they are going
3 to address this issue. You certainly will have
4 certain expectations on what -- the content of what
5 has to be addressed.
6 And that confused me -- the fact that
7 industry can say, "Well, we don't think there are
8 chemical effects, and we will find out about that
9 sometime in the future." I mean --
10 MR. SHERON: We've told the industry that
11 when they do go about addressing, you know, their
12 analysis of the sump and deciding what modifications
13 may be necessary, it would probably be a very wise
14 idea for them to include margin to accommodate any
15 adverse effects that may come out of further research
16 with regard to chemical effects.
17 CHAIRMAN BONACA: Okay. So you are
18 proposing at least some approach where --
19 MR. SHERON: Yes. They need to understand
20 that if chemical effects were to become a -- something
21 less than insignificant, if you can use that term,
22 they should probably -- I think prudence would dictate
23 that whatever changes they propose to make to their
24 sump that they allow some margin in there to
25 accommodate that.

1 CHAIRMAN BONACA: But in order to -- and
2 I appreciate this, but in order to -- to allow some
3 margin, you've got to understand how you would model
4 chemical effects and what the potential results could
5 be, depending on what kind of debris are entrained or
6 whatever the issues may be.
7 Do we have sufficient technical
8 information for them to do that?
9 MR. HANNON: This is John Hannon again.
10 The expectation is that research will have been
11 completed by the end of the year that would identify
12 whether or not there is an issue, whether or not the
13 problem exists.
14 Once we come to that level of
15 understanding, then the expectation would be that
16 licensees -- and there would be a placeholder in our
17 safety evaluation acknowledging that, that they're
18 going to have to deal with it. If it turns out to be
19 an issue, they would have to address it, either
20 through design changes or through chemical methods, to
21 take care of the chemical effects.
22 Similar for the downstream effects, as you
23 pointed out, we need to have that resolved by August.
24 And what we intend to do is have some guidance in our
25 safety evaluation that would be intended to take care

1 of downstream effects. So even though the research
2 may not be completed by then, we're going to have some
3 guidance in the safety evaluation for the methodology
4 as to how to deal with it.
5 VICE CHAIRMAN WALLIS: I'm sorry. I'm
6 reading the changes in what we saw last time. The
7 Generic Letter that the subcommittee thought we were
8 going to suggest that we recommend be issued actually
9 asked for a mechanistic analysis, and it explained why
10 it was necessary. What you've done is taken out all
11 the justification for requiring a mechanistic
12 analysis.
13 You say, "If a mechanistic analysis will
14 be performed," well, how else are they ever going to
15 confirm compliance except by making a mechanistic
16 analysis? You seem to be taking out all of the teeth
17 in the original letter.
18 MR. SHERON: Dr. Wallis, I think the
19 problem may be more legalistic, and that is that in
20 50.54F we are only allowed to ask for information. We
21 cannot tell a licensee how to get the information.
22 VICE CHAIRMAN WALLIS: Okay.
23 MR. SHERON: We can make suggestions on
24 what might be an acceptable way for them to provide
25 the information, but we cannot tell them how to

1 provide the information.

2 VICE CHAIRMAN WALLIS: So you seem to be

3 going into sort of a legalistic realm, which is

4 something which is --

5 MR. SHERON: I have no choice.

6 (Laughter.)

7 VICE CHAIRMAN WALLIS: -- we are not very

8 competent to advise you about.

9 MR. SHERON: I mean, I've been dealing

10 with Generic Letters probably my entire career in the

11 agency, and that has been a fundamental premise of

12 Generic Letters.

13 VICE CHAIRMAN WALLIS: You can't ask them

14 to analyze the performance of their system?

15 MR. SHERON: We can ask them to provide us

16 information on the performance of their system. Okay?

17 We can require them to provide us an answer to the

18 letter, but the only thing we can do in the Generic

19 Letter is request that they do an evaluation. But we

20 can't tell them how to do it.

21 VICE CHAIRMAN WALLIS: Well, but you

22 haven't even requested that. You said if the

23 analysis, if the evaluation is performed. You aren't

24 even requesting that they do the analysis anymore.

25 MR. SHERON: Well, it says if a

1 mechanistic analysis --

2 VICE CHAIRMAN WALLIS: Well, what else

3 will they do? A non-mechanistic analysis?

4 MR. SHERON: They could do a qualitative.

5 VICE CHAIRMAN WALLIS: That's not

6 acceptable.

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

8 MEMBER POWERS: Well, I mean, could -- I

9 presume that the option would be open to do a very

10 bounding analysis.

11 MR. SHERON: Yes.

12 MEMBER POWERS: Now, a guy could say, "I

13 don't know how it gets here, but here's the total

14 amount of insulation I have in my containment, and all

15 of the coding, and I put it in the sump and the sump

16 worked fine."

17 MR. SHERON: They could put it all on the

18 screen and say, "See, it still works."

19 MEMBER POWERS: And it worked fine, and

20 what not. That would be a non-mechanistic analysis

21 that would be pretty acceptable to you, I suspect.

22 MR. SHERON: Yes.

23 MEMBER POWERS: I mean, you'd be real

24 happy with that.

25 VICE CHAIRMAN WALLIS: It's still

1 mechanistic, it's just not detailed. It's just not
2 detailed. It's still mechanistic, though.
3 MEMBER POWERS: No. I mean, it's
4 deliberately a non-mechanistic analysis. I mean, the
5 regulatory process distinguishes between those. He
6 says, "I don't know how it got there, but everything
7 I got in containment ends up on the screen." I mean,
8 that -- that would be a non-mechanistic analysis. Am
9 I correct, Brian?
10 VICE CHAIRMAN WALLIS: You're asking for
11 analysis?
12 MR. SHERON: That's how I would interpret
13 it, yes.
14 MEMBER POWERS: Yes. Whereas a
15 mechanistic analysis would be one saying, "Okay. I
16 break this up into little particles by a shredding
17 mechanism, and it falls by hydronamic forces into the
18 sump," and things like that.
19 VICE CHAIRMAN WALLIS: So this is more
20 like what Los Alamos was doing. So what's going to
21 happen here is it's going to be a very conservative
22 assessment if they throw out all of the mechanisms and
23 make all of the bounding assumptions.
24 MEMBER POWERS: Well, I would be -- I
25 would be careful about that, because with a little

1 skill I can certainly portray a very non-bounding
2 accident as one that's very bounding. And do often,
3 by the way.
4 (Laughter.)
5 VICE CHAIRMAN WALLIS: It sounds like
6 slight of hand to me.
7 MEMBER SIEBER: Now, the procedure that
8 you're going to approve will be set out in the safety
9 evaluation report? Is that what you said?
10 MR. HANNON: Yes. The methodology will be
11 approved in a safety evaluation report.
12 MEMBER SIEBER: Wouldn't it be better done
13 through a regulatory guide? That's where I would
14 expect to see approved procedures as one way to
15 satisfy NRC requirements, rather than in a safety
16 evaluation report. To me that differs from how I'm
17 used to doing business.
18 MR. HANNON: That's true. If we had
19 unlimited time to -- we would be talking about
20 revising Reg. Guide 1.182. And ultimately they may --
21 that may happen after we produce the methodology. It
22 could later get incorporated into the Reg. Guide.
23 MEMBER SHACK: Just coming back again, you
24 issued an order for the BWRs. You've argued here
25 that, you know, you've got maybe a dozen PWRs that may

1 have to make changes in their sumps, other people are
2 going to have to change out insulation.
3 MR. SHERON: Excuse me. I think you said
4 -- you meant there was a Bulletin on the BWRs,
5 correct?
6 MEMBER SHACK: There's a Bulletin.
7 MR. SHERON: Yes.
8 MEMBER SHACK: And the Bulletin only said
9 provide information. Didn't even say that.
10 MR. ARCHITZEL: Ralph Architzel from the
11 staff. The Bulletin for the boilers was an action-
12 requested Bulletin.
13 VICE CHAIRMAN WALLIS: Yes. And they did
14 all make changes, as I recall.
15 MEMBER SHACK: Well, then why not issue a
16 Bulletin?
17 MR. ARCHITZEL: We have issued one
18 Bulletin for the interim actions, by the way.
19 MEMBER SHACK: But, I mean, issue a
20 Bulletin here for the analysis.
21 MR. SHERON: Again, you know, maybe -- I
22 think someone said, you know, did you bring your
23 attorneys with you? And we probably should have. The
24 position has changed. I mean, they have concluded
25 that a Bulletin or a Generic Letter is a request for

1 information under 50.54F, and it is not an appropriate
2 vehicle to impose a requirement -- namely, to require
3 them to do something.
4 You know, I would have to defer to an
5 attorney to explain that, but, you know, I think times
6 have changed since 1996.
7 MEMBER SIEBER: Well, have times changed
8 since last week? For example, I'm reviewing the
9 ultrasonic flow meter, which requires a response, an
10 analysis and response by licensees who are using
11 those. And it seems to me to be an analogous
12 situation to this one.
13 MR. SHERON: Well, in that case we're
14 requesting information. Again --
15 MEMBER SIEBER: That's right.
16 MR. SHERON: -- UFM. Okay? And that's
17 what we're doing here is we're requesting information.
18 We're requesting them to provide us information on
19 whether or not their sumps comply with I think it's
20 Section A3 of 50.46.
21 MEMBER SIEBER: Right.
22 MR. SHERON: Using this new methodology --
23 in other words, not using the 50 percent blockage
24 assumption, but this -- this approved methodology.
25 And that's the information that we're requesting.

1 MEMBER SIEBER: But the vehicles that
2 you're using in this case are different than you're
3 using on the last case that I reviewed anyway, which
4 is the ultrasonic flow meter.
5 MR. SHERON: No, it's the same. The
6 ultrasonic flow meter we're requesting --
7 MEMBER SIEBER: Well, you're using a
8 Bulletin for that, right?
9 MR. SHERON: Right. The only difference
10 --
11 MEMBER SIEBER: And you're using a Generic
12 Letter for this one. The procedure is going to be in
13 a safety evaluation. There the procedure is in a
14 bunch of references issued by the vendor.
15 MR. SHERON: Right. The only difference
16 between a Bulletin and a Generic Letter is that
17 Generic Letters are issued for public comment before
18 they go out. There is a draft and then there's a
19 final.
20 A Bulletin is considered a little more
21 urgent, and, therefore, we -- you know, and we use a
22 Bulletin when we don't believe we have time to go
23 through the public comment process.
24 MEMBER SIEBER: Okay.
25 MR. SHERON: But they are both the same.

1 They are both issued under 50.54F.

2 MEMBER SIEBER: Right.

3 MR. SHERON: And either one -- both of

4 them, all they can do is request information.

5 MEMBER SIEBER: I'm glad I'm not an

6 attorney.

7 VICE CHAIRMAN WALLIS: Can we go back to

8 the presentation?

9 MR. CULLISON: Next slide?

10 This slide has changes to the Generic

11 Letter. Based on comments from internal and external

12 stakeholders, the staff has made changes to the

13 Generic Letter in these areas -- and the purpose, the

14 requested action/information in the backfit

15 determination. Some of these changes are new since

16 the subcommittee meeting two weeks ago, and I will

17 discuss these areas in the following slides.

18 Also, on upgrading licensing basis -- a

19 driving consideration in this Generic -- for this

20 Generic Letter has been the proposed staff position --

21 or, actually, it's not proposed anymore, the staff

22 position on approving the current licensing basis

23 analysis to a more realistic model of sump

24 performance.

25 The staff determined that in light of the

1 new information identified during the efforts to
2 resolve GSI-191, the previous guidance used to develop
3 current licensing basis analyses does not adequately
4 and completely model sump screen debris blockage and
5 related effects.
6 This new information, had it been known at
7 the time, would have been included in the original
8 guidance. As a result, the staff is revising the
9 guidance for determining the susceptibility of PWR
10 recirculation sump screens, the adverse effects of
11 debris blockage during design basis accidents
12 requiring recirculation operations of the ECCS and the
13 containment spray system.
14 VICE CHAIRMAN WALLIS: I'm going to go
15 back to what I asked before. When the subcommittee
16 met with the staff two weeks ago, we were told that
17 the letter we saw at that time was not expected to
18 have -- suffer substantial changes before, you know,
19 this meeting, and so we should treat it as if it were
20 final. And now we're assured that the new one is
21 final. It's the same assurance.
22 I think we're a little reluctant -- I
23 think we're all in favor of doing something and
24 probably this Generic Letter is a reasonable thing to
25 do. But we'd like to know what it is that we're

1 approving when we approve something.

2 MR. CULLISON: What we presented at the

3 subcommittee had not gone through the Office of

4 General Counsel yet. Technically, we felt we were --

5 VICE CHAIRMAN WALLIS: So it was really

6 the General Counsel that caused all of these changes?

7 The legal people caused all of the changes.

8 MR. CULLISON: Yes.

9 VICE CHAIRMAN WALLIS: Okay. And they're

10 not going to have another go at it?

11 MR. CULLISON: Well, they will when we go

12 through with the CRGR package. But they've already

13 seen it, and so we can always use --

14 VICE CHAIRMAN WALLIS: So we are further

15 along than we were.

16 MR. CULLISON: We are further along, and

17 so I -- again, I hate to say this, but we don't expect

18 any substantial changes.

19 VICE CHAIRMAN WALLIS: Well, let's say if

20 we write a letter on this, and if we find that it has

21 substantially changed, then you will probably hear

22 from us after -- if it's substantially changed after

23 you've written a letter, I expect you will hear from

24 us.

25 MR. CULLISON: I understand that.

1 MR. SHERON: I think if it substantially
2 changes from the version you've seen, we would
3 probably come back to the committee before we --
4 VICE CHAIRMAN WALLIS: That would make
5 sense, I think, and avoid any hassle.
6 MR. SHERON: I mean, we're not trying to,
7 you know --
8 VICE CHAIRMAN WALLIS: No, I know.
9 MR. SHERON: -- mislead you with something
10 that's going to change.
11 VICE CHAIRMAN WALLIS: I realize that you
12 have -- you're doing the best you can with a somewhat
13 tough assignment.
14 MR. HANNON: I also want to point out that
15 this letter is scheduled to be issued the end of
16 August. Okay? So, you know, that's why we're trying
17 to meet with you now early, because we understand you
18 don't have a meeting in August. So the timing is such
19 that it was important for us to have this dialogue
20 today.
21 VICE CHAIRMAN WALLIS: Well, we do have
22 subcommittee meetings on the NEI guidance in August
23 and the ACR. And it's conceivable that -- I don't
24 know what's going to happen then. It's conceivable
25 that that might influence our thoughts about the

1 letter. I don't know.

2 MR. CULLISON: And the last bullet is a

3 change from the subcommittee meeting. The staff has

4 since then determined that the sump performance

5 evaluation is a boundary evaluation of the ECCS model.

6 The staff determined that deficiencies in the previous

7 guidance potentially resulted in a potential

8 analytical error that could result in ECCS performance

9 that does not conform with the requirements of 10 CFR

10 50.46B(5). As a result, the requirements of

11 50.46A(3)(ii) apply in this situation.

12 MEMBER SIEBER: But sump performance may

13 be poorer than originally analyzed --

14 MR. CULLISON: Right.

15 MEMBER SIEBER: -- but you could still be

16 in compliance with 50.46.

17 MR. CULLISON: Right.

18 MEMBER SIEBER: Depending on how much

19 margin you have.

20 MR. CULLISON: Right.

21 MEMBER SIEBER: So that's the ultimate

22 criteria.

23 MR. CULLISON: Right.

24 VICE CHAIRMAN WALLIS: Could you be in

25 compliance by having alternative ways to cool the core

1 without using recirculation? Or does the compliance
2 require that the recirculation process actually work?
3 MR. CULLISON: I believe that would
4 require an exemption from the rule.
5 VICE CHAIRMAN WALLIS: 50.46 requires that
6 the recirculation mechanism work. It doesn't allow
7 you to sort of say, "Well, we've got alternative ways
8 to cool the core."
9 MR. SHERON: I think 50.46 just says that
10 you're supposed to have long-term cooling. It doesn't
11 say how.
12 VICE CHAIRMAN WALLIS: So alternative ways
13 would be acceptable without using recirculation.
14 MR. SHERON: Yes, as long as they met
15 other -- any other regulations that were applicable.
16 VICE CHAIRMAN WALLIS: So that's another
17 option that they have in complying.
18 MR. CULLISON: Next slide, please.
19 VICE CHAIRMAN WALLIS: So that would
20 remove the need for a sump altogether, if you had --
21 for the sump screen to work altogether, if you had
22 another way to cool the core. Okay.
23 MEMBER ROSEN: You don't take credit for
24 sprays.
25 VICE CHAIRMAN WALLIS: Hitch up to some

1 other source of water.

2 MEMBER SIEBER: There is some limit as to

3 how much you can pump in there, though.

4 MR. CULLISON: The purposes of this

5 Generic Letter are to request that addressees submit

6 information to the NRC to confirm compliance with

7 10 CFR 50.46B(5) and requires addressees to provide

8 the NRC a written response in accordance with 10 CFR

9 50.54F. And this is a change from the subcommittee

10 meeting as the staff is no longer requesting

11 addressees to perform any action.

12 Next slide.

13 And these are the regulatory requirements

14 that form the basis for the Generic Letter. I left

15 off 50.54F, because this -- basically, these were the

16 two main ones. The first one is the 50.46B(5); the

17 other one is 50.46A(3)(ii).

18 And the bullet on the bottom is an

19 exemption from the requirement to take immediate steps

20 that may be necessary upon a determination of non-

21 compliance. And that's if there's a determination of

22 non-compliance, and that is factored into the Generic

23 Letter.

24 VICE CHAIRMAN WALLIS: Yes. The bit I

25 remember from this is that that second part of the

1 second bullet there -- that affected applicants shall
2 propose immediate steps to demonstrate compliance.
3 MR. CULLISON: Right. And the --
4 VICE CHAIRMAN WALLIS: That does force
5 them to take some action immediately.
6 MR. CULLISON: And depending on what that
7 -- what action they choose, they can also come in for
8 an exemption from the -- from that requirement, as
9 long as they propose adequate other actions in
10 accordance with 50.12 exemption request.
11 And in the request -- the information
12 request, we actually -- when they submit it
13 September 1, 2005, we're asking them to submit any
14 exemption requests that they may have.
15 VICE CHAIRMAN WALLIS: Now, going back to
16 your slide on public comments, several of the public
17 comments were legalistic, saying you can't do this
18 under 51.09 or something, you can't do this under so
19 and so,r so and so, and so and so. You didn't put
20 them in your presentation here, but --
21 MR. CULLISON: Right.
22 VICE CHAIRMAN WALLIS: -- presumably
23 someone has gone into all this, and now the legal --
24 MR. CULLISON: Yes.
25 VICE CHAIRMAN WALLIS: -- but it is sorted

1 out?

2 MR. CULLISON: Yes.

3 VICE CHAIRMAN WALLIS: You are doing what

4 you are allowed to do, and you aren't tangled up

5 with --

6 MR. CULLISON: We've discussed this with

7 OGC, with the lawyers.

8 VICE CHAIRMAN WALLIS: And you've sorted

9 all of that out.

10 MR. CULLISON: To make sure that we're on

11 the legal straight and narrow here.

12 VICE CHAIRMAN WALLIS: Maybe it's not too

13 narrow, so you can actually get through this task.

14 MR. CULLISON: Right.

15 Next slide, please.

16 And on this slide, on the requested

17 action, it is pointing out the fact that the letter is

18 now an information request only. When we briefed the

19 subcommittee, there were requested actions, and the --

20 VICE CHAIRMAN WALLIS: That makes it sound

21 pretty weak. I know it probably is going to result in

22 actions, but I think it -- I want to make sure to the

23 public that -- that it is going to result in action.

24 It's not just -- it sounds an awful weak thing to do,

25 just ask for information.

1 MR. CULLISON: That's the mechanism we
2 have.
3 VICE CHAIRMAN WALLIS: Well, you've
4 already gotten an awful lot of information.
5 MR. CULLISON: Well, we don't -- we have
6 a lot of information on a generic level, and what
7 we're trying to identify here in the Generic Letter is
8 those plants which may have a problem with their sumps
9 based on the new information.
10 VICE CHAIRMAN WALLIS: But the information
11 you request is in such a form that it is going to lead
12 to action, if action is appropriate.
13 MR. CULLISON: Right. They could -- the
14 range of responses we could get is that they are in
15 compliance the way they are, and no additional effort
16 is needed to --
17 VICE CHAIRMAN WALLIS: I hope you have a
18 good way of checking that those statements made are,
19 in fact, supportable.
20 MR. CULLISON: We do have plans to perform
21 audits on --
22 VICE CHAIRMAN WALLIS: All these different
23 -- 64 different --
24 MR. CULLISON: Not on all the plants, but
25 on a number of plants. And the first --

1 VICE CHAIRMAN WALLIS: Well, we're going
2 to hear from NEI later, but hopefully what will happen
3 is that industry will realize that it's up to them to
4 fix this anyway, and you won't have to lean on them
5 too much so that it will all be resolved.
6 MEMBER SIEBER: Generally speaking, and
7 from my experience, once you get one of these, the
8 licensees understand what the deal is and respond.
9 So, you know, we're jumping through a lot of
10 legalistic hoops right now, but when it's finally
11 issued and the licensees get it, they know all about
12 this anyway, so they can run off and do it. And I
13 imagine anybody that says "I'm okay" gets an audit,
14 right?
15 MR. SHERON: Well, I mean, what -- what
16 the letter really does is that, you know, I don't
17 think any licensee is going to come back to us and
18 say, "You know, we've done the analysis, and we're not
19 in compliance. Thank you very much." Okay?
20 MEMBER SIEBER: Well, they got -- once you
21 identify you're outside of your licensing basis,
22 you've got to do something or shut down.
23 MR. SHERON: Yes. And if you look at
24 50.54F, it basically says, "We are requesting
25 information to determine whether we need to modify or

1 suspend or revoke your license."

2 MEMBER SIEBER: Right.

3 MR. SHERON: You know, those are pretty

4 strong words.

5 MEMBER SIEBER: Yes.

6 MR. SHERON: Okay? And so I don't think

7 a licensee is going to come in and say, "I'm out of

8 compliance, and I'm not going to do anything about

9 it."

10 MEMBER POWERS: But don't you ask him for

11 a JCO?

12 MR. SHERON: What?

13 MEMBER POWERS: Don't you ask him for a

14 JCO if he's out of compliance? Justification for

15 Continued Operation.

16 MR. SHERON: Licensees have requirements.

17 Once they find themselves out of compliance, they

18 either have to, you know, come in and provide, for

19 example, compensatory measures, a justification for

20 continued operation --

21 MEMBER POWERS: I thought this thing

22 actually required --

23 MR. SHERON: Or, as Dave said, they may

24 want to come in and request an exemption.

25 MR. CULLISON: The Generic Letter does

1 what the -- for the information to be sent in on
2 September 1, 2005. If necessary, there is -- they are
3 to submit a JCO.
4 MEMBER POWERS: Yes. I mean, I thought I
5 read the report to --
6 MEMBER ROSEN: Would that justification
7 for continued operation be okay if it was based on
8 risk analysis? In other words, was risk-informed? It
9 might be?
10 MR. SHERON: Yes, we can -- yes, we've
11 accepted risk as a basis for -- you know, again, if
12 there's a -- you know, I think there would have to be
13 determination, okay, whether or not there was a
14 compliance issue. And then, you know, risk may be
15 justification for an exemption, for example.
16 MEMBER ROSEN: Well, I was trying to
17 phrase it a little more narrowly than that, Brian. I
18 was trying to say -- because I know that the exemption
19 process is difficult. You have to get through 50.12
20 and all the rest. But let's leave that aside for the
21 moment for this question.
22 If the licensee said they were not -- did
23 the analysis, felt they were not in compliance,
24 defined steps to get into compliance, they would take
25 some time, and that their justification for continued

1 operation was based on a risk analysis. Would that be
2 acceptable for the staff?
3 MR. SHERON: Probably. I want to qualify
4 it, but I would say, you know, that I -- I don't see
5 any reason why it wouldn't be.
6 MEMBER ROSEN: Okay. Thank you.
7 MR. CULLISON: And the first set of
8 information is due within 60 days of the issuance of
9 the guidance SECY. And actually, on this bullet I
10 carried forward the mistake I made in the letter about
11 returning to the requested evaluation. But in that
12 response we are asking for their plans and their
13 expected completion dates.
14 Next slide.
15 MEMBER SHACK: To demonstrate compliance,
16 is that what you're asking?
17 VICE CHAIRMAN WALLIS: That's the next
18 one. See, this first bullet, they're just
19 demonstrating compliance. It says nothing whatever
20 about risk. I mean, it's quite a different --
21 compliance is a deterministic thing, isn't it? You
22 either meet the regulatory requirements or you don't.
23 You don't -- you would bring risk into it.
24 MEMBER ROSEN: That's why I phrased my
25 question the way I did, is if the licensee concludes

1 it's not now in compliance, but that the justification
2 for continued operation includes here is the risk of
3 us continuing to operate in non-compliance for X
4 period of time. And so I phrased it to Brian Sheron
5 whether or not that would be acceptable, and he said
6 -- I think he said, "Yes, probably."
7 MR. SHERON: I mean, a lot of times
8 licensees do that in combination, for example, with
9 proposed compensatory measures.
10 MEMBER ROSEN: Sure.
11 MR. SHERON: You know, and we've used
12 those as a basis I think in fire protection.
13 MR. CULLISON: The second response, which
14 is due September 1, 2005, is the main response to the
15 Generic Letter. And in the next couple of slides
16 we'll go through some of the information we're
17 requesting in the Generic Letter.
18 The first is that addressees provide
19 confirmation that their ECCS and CSS recirculation
20 functions under debris loading conditions are or will
21 be in compliance with the regulatory requirements and
22 the general description of and implementation schedule
23 for all corrective actions, if any.
24 And also, we want them to initiate actions
25 to implement corrective actions no later than the

1 first refueling outage starting after April 1, 2006.
2 However, all corrective actions should be completed by
3 December 31, 2007. And if all corrective actions will
4 not be completed by December 31, 2007, describe how
5 this is consistent with the requirement of
6 50.46A(3)(ii), the requirement to take immediate steps
7 to demonstrate compliance.
8 VICE CHAIRMAN WALLIS: Now, they used to
9 provide confirmation by this 50 percent assumption.
10 That's --
11 MR. CULLISON: Right.
12 VICE CHAIRMAN WALLIS: It's clear that
13 that has gone by the board, and the confirmation has
14 to be based on presumably this NEI guidance. Is that
15 it? Or something like a bounding analysis, which is
16 more extreme. That's what it's got to be based on.
17 MR. CULLISON: We used the generic phrase
18 "NRC-approved methodology."
19 VICE CHAIRMAN WALLIS: So you make it
20 clear in the letter what is going to be acceptable --
21 MR. CULLISON: Right.
22 VICE CHAIRMAN WALLIS: -- evidence for
23 this confirmation.
24 MR. CULLISON: It's in the methodology.
25 VICE CHAIRMAN WALLIS: It's in the

1 methodology. I haven't studied that -- the new
2 version of that yet.
3 MR. CULLISON: Next slide, please.
4 MEMBER SIEBER: But there's nothing in the
5 Generic Letter that implies a risk-based approach.
6 MR. CULLISON: No.
7 MEMBER SIEBER: And if the staff were to
8 want a risk-based approach, or be inclined to approve
9 it, it would show up on the methodology.
10 MR. CULLISON: That's correct.
11 MEMBER SIEBER: So this is all
12 deterministic here.
13 MR. HANNON: No. Understand that the
14 methodology has a risk-informed section that would
15 enable a licensee to reduce the break size for debris
16 generation calculation purposes. So that --
17 MEMBER SIEBER: Right.
18 MR. HANNON: And so that's an allowed
19 method that we're going to be looking at for the
20 approval.
21 MEMBER ROSEN: So there's two levels of
22 risk analysis you can use -- the risk analysis that's
23 embedded in the methodology and a risk analysis that
24 might be used in a justification for continued
25 operation.

1 VICE CHAIRMAN WALLIS: Now you're taking
2 a risk here, because we haven't seen this yet. And
3 when we review all this stuff in September, we may
4 say, "This risk-informed approach is baloney." I'm
5 not saying we will, but, I mean, there is -- we
6 probably won't, but --
7 MEMBER ROSEN: We might say that, but we
8 did say in our letter that -- we did encourage the
9 staff and the industry to use risk-informed
10 approaches, and I think they are using it.
11 VICE CHAIRMAN WALLIS: We haven't yet
12 seen --
13 MR. HANNON: I would also point out that
14 we are attempting to couple closely with the effort on
15 revising the regulation 50.46.
16 MR. CULLISON: And on this slide there's
17 a couple more bullets on what we're requesting for
18 September 1st. The results of the -- or the submittal
19 that describes the methodology, that used from the
20 analysis, and the results of that analysis. Also, at
21 the time they make the submittal, we are requesting
22 that they submit any changes --
23 VICE CHAIRMAN WALLIS: You mean with a
24 blocked sump screen, don't you? Without a blocked
25 sump screen, there's no problem. So there's no sense

1 in doing the second white bullet there. Do you mean
2 including the minimum available -- with whatever
3 blockage you happen to get. You don't mean with an
4 unblocked sump screen.
5 MR. CULLISON: What I did do is I -- I
6 just put that first bullet on there. That's one of
7 the --
8 VICE CHAIRMAN WALLIS: Yes, but the second
9 bullet doesn't make any sense. I mean, if it's a
10 clean screen, why is there an issue? I mean, there
11 isn't any issue with a clean screen, so you've got to
12 say with a realistically blocked sump screen or
13 something.
14 MR. CULLISON: Well --
15 MEMBER SIEBER: Or partially blocked.
16 VICE CHAIRMAN WALLIS: Partially blocked.
17 MR. CULLISON: Well, what I didn't put on
18 the slide is that we're asking for the maximum head
19 loss postulated from debris accumulation on the
20 submerged sump screen.
21 VICE CHAIRMAN WALLIS: That's not what the
22 second thing says. It says unblocked sump screen.
23 MR. CULLISON: This is in addition.
24 VICE CHAIRMAN WALLIS: In addition.
25 MR. CULLISON: This is in addition. I

1 didn't put all --

2 VICE CHAIRMAN WALLIS: Oh. So they're in

3 real trouble if it doesn't work when it's unblocked.

4 MR. CULLISON: Right. So in the letter

5 it's a list of items that we're requesting. But we

6 are asking for the maximum head loss postulated from

7 debris accumulation on the submerged sump screen and

8 a description of the primary constituents of the

9 debris bed that result in a head loss.

10 VICE CHAIRMAN WALLIS: Well, why do you

11 ever ask, though, for an unblocked sump screen

12 analysis? Since they're being asked to do an analysis

13 of a blocked sump screen.

14 MEMBER SHACK: Presumably, they need a 50

15 percent block now, right?

16 VICE CHAIRMAN WALLIS: Yes, so it's just

17 -- I think you mean with a realistically blocked sump

18 screen.

19 MR. CULLISON: Well, we're asking for

20 that, too. This is just an additional -- just to see

21 what the margin is with an unblocked screen, the

22 starting point, a clean screen analysis.

23 VICE CHAIRMAN WALLIS: They've already

24 done the 50 percent one, which is a part of the

25 record.

1 MR. CULLISON: Well, the 50 percent may
2 not be an analysis per se. It's an assumption that
3 they used.
4 VICE CHAIRMAN WALLIS: But they still have
5 to predict an MPSH margin with that 50 percent. Isn't
6 that part of the licensing basis?
7 MR. CULLISON: Yes, they do. They do have
8 to calculate a head loss for that.
9 MEMBER SIEBER: That's right.
10 MR. ARCHITZEL: This is Ralph Architzel
11 from SPLB. I guess the only point on that bullet --
12 and it's a little bit carried over from the earlier
13 versions -- when you do an MPSH analysis, we don't
14 have it all submitted. That's the starting point that
15 you would then assess the blockage against, so we
16 don't have that submitted to us across the board. So
17 this information is used to assess the blockages
18 that --
19 VICE CHAIRMAN WALLIS: So you would find
20 it useful.
21 MR. ARCHITZEL: It's a limited set of
22 information that's being requested.
23 VICE CHAIRMAN WALLIS: It would be
24 interesting to see if the MPSH is bigger or less than
25 it would be for 50 percent blockage.

1 MR. CULLISON: And we're requesting
2 changes that, at the time they make the submittal, to
3 submit any licensing actions and exemption requests,
4 a description of the programmatic controls for
5 controlling what materials are introduced into
6 containment, and, as we discussed before, provide a
7 JCO if needed.
8 VICE CHAIRMAN WALLIS: What is a JCO?
9 MR. CULLISON: Justification for continued
10 operations.
11 Next slide.
12 And I put this slide up here --
13 VICE CHAIRMAN WALLIS: That means justify
14 why you shouldn't be shut down?
15 MR. CULLISON: Right.
16 MEMBER SIEBER: Yes.
17 MR. CULLISON: Yes.
18 VICE CHAIRMAN WALLIS: Okay.
19 MR. CULLISON: I put this slide in here
20 because the letter that was presented to the
21 subcommittee was a compliance exception to the backfit
22 rule. But now the Generic Letter requests information
23 only. There is no backfit, but --
24 VICE CHAIRMAN WALLIS: But you don't
25 specifically say it. The first Generic Letter had all

1 kinds of things denying this was a backfit. There's
2 no word that -- does the "backfit" appear at all, the
3 word "backfit"?
4 MR. CULLISON: In the back, there's a
5 backfit determination section.
6 VICE CHAIRMAN WALLIS: Oh, there is.
7 MR. CULLISON: And it discusses the fact
8 that this is requesting information only.
9 VICE CHAIRMAN WALLIS: Okay, there is.
10 MR. CULLISON: No backfit is intended or
11 implied.
12 VICE CHAIRMAN WALLIS: It seems very
13 strange, because probably -- well, that was one of the
14 comments from industry is you say this, but, in fact,
15 you're going to require a backfit.
16 MEMBER SIEBER: No, you're going to
17 require compliance.
18 VICE CHAIRMAN WALLIS: Well, okay, but it
19 would amount to the same thing. It's just --
20 MR. SHERON: We're requesting information
21 on compliance. If a licensee comes in -- a licensee
22 may come back and say, "We're in compliance, and here
23 is our reasons." And if we review those reasons and
24 we don't agree with them, maybe they're still trying
25 to justify 50 percent or something, then ultimately

1 the burden becomes -- it goes on to the staff to
2 decide if we want to backfit that licensee.
3 If we don't agree with that licensee, then
4 the burden is on the staff. We can either order them
5 to revise their -- modify their sump. Okay? But
6 that's the whole purpose of the Generic Letter
7 approach is we're requesting information to determine
8 if we need to take action against a licensee.
9 If a licensee comes in and says, "I'm
10 making changes. These are the changes I'm making," we
11 look at it and we say, "Yes, that's acceptable. We
12 have assurance now you're in compliance." Then that's
13 fine. If a licensee comes in and says, "I'm not
14 making changes. Here's my reason why," we review it,
15 we don't agree with that. Ultimately, the staff then
16 has the burden of deciding if we want to order that
17 licensee to make those changes.
18 VICE CHAIRMAN WALLIS: You might not agree
19 with the changes they propose, too.
20 MR. SHERON: That's true.
21 VICE CHAIRMAN WALLIS: So that although
22 it's said that no backfit is implied, essentially a
23 backfit is implied if you disagree with their
24 argument.
25 MR. SHERON: That's right. But the burden

1 is on the staff, then, to -- in other words, if we
2 decide that we don't agree with them, if we impose a
3 backfit it would be most likely through an order. The
4 licensee then has hearing rights associated with that,
5 and the burden is on the staff.
6 You know, I don't like getting into the
7 legalistic, but that's basically what, you know, the
8 licensee then -- for example, if it's an immediately
9 effective order, I think a licensee has five days if
10 they want to request a hearing, in which case then the
11 staff has to justify why we are doing that. If it's
12 not immediately effective, I think there's like 20
13 days. But there are certain rights that come with an
14 order.
15 MEMBER SIEBER: Now, if a licensee came in
16 and said, "I did the analysis, and I don't meet the
17 MPSH requirement, unless you give me an exemption for
18 containment overpressure," would the staff -- how
19 would the staff mechanistically deal with that? You
20 know, there has been a few of those --
21 MR. SHERON: You're going to complicate it
22 with containment overpressure.
23 MEMBER SIEBER: Well, there's been a few
24 of those issued --
25 MR. SHERON: Yes.

1 MEMBER SIEBER: -- in the past, but the
2 majority of licensees don't have that kind of a
3 credit.
4 MR. SHERON: Yes. And the position the
5 staff has right now on containment overpressure is
6 that we will give credit to a licensee for containment
7 overpressure if it is appropriately justified --
8 MEMBER SIEBER: For short periods of time.
9 MR. SHERON: No, not for short periods of
10 time.
11 MEMBER SIEBER: Do you mean for the whole
12 accident? The whole length of the accident?
13 MR. SHERON: Well, they would -- two ways.
14 One is they would have to demonstrate that the
15 overpressure was available for the period of time that
16 they required it. And, second, is they would have to
17 show that the risk associated with taking that credit
18 was acceptable, for example, a la Reg. Guide 1.174
19 criteria.
20 MEMBER SIEBER: So that's sort of another
21 risk-informed alternative that a licensee could choose
22 to use, and maybe the staff would approve it?
23 MR. HANNON: The allowance for the use of
24 overpressure I believe is one of the refinements in
25 the methodology that we have under review.

1 MEMBER SIEBER: Okay.

2 MR. HANNON: I don't want to unnecessarily
3 complicate the exemption discussion. But what we had
4 in mind for exemptions was, once a licensee determined
5 they were not in compliance -- strict compliance with
6 50.46, they have the JCO, they can request a temporary
7 exemption, schedule or exemption, to allow them time
8 to make modifications.

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

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

21 MEMBER SIEBER: okay.

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

25 MR. CULLISON: No, it hasn't.

1 MEMBER FORD: The reason why I ask the
2 question is that at the end of the subcommittee
3 meeting there was considerable discussion as to
4 whether we should -- this letter should be issued in
5 comparison to continuing just the Bulletin 2003 actual
6 one.
7 And it was my impression after all the
8 discussion of the technical issues that there was a
9 tacit approval that the letter should be -- at a
10 subcommittee level, should be issued with the hope
11 that many of the technical questions would be answered
12 by the fall of this year.
13 But now this Generic Letter has been
14 changed substantially from that which presumably went
15 out for public comment. So what is your view? Does
16 the industry know about this revised version?
17 MR. CULLISON: No.
18 MEMBER SIEBER: They do now.
19 MEMBER FORD: Are there any --
20 MR. CULLISON: They haven't seen it. But
21 it's very similar to what went out as the draft
22 Generic Letter for comment.
23 MEMBER SIEBER: Yes, I see that.
24 MR. CULLISON: The fact that it's for
25 information only, no backfit, under 50.54F, all those

1 are the same as what went out for public comment. So
2 the fewer the changes are, the use of 50.46A(3)(ii),
3 and that's -- for the rest, most of the rest of it is
4 very similar to what has been out for public comment.
5 VICE CHAIRMAN WALLIS: So another question
6 is: why issue it now? You're hoping that the NEI
7 guidance will turn out to be acceptable and usable,
8 and this does to some extent depend upon that. And
9 it's supposed to be available by September. Maybe you
10 could wait a month or two. We could review this again
11 in September with the NEI guidance and say, "Yes, the
12 whole package works out."
13 And also, I just wonder if something which
14 is done with last-minute changes is really the right
15 thing to put out on such an important issue. Maybe
16 you need to have at least a week to think about
17 whether exactly all of the words are exactly -- just
18 exactly what you want to put in there, rather than
19 rushing to put something out when it has just been
20 edited so substantially.
21 My experience says that it's sort of risky
22 to do that. This committee puts out letters like
23 that. My -- in my own professional life, I don't like
24 to make a lot of major changes and then immediately
25 put something out.

1 MR. CULLISON: The process --

2 MEMBER POWERS: Fortunately, there are

3 more eyes looking at committee letters than just

4 Professor Wallis'.

5 VICE CHAIRMAN WALLIS: No, I'm serious,

6 though.

7 MR. CULLISON: And this letter will get

8 more scrutiny for the wording, not for the technical

9 content, but to make sure my -- when I make a mistake

10 like I did, it will get caught before it goes out,

11 gets issued. So we still have to go through the CRGR,

12 and there's a whole review process before we get

13 there. Most of the people who will review it have

14 already seen it, but --

15 VICE CHAIRMAN WALLIS: So --

16 MR. CULLISON: -- it'll go through

17 technical edit -- it'll go through an entire process

18 to clean it up to make sure that the wording is

19 exactly right.

20 VICE CHAIRMAN WALLIS: So all of this

21 rewriting, and so on, is really -- doesn't really

22 change the substance. What you're doing is you're

23 getting enough information to decide whether or not

24 these plants have to make -- you have to insist that

25 the plants make changes. And, of course, if you get

1 information that they've already made changes which
2 are acceptable, then you won't have to insist on
3 anything. Isn't that what you're doing?
4 There's an issue here -- you're getting
5 enough information to decide whether or not they're in
6 compliance. And if they're not, then you have enough
7 information to decide what to do.
8 MR. CULLISON: That's correct.
9 VICE CHAIRMAN WALLIS: That's what the
10 whole purpose of this is.
11 MR. CULLISON: That's correct.
12 VICE CHAIRMAN WALLIS: And all of these
13 changes and drafts didn't change any of that.
14 MR. CULLISON: No. It's -- I guess the --
15 how we're doing -- how we're asking and the wrapping
16 of the asking.
17 VICE CHAIRMAN WALLIS: Right. So that's
18 sort of the regulatory side of it.
19 MR. CULLISON: Right.
20 VICE CHAIRMAN WALLIS: And the ACRS isn't
21 an expert on the legalistic matters, and so on. But
22 we are always asked to advise on technical matters,
23 and the concerns that we have is with all of these
24 technical issues floating around and all of that, are
25 you really capable of making these decisions with a

1 sound technical basis?

2 I think that's a place where we -- I think

3 we can use our expertise, and we can advise you, and

4 we probably can't do it until we see the NEI guidance

5 and your response to it.

6 MEMBER SIEBER: Well, the key document is

7 going to be the SER, as I see it. So -- and that is

8 the key to this whole issue is how to do the analysis.

9 MR. SHERON: Obviously, if, you know, when

10 the ACRS reviews the SER, if there are major problems,

11 technical problems, with that, you know, first off my

12 experience says we'd probably agree with you if you

13 found something that was, you know -- basically said

14 this thing was fatally flawed.

15 The other thing that you need to be aware

16 of, and you'll be seeing this, and that is that I --

17 this is something I worried about -- Suzy will tell

18 you, and John will tell you -- a long time ago -- was

19 that supposing the industry, for example, doesn't

20 complete their guidance document on the schedule we're

21 working to, or supposing that the document they

22 ultimately come up with doesn't prove to be acceptable

23 to the staff. That doesn't -- we shouldn't be in a

24 position where we have to go back to square zero.

25 And so the staff has developed a backup

1 guidance document, okay, that we feel is acceptable.
2 And you'll hear about that as well I think later in
3 the month. So we're not hanging everything on the
4 industry document alone.
5 MEMBER SIEBER: On the other hand, maybe
6 you can answer this. Will the information or the
7 Generic Letter go out before the SER is signed off?
8 MS. BLACK: Yes. This is Suzy Black. We
9 have changed the requested information, and now we ask
10 for their response 60 days after we've approved the
11 methodology. So the response date is no longer --
12 MEMBER SIEBER: Why don't you wait until
13 after the SER is complete and we get a chance to look
14 at it before you send the Generic Letter out? And
15 then you don't have to go and pull anything back or,
16 you know, do any somersaults in the middle of the air
17 and --
18 MS. BLACK: We don't think we'd have to
19 pull anything back, because the -- because it's -- the
20 response is tied to the issuance of the approval for
21 the methodology. And we also believe that it's
22 important to get this information out and let the
23 licensees see what we're actually going to be --
24 MEMBER ROSEN: Yes, I tend to agree with
25 you, Suzy, because what -- if, for example, the NEI

1 guidance was delayed or something, you know,
2 interminably, you'd issue this backup guidance you've
3 got, and that would be what you reference in your
4 safety evaluation.
5 MS. BLACK: Right.
6 MEMBER ROSEN: So the words work, either
7 with the NEI guidance or with your own.
8 MEMBER SIEBER: Well, the net effect of
9 doing that is just to have all of the licensees
10 worried about what's going to be in the SER, for
11 however long it takes you to issue it. And I guess
12 that's okay. That's what they do for a living.
13 MEMBER POWERS: Persuasive to me on that
14 regard was just that there is a substantial
15 information data collection activity that needs to
16 take place before you can do any kind of analysis.
17 MEMBER SIEBER: Yes.
18 MEMBER POWERS: And I can't believe that
19 licensees are not aware of those needs.
20 MR. SHERON: Right. And the other thing
21 is the -- you know, I was asking John, I mean, the
22 staff has had numerous interactions with the industry
23 with regard to their guidance documents. So I -- you
24 know, unless there are major changes, I think, you
25 know, that result from, say, the ACRS review, I don't

1 think the SER is going to be any real surprise --

2 MEMBER SIEBER: Okay.

3 MR. SHERON: -- to the industry.

4 VICE CHAIRMAN WALLIS: Well, we had a

5 preliminary look at the NEI guidance two weeks ago,

6 and we asked some questions about the zone of

7 influence and whether or not air jet tests could be

8 used to predict what would happen with the steam water

9 jets, and so on, and it seemed as if the authors of

10 the NEI guidance were not aware that there were

11 questions of this type that needed to be asked and

12 answered.

13 So I'm just wondering if these matters

14 will all be resolved. I don't know.

15 MR. HANNON: Based on the interaction we

16 had with the subcommittee a couple weeks ago, we are

17 focused on those technical concerns and would expect

18 to have them addressed in the safety evaluation. And

19 I think we have a meeting scheduled to bring that to

20 the ACRS, what, in the middle of September? I mean,

21 middle of August.

22 VICE CHAIRMAN WALLIS: This is a

23 subcommittee meeting in August.

24 MR. HANNON: August 17th, I think. So,

25 and at that point we would expect to be in a position

1 to explain the --

2 VICE CHAIRMAN WALLIS: I think we're all

3 working on trying to resolve the technical issues.

4 But you can't just hope that automatically that will

5 result in success.

6 Okay. Now we want to hear from NEI. I

7 guess NEI wants to make a presentation? Is there

8 anything else that staff would like to say at this

9 time? I'm very happy that we have senior members of

10 the staff here to guide us today.

11 Thank you very much.

12 MEMBER SIEBER: Are we supposed to write

13 a letter on this?

14 VICE CHAIRMAN WALLIS: We have to decide

15 what we're going to do. We're going to discuss the

16 matter.

17 Now, Tony Pietrangelo from NEI. I'm very

18 happy to welcome you back here.

19 MR. PIETRANGELO: Thank you, Dr. Wallis.

20 CHAIRMAN BONACA: We hope that you have

21 all the solutions to all of --

22 MEMBER SIEBER: Yes, solve all these

23 problems, please.

24 MR. PIETRANGELO: We had no plans to

25 present anything to the ACRS this morning, because we

1 didn't know that the Generic Letter had changed so
2 significantly. We still haven't seen it, obviously.
3 But it looks like the first one a lot more. Given
4 that, it dismisses the vast majority of the public
5 comments that were sent in to the staff. Okay?
6 Just to step back for a second on this
7 issue, I think with the exception of Davis-Besse, all
8 licensees have --
9 VICE CHAIRMAN WALLIS: Excuse me. When
10 you say "dismisses," do you mean that the public
11 comments were made on that first draft?
12 MR. PIETRANGELO: Oh, yes.
13 VICE CHAIRMAN WALLIS: So what do you
14 mean, it just pays no attention to them?
15 MR. PIETRANGELO: Yes, pretty much. And
16 I advise you to look at the NUBAR comments on backfit,
17 but I'll get into that in a second.
18 Most licensees have -- their licensing
19 basis is this 50 percent blockage assumption. Okay.
20 That's what has been there, and they have -- through
21 the actions taken on the Bulletin have gone and looked
22 at their sump screens, made sure it complied with what
23 was described in the FSAR, and so forth. So they are
24 complying with their current licensing basis. Okay?
25 I think it was noted before there isn't

1 anything in 50.46 that requires a licensee to do this
2 mechanistic evaluation that we're all talking about.
3 Okay? So now we have knowledge from the research done
4 on GSI-191 that maybe the 50 percent blockage
5 assumption isn't conservative. Okay? There are some
6 doubts about that, okay? So let's go do some other
7 stuff.
8 And we've developed an evaluation
9 methodology to go do this in a mechanistic way that
10 starts with debris generation and transport and
11 accumulation on the screen and MPSH calculations.
12 Almost like it was a whole new required design basis
13 analysis. Okay?
14 MEMBER POWERS: When you say you're
15 developing all this stuff, how is your database? I
16 mean, experimental database.
17 MR. PIETRANGELO: Not very good. It's
18 what has been published by LANL essentially, and we
19 know that there is some draft reports by LANL on the
20 reference plant at Comanche Peak that we don't have
21 access to, which is --
22 MEMBER POWERS: You're not alone.
23 (Laughter.)
24 MR. PIETRANGELO: Right. So we have -- we
25 agree with the conclusion of the research that it --

1 this is a plausible concern that we should do
2 something about. The licensees are prepared to go do
3 this analysis.
4 The reason we said in our comments not to
5 make this a -- make this more like the Bulletin 96-03
6 that the BWR was performed was that it got through to
7 the solution in the quickest way and in the most
8 efficient way. You know, the legalistic hoops that
9 were talked about before are legalistic hoops that
10 both the licensee and the NRC have to jump through
11 that divert you from getting to the solution in the
12 quickest efficient way.
13 Okay. The staff can request anything it
14 wants in a Generic Letter. There is nothing that says
15 they can only request information. They can request
16 anything they want. Okay? They can do it under
17 50.54F or not. There's nothing that says that every
18 Generic Letter has to have 50.54F associated with it.
19 Okay?
20 All we wanted to do was follow the model
21 that has already been used for the BWRs to get to the
22 quickest resolution of this issue.
23 Part of our comments on the Generic Letter
24 was that this is more an additional assurance mode
25 that the ECCS systems would work, because 50.46

1 doesn't go into this level of detail. Okay? To keep
2 us out of this exemption space and JCO space, and all
3 these other things that cause more work for other
4 people, and divert you from getting to the solution in
5 the quickest way. Okay?
6 We're prepared to go forward, but the
7 evaluation methodology that we develop is tied to the
8 language in the Generic Letter. They are not mutually
9 exclusive things, because if you do the baseline
10 evaluation methodology, given all its conservatisms
11 that I thought the subcommittee saw a couple of weeks
12 ago, that's not a demonstration of whether you're in
13 compliance or not after you perform the baseline
14 methodology.
15 You may pass, but with that level of
16 conservatism it's unlikely you're going to meet the
17 MPSH criteria at the end. Does that mean you're not
18 in compliance anymore? No, it's indeterminant. So it
19 got supplemental guidance. It tries to put more
20 realistic assumptions based on the research that has
21 been done in debris generation and transport and
22 accumulation.
23 And we've got a risk-informed alternative
24 that further refines the methodology. And we think
25 most licensees will opt to use the risk-informed

1 methodologies.

2 VICE CHAIRMAN WALLIS: Tony, I think what

3 you're saying is that you liked what you saw in the

4 last Generic Letter, which asked for these analyses,

5 and so on, and you prefer it to the original draft,

6 which appears to be more like what we're offered

7 today.

8 MR. PIETRANGELO: That's correct.

9 VICE CHAIRMAN WALLIS: So that this is

10 significant information from the committee, and I

11 think that at the subcommittee meeting there seemed to

12 be a real sort of agreement between the staff and NEI

13 this was a good way to proceed. Now you're wondering

14 if it is because --

15 MR. PIETRANGELO: No. In fact, given what

16 I've heard today, I would urge you not to issue the

17 Generic Letter, not to approve issuance of the Generic

18 Letter. If we don't do chemical effects testing until

19 the end of the year -- and okay, fine, we'll add some

20 margin in. Then you're going to hold me in compliance

21 to 50.46A(2)(i) based on that thing?

22 I mean, you're putting the licensees and

23 I think ultimately the NRC in handcuffs if you do

24 that. So I think there is a nexus between the -- what

25 the Generic Letter requests you to do and how our

1 evaluation methodology is set up.

2 VICE CHAIRMAN WALLIS: Well, this is what

3 I was concerned about, this sudden decision to rewrite

4 the thing and approve it without having some time to

5 think about it. And I'm now learning that if you had

6 time to think about it, you might learn that NEI

7 didn't like this change, and maybe some accommodation

8 might be appropriate. Is that what I'm learning?

9 MR. PIETRANGELO: Well, I think you are

10 learning that. But I'll take you back to what the

11 Commission requested you to do. Okay? And we said

12 the same thing at the subcommittee two weeks ago.

13 You're in a good position to really help on this

14 issue. Okay?

15 And I think the Commission, both in the

16 public briefing and in the SRM, are requesting you to

17 work with the staff and make a recommendation for a

18 practical solution within a reasonable period of time.

19 And given all you've heard, I think you should respond

20 to that request.

21 And we want to do this right. I think the

22 industry has committed to do this right. All of the

23 tools that -- you know, the orders and enforcement

24 that Brian went through, if a licensee doesn't respond

25 in a straightforward way to the Generic Letter, all

1 those tools are still available. Okay? But you have
2 to use them all at the front end in a compliance mode
3 and create work for both the licensee and the NRC
4 later.
5 If you could request any action you want
6 in the Generic Letter, and if the licensee doesn't
7 respond appropriately, then it's time to get more
8 draconian with all of that other stuff. But we're
9 willing to do it. We've put a lot of time into the
10 evaluation methodology.
11 The chief nuclear officers in the industry
12 are all well aware of this issue; they're briefed on
13 it regularly. We've already taken the NEI guidance to
14 do the containment walkdowns. There has already been
15 actions and responses on the docket for the Bulletin,
16 and we're ready to do the next step.
17 But trying to do all of this other stuff
18 -- diverts from you resolving the issue in a timely
19 manner.
20 VICE CHAIRMAN WALLIS: Now, you said that
21 you urged us not to recommend issuing the Generic
22 Letter in its new form?
23 MR. PIETRANGELO: Yes.
24 VICE CHAIRMAN WALLIS: And you made that
25 statement?

1 MR. PIETRANGELO: I haven't seen it.

2 MEMBER ROSEN: Even though you haven't

3 seen it.

4 MR. PIETRANGELO: Even though I haven't

5 seen it, I think I know -- it looks like the first

6 one. There's a lot of problems with it.

7 VICE CHAIRMAN WALLIS: It looks more like

8 the first one.

9 MR. PIETRANGELO: Yes.

10 MEMBER KRESS: Tony, the thing that's

11 bothering me is I thought I heard the staff say that

12 they were more or less forced into this form by the

13 Office of General Counsel.

14 MR. PIETRANGELO: I can't speak to that.

15 MEMBER KRESS: You can't speak to that

16 either.

17 MR. PIETRANGELO: No. They are there to

18 provide legal counsel. They're not there to direct

19 the staff to do anything. The Commission directs the

20 staff.

21 MEMBER SIEBER: Okay.

22 VICE CHAIRMAN WALLIS: Well, this is a bit

23 like riding a bronco or something.

24 MR. PIETRANGELO: Well, it's certainly --

25 VICE CHAIRMAN WALLIS: We may say, well,

1 just go out -- put out this Generic Letter in whatever
2 form the staff wants and thinks is legal, and then
3 we'll deal with the consequences.
4 MR. PIETRANGELO: And I urge you not to
5 just accept that argument on its face, because I think
6 there is other ways to do this. It has been done
7 already for the boilers. Okay? Things haven't
8 changed that much, and we know that path. We know how
9 to move forward with it. And if the requested actions
10 aren't adequate, then the staff has many regulatory
11 tools at its disposal to -- with an individual
12 licensee.
13 VICE CHAIRMAN WALLIS: Well, I think the
14 staff needs to comment on what you've just told us.
15 MR. SHERON: I think the -- I think where
16 the difference of opinion is is with the word
17 "compliance." Okay? If we invoke 50.54F, we're
18 asking for the information to determine compliance
19 with the regulations. I think NEI and the industry
20 would argue that they are in compliance, because the
21 guidance out there is -- says 50 percent blockage.
22 And if we just said, "Please analyze your
23 plans," without invoking the compliance part -- in
24 other words, just sent them a letter, a request, okay,
25 "Dear Industry: We would like you to voluntarily

1 reanalyze your plants against this new methodology,
2 whatever, and tell us what you intend to do about it,"
3 okay? The problem is is that the first time somebody
4 does an analysis using perhaps this most conservative
5 method, this bounding method, and concludes they are
6 not in compliance, then they are sort of in a little
7 bit of a regulatory or a legal dilemma. Okay? In the
8 sense of --
9 MEMBER ROSEN: I don't think I understand
10 that. I mean, I heard Tony say it's an admittedly
11 conservative screening tool. So you can do an
12 analysis that says you don't pass the screening. It
13 doesn't say you're in non-compliance. I think that's
14 the difference.
15 MR. SHERON: Right. And I don't think
16 we're saying that the minute somebody comes up with a
17 conclusion using the most conservative method, for
18 example, and concludes that they don't meet the MPSH
19 requirements that automatically they are not in
20 compliance. Okay?
21 They have a methodology in front of them
22 which the staff approved? Okay? One of those methods
23 presumably they will use ultimately to determine
24 whether or not, you know, their sumps are operable or
25 not.

1 MEMBER ROSEN: Okay.

2 MR. SHERON: And at that point, okay, as
3 we said, they have an option. They can come in, and
4 they can say either, you know, we've determined that
5 our sumps -- we don't meet the MPSH requirements, for
6 example. Okay?

7 Here are the proposed modifications we
8 intend to take. Okay? And what we're saying is that
9 and they need to then provide us with justification on
10 why it is acceptable to continue to operate while you
11 make those modifications.

12 MEMBER ROSEN: And that can be a risk-
13 based justification.

14 MR. SHERON: Yes.

15 VICE CHAIRMAN WALLIS: So the difference
16 is you --

17 MR. SHERON: Or with a combination of
18 risk-based and compensatory measures.

19 VICE CHAIRMAN WALLIS: In the letter which
20 we saw two weeks ago, you requested essentially this
21 analysis. And in the new letter you're requesting
22 that they submit information to confirm compliance --
23 a different tone altogether. And that is the problem
24 that you have I think -- NEI.

25 MR. PIETRANGELO: Yes. I mean,

1 admittedly, 50.46 does not require you to do this
2 level of examination. There is nothing in there that
3 says how to do this. All right? And then you're
4 asking me to take the results of this thing and tell
5 me why I'm in compliance with 50.46.
6 MEMBER SIEBER: Well --
7 MR. PIETRANGELO: And you're going to go
8 through all of these gymnastics.
9 MEMBER SIEBER: I think there's another
10 issue here. It seems to me the 50 percent blockage
11 assumption is built into Title 10.
12 MR. PIETRANGELO: No, it's not.
13 MEMBER SIEBER: It's not?
14 MR. PIETRANGELO: Nope.
15 MEMBER SIEBER: What is it, a Reg. Guide?
16 MR. PIETRANGELO: It's a Reg. Guide.
17 PARTICIPANT: Reg. Guide 1.82.
18 MEMBER SIEBER: So you can change that
19 with relative ease.
20 MS. BLACK: That was changed several years
21 ago.
22 MEMBER SIEBER: Okay.
23 MS. BLACK: And it said for future
24 modifications you can no longer use that, or you
25 should no longer use that.

1 MEMBER SIEBER: Okay.

2 MR. PIETRANGELO: Well, but that's what

3 every -- the licensing basis at every facility except

4 for Davis-Besse is.

5 VICE CHAIRMAN WALLIS: I wonder if we have

6 learned enough now. Do we need to pursue this any

7 more? I think the committee has to decide what it

8 wants to recommend.

9 Thank you very much.

10 MR. PIETRANGELO: Okay.

11 VICE CHAIRMAN WALLIS: It goes back to,

12 again, to -- as an interested member of the public

13 here, I'm interested to see, you know, what happens

14 and whether the agency -- how the agency and industry

15 handle the situation where new research indicates that

16 assumptions which were made in the past are no longer

17 appropriate. And it seems to be extraordinarily

18 difficult, and I don't quite understand why.

19 MR. PIETRANGELO: Well, I think --

20 VICE CHAIRMAN WALLIS: And you have all of

21 this baggage of regulations and stuff that you have to

22 deal with.

23 MEMBER ROSEN: I think what has happened

24 now is, given all of that, the Commission itself, to

25 which we are advisory, has asked us to weigh in very

1 directly on June 30th in the SRM, to weigh in to
2 recommend a practical solution, work with the staff
3 and with others I guess to -- although it only
4 specifically says the staff -- make a recommendation
5 for a practical solution within a reasonable period of
6 time. And so --
7 VICE CHAIRMAN WALLIS: But we're nowhere
8 near a practical solution. We're just asking for
9 information. That's no solution at all. It's just
10 gathering information and figuring out what the
11 situation is, not what the solution is.
12 MEMBER ROSEN: I think the Commission has
13 handed us a mandate.
14 VICE CHAIRMAN WALLIS: But we can't get --
15 you know, this Generic Letter doesn't offer any
16 solution at all. It just says, "Let's find out what
17 the situation is."
18 CHAIRMAN BONACA: Right. I think we are
19 being caught in a debate on the licensing approach to
20 deal with this issue. That's what --
21 VICE CHAIRMAN WALLIS: Which is not our
22 expertise.
23 MR. SHERON: This is a process issue that
24 we're struggling with right now. Okay?
25 VICE CHAIRMAN WALLIS: We have been told

1 in the past not to get involved in process issues.

2 MR. SHERON: Yes. And, unfortunately,

3 it's difficult. In the past, when we -- when

4 licensees would come in and provide us with

5 justification for something in their plant -- in other

6 words, they said, "Here's a lot of data, here's some

7 analysis to justify what we're doing," and the NRC

8 reviewed it and we said, "Okay. Yes, we accept that,"

9 okay, and then we find new information.

10 We have typically gone out with a Generic

11 Letter that said we are challenging this information

12 you gave us. Okay? Steam generators are a good

13 example where licensees when they first came in said,

14 "Gee, wastage and thinning is the dominant form of

15 degradation. And, therefore, the methods we'll use to

16 examine our tubes will be just bobbin coils."

17 Okay? And then we found out that that

18 degradation mechanism was no longer the dominant

19 mechanism. Okay? They didn't give us complete

20 information. Okay? The mechanism changed to stress

21 corrosion cracking.

22 We went back to the industry and basically

23 challenged them along the lines of, "You can't use a

24 bobbin coil anymore." Okay? Because that's not

25 appropriate. What you told us way back in the '70s is

1 no longer true.

2 What's different here in my mind is the

3 fact that the staff put in a guidance document, a

4 regulatory guidance document, an acceptable way to

5 analyze the sump. We said 50 percent blockage is an

6 acceptable way to analyze the sump, and industry did

7 that. So NRC sort of became part and parcel to this.

8 Now we've concluded that some of our

9 guidance is no longer appropriate. Okay? And what

10 we're struggling with is: how does one go about

11 changing a guidance document, okay, in regulatory

12 space, okay, and getting licensees to do the

13 reanalysis? When you request a licensee to redo

14 something, okay, you have to have a reason for doing

15 it.

16 Why are we asking them to do it? Because

17 we're questioning compliance. Okay? If it was we

18 just want to make the plant safer -- you know, gee,

19 50 percent is still good, but we think it's cost

20 beneficial to make the plant safer, then we would be

21 in backfit space where we would be doing cost

22 beneficial analyses and trying to convince you that

23 the costs of fixing the sump and everything were with

24 it from a risk standpoint. But we're not there.

25 Okay?

1 That's what we're struggling with right
2 now. The only other way we can do this is if we said
3 we need them to fix the sumps, because then we go to
4 the order. Okay? Or we fix it by now saying, "I've
5 got to put sump blockage requirements in the
6 regulations." Okay? Which I don't think anybody
7 thinks is really -- you know, that's kind of an
8 overkill.
9 So that's where we're struggling with this
10 is the question of: why are we requesting licensees
11 to do it? Because it raised a question of compliance.
12 Okay? It didn't raise a question of, can I make the
13 plant safer? Okay? But they were already safe
14 enough.
15 MEMBER SIEBER: Well, the interesting
16 thing, though, is that we questioned what makes the
17 licensee, then, modify the plant? And a licensee is
18 faced with the same situation here that he would be if
19 he discovered a defect in the plant on his own. You
20 have to comply with your license. You have to obey
21 the rules in Title 10. You have to maintain the
22 design and licensing basis and operate within those
23 constraints.
24 And if you -- a licensee finds information
25 that takes them outside the boundaries of those rules,

1 he is obligated to correct the situation or shut down
2 without further action by the NRC, by the staff. And
3 so that -- that's how I would expect licensees to
4 perform, and I think every licensee knows what the
5 rules are.
6 And so I don't see such a big conflict
7 between asking for information but not telling them to
8 do anything because they're bound by the conditions of
9 their license to do something once they discover that
10 they are outside the licensing basis.
11 MR. SHERON: I think the guidance document
12 -- you know, the evaluation guidance document gives
13 them a flexibility, okay, for doing more sophisticated
14 analyses. If a bounding one, for example, you know,
15 gets them to -- an answer that they're not satisfied
16 with --
17 MEMBER SIEBER: And I can still consider
18 that the key document as opposed to the Generic
19 Letter, and I think the timing -- you know, the rush
20 to send this out to me isn't as important as is the
21 timely completion of the guidance document. But, you
22 know, there is an opportunity to send something out
23 that might be different than you wished it would have
24 been if you had waited until the guidance document was
25 available.

1 VICE CHAIRMAN WALLIS: Well, I'm going to
2 go back to what you said a little while ago, Brian.
3 You said that this is a matter of compliance and not
4 a question of safety. But what set this whole thing
5 off was a LANL study which said that these plants are
6 likely to be out of compliance, and some selected to
7 be blocked, and this could have an order of magnitude
8 effect on some of the CDF terms.
9 MR. SHERON: Well, I didn't say this was
10 not --
11 VICE CHAIRMAN WALLIS: That's what set
12 this whole thing going, so that essentially at the end
13 the real criterion, it seems to me, for what you do
14 has to be based in terms of the safety implications of
15 it all, not some legalistic --
16 MR. SHERON: I didn't say that this was
17 not a safety issue.
18 VICE CHAIRMAN WALLIS: Well, and that's
19 what I found difficult about this whole thing from the
20 very beginning is -- is it important to safety or not?
21 I mean, are these things that they've done as a result
22 of the Bulletin -- did they make the -- sort of the
23 safety problem essentially go away, or not? So what's
24 the measure of safety that's at issue here? That's
25 something that has never been fully explained to us.

1 MR. SHERON: Well, LANL did risk
2 assessments on this.
3 VICE CHAIRMAN WALLIS: The initial ones
4 were very dramatic, let's say.
5 MR. SHERON: Right. But then the revised
6 ones demonstrated -- and we used those as the
7 justification --
8 VICE CHAIRMAN WALLIS: But are they right?
9 Are these revised ones right? They rely on operator
10 actions and alternative ways of cooling, and so on.
11 MR. SHERON: They took into --
12 VICE CHAIRMAN WALLIS: Now, as I
13 understand, the plants haven't adopted all of these
14 possible new actions, and so on? We also had a
15 presentation on that. WOG made various suggestions.
16 Some of the plants adopted some of them, some of them
17 didn't, and so on.
18 Now, what effect has that had on the
19 safety issue? We don't know.
20 MR. SHERON: Well, I think the risk
21 assessments -- and, Ralph, you can chime in here --
22 but the risk assessments, the revised ones that were
23 done, I think took credit for some of these
24 compensatory measures and --
25 VICE CHAIRMAN WALLIS: But did the plants

1 actually make these -- all these --

2 MR. ARCHITZEL: I'd like to just clarify.

3 Ralph Architzel again. The LANL supplemental study

4 took credit for existing operator procedures and

5 actions that were in the existing procedure. So the

6 first study that was done did not have any credit for

7 operator actions.

8 LANL studied that situation and dropped it

9 down to -- it was like an order of magnitude --

10 VICE CHAIRMAN WALLIS: An order of

11 magnitude change, right.

12 MR. ARCHITZEL: With the operator actions

13 that were on the books, the Bulletin requested

14 additional operator actions that dropped it further.

15 So the ones that were in the first study were existing

16 ones that you'd find in procedures, that licensees

17 would be expected to do already. That wasn't in the

18 original study. The Bulletin requested additional

19 compensatory measures that have been taken in a

20 large --

21 VICE CHAIRMAN WALLIS: But this all has --

22 MR. ARCHITZEL: -- so it would reduce it

23 further.

24 VICE CHAIRMAN WALLIS: This all has a big

25 effect on the imperative to resolve the sump blockage

1 problem, doesn't it?

2 MR. SHERON: And that's why we concluded

3 that we could -- we provided the justification that

4 said that's why we can wait until, for example, the

5 end of calendar year 2007 for plants to actually do

6 the analysis, design whatever changes they have to

7 make, you know, procure the materials, and install

8 them. Okay? That's why we felt that the industry had

9 this amount of time, this three- or four-year period,

10 to do that, based on these risk assessments.

11 VICE CHAIRMAN WALLIS: But they still need

12 to come into compliance. Even though it's now --

13 MR. SHERON: Yes.

14 VICE CHAIRMAN WALLIS: -- not so

15 significant from the point of view of risk.

16 MR. SHERON: Yes.

17 VICE CHAIRMAN WALLIS: Okay. Well, we've

18 taken a long time. I think unless anybody wishes to

19 say anything more, I'd like to hand it back to the

20 Chairman.

21 Thank you very much.

22 CHAIRMAN BONACA: Any other comments?

23 Thank you very much.

24 Now I think we'll break and get back again

25 at 10 of 2:00.

1 (Whereupon, at 12:48 p.m., the
2 proceedings in the foregoing matter went
3 off the record for a lunch break.)
4 VICE-CHAIRMAN WALLIS: Let's come back
5 into session. I think the Chairman is caught up. The
6 next item is a discussion of 50.46, as if we haven't
7 had enough exciting issues today already.
8 We're going to start now. The Chairman is
9 back. It's up to you. We are on the record. And Dr.
10 Shack is going to get us started.
11 MEMBER SHACK: Well, we've been through a
12 number of topics on 50.46. I think that the new thing
13 today is that there is a new staff requirements memo
14 that just came out July 1st. Brian Sheron will tell
15 us about the staff's plans presumably to address some
16 of the issues raised in that staff requirements memo.
17 MEMBER POWERS: Brian, are you just
18 continuously drawing short straws? Is that all? When
19 they give you straws, Brian, don't pick the short one
20 anymore. Okay?
21 MEMBER SIEBER: Do you want to get a
22 chair? Do you want to get a chair? You can sit down,
23 then.
24 MR. SHERON: Good afternoon. My name is
25 Brian Sheron. I'm the Associate Director for Project

1 Licensing and Technical Assessment in NRR.

2 It's kind of an honor. I haven't been up

3 here in front of the ACRS for -- I don't know -- a

4 long time. Maybe it's a good thing or a bad thing.

5 I don't know.

6 VICE-CHAIRMAN WALLIS: It makes you feel

7 younger.

8 MR. SHERON: Yes. Thank you.

9 What I would like to do is spend a little

10 bit of time talking about where the staff is heading

11 on risk-informing 10 CFR 50.46. Just for background,

12 this is one of the regulations that we chose to

13 risk-inform as part of option 3 with regard to the

14 risk-informing our regulatory processes.

15 Remember, there are two other options:

16 option 2, which was the special treatment

17 requirements; and then option 1, which would basically

18 on a plant-specific basis look at risk-informed

19 submittals.

20 For background, recall that the Commission

21 directed the staff to determine how best to proceed

22 with risk-informing part 50 regulations. From June

23 '99 through March of last year, the staff, primarily

24 the Office of Research, performed feasibility studies

25 and technical analyses basically laying, trying to

1 lay, a technical groundwork for how one would modify
2 50.46.
3 The staff was supposed to be coming
4 forward with a rule, a proposed rule. Now, as you can
5 see, in March of '03 the Commission directed us to do
6 that with a risk-informed alternative maximum break
7 size.
8 Early in the year, this year, we kind of
9 concluded that there were a number of policy issues
10 that were really -- let me use the word "stumping" the
11 staff a bit in terms of how to proceed. So we
12 developed SECY-04-0037. And we requested that the
13 Commission provide us with some additional policy
14 guidance on this alternative break size rule,
15 primarily with regard to the scope of the rule.
16 Nonetheless, the Commission spent a fair
17 amount of time deliberating on that SECY paper that
18 went up, but it was clear that we needed to keep
19 moving on 50.46, that we just couldn't sit back and
20 wait until the Commission provided the guidance.
21 There was a lot of stuff that we can continue to do.
22 What I proposed to my supervisor, Mr.
23 Dyer, was that we form an interoffice steering
24 committee to give it some focus. Previously there
25 really wasn't -- you know, there were a lot of

1 different divisions and offices that were involved,
2 but I don't think there was any clear one person, let
3 me say, being held accountable. So I guess, as Dana
4 said, I drew straws and got the short one again.
5 I proposed that we form an interoffice
6 steering committee. And I said that I would assume
7 the chairmanship of it, kind of basically shepherd it
8 through. I put together on the steering committee
9 senior-level managers.
10 Dave Matthews, Division of Regulatory
11 Improvements, who is basically responsible for the
12 rulemaking process, is on it. Suzy Black, Director of
13 Division of System Safety and Analysis, is on it.
14 Rich Barrett, Division of Engineering Director, is on
15 it. Charlie Ader from the Office of Research is on it
16 to represent the research interests, Joe Gray or
17 substitute from OGC to make sure that we are being
18 legally pure in what we do. NSIR is involved with
19 regard to any security interfaces. And the plan
20 basically is with this steering group to provide
21 guidance to the staff on developing the framework for
22 a rule.
23 The first thing we did was we had to
24 assign lead responsibility for certain aspects of the
25 rule. We established division leads. What I mean by

1 that is basically each division director that was
2 assigned to lead was held accountable for producing
3 that part of the regulatory framework for 50.46.
4 Break size definition, Division of
5 Engineering and the Office of Research were
6 responsible for developing that. LOCA and PRA success
7 criteria, again DSA and Research were responsible for
8 that.
9 The rule framework was with Dave Matthews
10 and DRIP, his division. Assessment of impacts and
11 potential consequences, that was primarily DSSA and
12 DE. We have used the term "tentacles" to describe
13 that. In other words, obviously 50.46 has very
14 far-reaching consequences in terms of the design of
15 plants. And we wanted to make sure that we fully
16 understood whatever changes we make, how they might
17 affect the design of plants.
18 Assessment of impacts and potential
19 consequences, again, this is the -- I'm sorry. I just
20 talked about that. That is the tentacles, as they
21 call it.
22 PRA quality and scope requirements.
23 Again, that was DSSA, the PRA Branch, along with the
24 Office of Research. Adequacy of reg guide 1.174
25 guidance. Again, that was DSSA. And in security

1 impacts, we asked the NSIR to provide any input on
2 that.
3 Next slide, please. The Chairman in his
4 tasking memo had asked -- he wanted a proposed rule in
5 a short period of time. I can't remember exact words.
6 I think it was possibly within a year when he issued
7 his memo.
8 So we put together a streamlined schedule.
9 This is a very optimistic schedule. I want to
10 emphasize this is something that we think is going to
11 be very difficult to meet, but, nonetheless, we are
12 going to try.
13 Basically we plan on meeting, well, with
14 the full Committee today. We expect that there will
15 be perhaps one, perhaps two more meetings with the
16 full Committee later in the fall, when we flesh out
17 this rule a little bit more and put some meat on it.
18 We expect there will be several subcommittee meetings.
19 I think there are some scheduled later this month on
20 this to discuss some of the detailed areas.
21 Our plan, which we have already had a
22 little bit of a slip, was we want to get a Federal
23 Register notice issued this month, early this month
24 hopefully, in which we will provide a conceptual
25 outline and a summary description of what we are

1 thinking about for a rule. And the reason is we want
2 to get public feedback from stakeholders.
3 And we would propose holding a meeting.
4 I think that July 26th date was originally what was
5 scheduled. I'm going to guess that's probably going
6 to slip a little bit.
7 But the plan is once the public had seen
8 the Federal Register notice and it gets a better
9 understanding of what our proposed concept is for the
10 rule as well as describing what some of the elements
11 are, we would get some meaningful feedback. And that
12 could feed into both the formulation of the draft rule
13 as well as the regulatory analysis.
14 The plan right now is we want to get a
15 draft rule into the internal concurrence process I
16 think by about early September. That would allow us
17 presumably to get concurrences, resolve comments, and
18 get a package to the executive director by the end of
19 November and then a package to the Commission by
20 December 15th. And that right now is essentially
21 consistent with the SRM guidance that said to produce
22 a rule in about six months.
23 We are going to request CRGR waiver of the
24 draft rule review, mainly because it is not a backfit.
25 It is a voluntary alternative. So there is no

1 backfitting requirement associated with it.

2 Next slide, please. The SRM we received

3 basically said we should select a maximum break size

4 using the approach in reg guide 1.174, which would be

5 a risk-informed approach. Use initiating event

6 frequencies from the expert elicitation process, which

7 I believe you are going to discuss after I am done

8 here, and any other relevant information.

9 One of the first things we met on as a

10 steering committee was on this break size. I don't

11 have it on the slides here, but I was amazed. I was

12 actually very optimistic because that seemed to be

13 about the easiest thing we could agree on in terms of

14 a break size, risk-informed break size.

15 I'm not going to get into details on it

16 today. I think that's better left for a subcommittee.

17 But we do have a proposed go forward approach for

18 break sizes for both PWRs and BWRs and a basis upon

19 which we selected those. They are smaller than a

20 double-ended guillotine.

21 MEMBER POWERS: Could I just ask you a

22 question, Brian? You come down, and you say, "We're

23 going to use an expert elicitation process here"?

24 MR. SHERON: I'm sorry. We used the

25 research expert elicitation process for developing

1 break size frequency.

2 MEMBER POWERS: I guess what I'm

3 struggling with is how many large pipe breaks in

4 nuclear power plants have we had? Could that possibly

5 generate experts?

6 MR. SHERON: I'm going to defer that to

7 the Office of Research. That's obviously a key

8 question in terms of the efficacy of the expert

9 elicitation process and the absence of data.

10 MEMBER POWERS: It just seems to me that

11 the approach that you are adopting that has been

12 adopted on things like --

13 MR. SHERON: We did it in 11.50, in

14 containment failure and so forth.

15 MEMBER POWERS: Yes. And what I --

16 MR. SHERON: It has generated a lot of

17 controversy.

18 MEMBER POWERS: What I have liked a lot is

19 the kinds of stuff that is being done for pressurized

20 thermal shock, where they get the expertise into areas

21 where you could have expertise, like flaw size

22 distribution and things like that, in steel. There is

23 a lot data on that, at least some data. And so you

24 can have some expertise on that. But, actually, the

25 break size problems, you don't have a lot of data.

1 MR. SHERON: Right. And that is why we
2 are taking a risk-informed approach. You will see
3 that the break sizes we're ultimately going to
4 recommend are not frequency-based.
5 But there is some accounting for the fact
6 that there is some uncertainty obviously in the expert
7 elicitation process and that there are some initiating
8 events that I think were not considered in the expert
9 elicitation process that we wanted to make sure we
10 accounted for.
11 MEMBER POWERS: Now, you took no interest
12 at all in the German approach to these large breaks?
13 MR. SHERON: I apologize. I'm not
14 familiar with the German --
15 MEMBER POWERS: Well, what they basically
16 do is they say, yes, the biggest pipe breaks, it's
17 really not a double-ended guillotine break. There's
18 some reduction in the amount of flow area that steam
19 and water can come out of because of the pipe breaks.
20 And it kind of offsets, like this.
21 They spent a lot of time figuring out what
22 that was and came up with a number. But they still
23 took a big break. It's just that they took it as more
24 realistically what they thought the break would look
25 like.

1 MR. SHERON: Yes. And I think that the
2 breaks that we are proposing I think have a -- there's
3 a practical basis behind there. Okay? But, like I
4 said, that's probably a whole separate meeting.
5 MEMBER SHACK: What's your criteria if
6 it's not frequency-based for choosing the maximum
7 break size?
8 MR. SHERON: Well, for example, you might
9 pick a probability of a frequency, of a break size,
10 and you look it up on a curve and you say, "Okay.
11 That corresponds to a break of X inches in diameter."
12 But then you say, "Okay. What are things that weren't
13 considered?"; for example, heavy load, seismic,
14 whatever, so forth.
15 Then you also might look and say, "Okay.
16 From a practical standpoint, what are the largest pipe
17 sizes in the plant once you drop below the main
18 coolant pipes." Okay?
19 It's basically the pressurizer. All
20 right? I think the largest one out there for PWR is
21 like 14 inches, which is South Texas. The rest of
22 them are I think around 12 or 13 inches.
23 So one might argue and say, "Well, if I
24 pick a break size that is 12 inches or 14 inches or
25 just say it's the surge line and that's some size

1 greater than, say, a pure frequency-derived break
2 size, then you can argue that that accounts for
3 uncertainty. And there it relates to a practical
4 limit within the plant." Okay?
5 And you can look at it and say, "Okay.
6 Where does that really fall from a" -- you know, if
7 you want to get into statistics, you could try to put
8 confidence intervals or something on it. Okay? But
9 it provides margin over and above just a pure
10 frequency-derived break size.
11 One of the logic things, too, is that the
12 Commission had said what they would like us not to --
13 for this reversibility argument basically that if down
14 the road we get new data that says, all of a sudden,
15 that this break frequency plot changes for the worst,
16 becomes less conservative, they want to make sure the
17 changes that licensees make are not irreversible in a
18 plant such that if they had to go back and say they
19 changed a piece of equipment or took something out of
20 service and then the break size changed such that they
21 would have to put that back in, it shouldn't be a
22 major catastrophe for the plant.
23 You would like not to have the plant
24 sitting right on a ragged edge of something where if
25 it changed two years from now, all of a sudden, we

1 would have to go out and make all of these plants
2 redesigned and put stuff in. You want to have margin
3 in there so that, even if that frequency number did
4 change, you could argue that it's bounded.
5 Again, like I said, I think that's
6 probably the subject of probably a detailed
7 subcommittee meeting and by people that are a lot
8 smarter than I am in fracture mechanics and so forth.
9 The Commission also wanted us to allow
10 operational as well as design changes, which could be
11 interpreted as things like, for example, allowed
12 outage times, so forth, in tech specs.
13 Restrict changes where --
14 MEMBER SHACK: Power outages?
15 MR. SHERON: Yes, possibly, especially
16 PWRs. If they change out their steam generators and
17 they, all of a sudden, find themselves with 20 percent
18 extra heat transfer area sitting around there, this
19 could be a possibility.
20 Restrict changes where engineering margins
21 are necessary to meet the reg guide 1.174 principles
22 or security considerations. Let me hold off. And
23 I'll discuss that in a little bit in a broader
24 context.
25 And then mitigation of LOCA up to the

1 double-ended guillotine break should be required. And
2 changes to this capability should be controlled by
3 regulation commensurate with risk. Okay?
4 Basically what that means is that for
5 breaks up to -- and I am going to use the term
6 "transition break size." We have been struggling with
7 a name or an acronym. Okay? You know, we called it
8 "risk-informed" versus "deterministic" and didn't like
9 that. And then I called it the "region formally known
10 as risk-informed," and they didn't like that.
11 Then we called it region I and region II.
12 So we're calling it right now basically breaks up to
13 a transition break and then breaks beyond the
14 transition up to the double-ended guillotine.
15 MEMBER SHACK: It's just a design basis
16 break, right?
17 MR. SHERON: If you want to call it that,
18 yes, because the Commission did say that breaks beyond
19 this transition should be considered beyond design
20 basis. And I'll explain that in a little bit.
21 Basically what they're saying is that for
22 breaks up to this transition break size, everything is
23 the same. Okay? You do a 50.46 analysis.
24 Everything, all the equipment required upon its design
25 base needs to meet all of the same requirements.

1 For breaks at the transition break size up
2 to the double-ended guillotine, the guidance is that
3 you don't want these breaks going to Carmill, for
4 example, because they took out certain pieces of
5 equipment and the like.
6 In other words, what you want to say is
7 that up to the double-ended guillotine, the plant can
8 still handle that break size. In other words, you're
9 not going to melt the core. You're not going to
10 produce fuel damage.
11 But, nonetheless, the way they analyze it
12 maybe different commensurate with the lower risk
13 significance. For example, you don't have to use an
14 evaluation model with all the conservatisms. You can
15 use the best estimate model because you don't have to
16 use --
17 MEMBER SHACK: You have to do that now.
18 MR. SHERON: But you still have to, you
19 know, I think, pick single active failure. And there
20 still has to be a certain conservatism. I think the
21 staff has been using like --
22 VICE-CHAIRMAN WALLIS: You just have to
23 consider uncertainties
24 MR. SHERON: Right. And the staff has
25 been using I think numbers -- I've seen like 95

1 percent. Okay? And so we may pick a best estimate
2 model but with a lower probability, not 95 percent for
3 something lower.
4 VICE-CHAIRMAN WALLIS: Are you going to
5 define what you mean by mitigation, then?
6 MR. SHERON: Yes.
7 VICE-CHAIRMAN WALLIS: It seems to me we
8 aren't talking there at the moment.
9 MR. SHERON: Well, right now I think one
10 of the phrases we are considering is "coolable
11 geometry"; in other words, that you have to maintain
12 a coolable geometry.
13 Now, how you demonstrate that is a
14 different story. Okay? Right now the staff would say
15 that in the absence of any additional data, 2,200
16 degrees and 17 percent oxidation is sufficient to
17 demonstrate coolable geometry.
18 What we don't want to do is we don't want
19 to foreclose the opportunity for the industry if they
20 want to produce additional data that says they can
21 either go to higher temperatures, clad temperatures,
22 or changes in the oxidation to restrict them.
23 So the thought right now is that if we
24 kept it at coolable geometry and maybe in a regulatory
25 guide or some other regulatory guidance, say, that

1 today we can live with -- the staff feels comfortable
2 with 2,217 percent, but if the industry wants to
3 produce additional data to demonstrate that they could
4 go to higher numbers or something, then we would
5 consider it.
6 VICE-CHAIRMAN WALLIS: So you will define
7 the confidence with which they have to get this
8 coolable geometry?
9 MR. SHERON: No. I don't think at this
10 point --
11 VICE-CHAIRMAN WALLIS: You said about 95
12 percent for the --
13 MR. SHERON: Well, what we have said is
14 that, say, a licensee wanted to use their best
15 estimate model out in that region or this beyond
16 design basis region. The uncertainty in that model
17 may not have to be as well-defined, you might say. It
18 makes that more uncertainty.
19 VICE-CHAIRMAN WALLIS: Then you have to
20 say what is acceptable and --
21 MR. SHERON: Yes. And we will do that.
22 VICE-CHAIRMAN WALLIS: Do you accept 95
23 percent confidence up to this transition break size?
24 MR. SHERON: Then maybe we would --
25 VICE-CHAIRMAN WALLIS: Would you accept 50

1 percent or 75 or what above it?

2 MR. SHERON: Right. We would pick --

3 VICE-CHAIRMAN WALLIS: We will pick

4 something explicit.

5 MR. SHERON: Yes.

6 VICE-CHAIRMAN WALLIS: That's good. And

7 if it will have a justification based on risk or

8 something?

9 MR. SHERON: I can't tell you what the

10 justification will be based on, but it will be based

11 on something.

12 VICE-CHAIRMAN WALLIS: It's going to be

13 not just picked out of the air?

14 MR. SHERON: Well, I'm hoping it won't be

15 picked out of the air. Obviously any of these numbers

16 is a little --

17 MEMBER SHACK: But it will have to be

18 consistent with 1.174 and other such type

19 arrangements.

20 MR. SHERON: Yes. Now, I will get into

21 the 1.174 aspect of this in a minute. Okay? I think

22 the point we want to make is that the approach we are

23 taking right now is that we would expect licensees to

24 still be able to demonstrate through an analysis that

25 for breaks larger than this transition break size,

1 they can still maintain a coolable geometry in the
2 plant and mitigate the event.
3 VICE-CHAIRMAN WALLIS: With some
4 confidence. They're never going to be sure.
5 MR. SHERON: Right. Again, in the SRM
6 from the Commission, they told us that the backfit
7 analysis should not be required to reverse changes
8 needed to maintain compliance. Basically what this
9 means is that we will basically write a waiver to
10 having to deal with 50.109 if break frequencies, for
11 examples, plot of break size versus frequency were to
12 change based on new information. It is what I was
13 talking about before, this reversibility thing.
14 The Commission also doesn't think we have
15 to go through a complete backfit analysis in order to
16 -- for example, if a licensee had to reinstall a pump
17 or something like that.
18 VICE-CHAIRMAN WALLIS: So after the first
19 large break LOCA really occurs, you won't require any
20 backfits?
21 MR. SHERON: My guess is after the first
22 large break LOCA occurs, we won't have to because most
23 plants may not be running. I don't know. I don't
24 even want to think about what the consequences would
25 be if a plant had a break like that.

1 Use of best estimate code should be
2 encouraged but not required. This was primarily in
3 the small break region because most plants don't have
4 best estimate small break analyses. I think the
5 Commission did not believe that we should be forcing
6 licensees to develop best estimate small break
7 analyses just for the purpose of this rule.
8 VICE-CHAIRMAN WALLIS: Some of these codes
9 haven't been approved anyway.
10 MR. SHERON: Your best estimate --
11 VICE-CHAIRMAN WALLIS: Some of these codes
12 have been only approved for certain kinds of things.
13 MR. SHERON: Correct.
14 VICE-CHAIRMAN WALLIS: And you may have to
15 do some more code approval work if it is any use for
16 some of this --
17 MR. SHERON: It depends on how a -- for
18 example, the issue came up of power uprate. Okay?
19 And one could envision -- and I am just kind of
20 speculating now, but we did envision that with
21 licensees having to be able or being capable of doing
22 a more realistic best estimate analysis in this beyond
23 transition break region, that, in fact, the
24 controlling peak clad temperature could, in fact
25 become the small break, not the large break.

1 And if a licensee bumped up against, say,
2 2,200 degrees down in this below the transition break
3 size, they may wish to move to a best estimate small
4 break analysis just to get some increased margin or
5 some increased flexibility.
6 But it's not a requirement. They would be
7 something they would choose on their own voluntarily
8 if they wanted to gain additional margin. But we're
9 not going to require that best estimate codes be used
10 in the analyses.
11 MEMBER SIEBER: Well, that sometimes
12 requires some trade-offs in assumptions, like the
13 decay heat curve and so forth.
14 MR. SHERON: Correct.
15 MEMBER SIEBER: You aren't going to do
16 that piecemeal, I presume. Everything comes as a
17 package?
18 MR. SHERON: As a package, yes.
19 MEMBER SIEBER: Okay.
20 MR. SHERON: They also told us to pursue
21 requirements for future plants separately and I think
22 on a longer scale. Let me just explain that one of
23 the premises we sat -- when we first sat down to
24 develop this as a steering committee, we set some
25 ground rules. One of the first ground rules was the

1 only way we were going to get a rule, a draft rule, in
2 place in six months is we are not going to create any
3 new information. We are not going to go off and forge
4 new ground. We are going to basically go with what we
5 have and develop it from there.
6 So from the standpoint of thinking this
7 through for advanced plants, that was not part of our
8 scope. We will do that on the longer schedule.
9 MEMBER KRESS: I'm trying to picture how
10 that would work, Brian, because the way I interpret
11 that is a new plant would have to conform to the
12 current rules of the large break, double-ended
13 guillotine break.
14 And then given that they put in the
15 capability and show that they can meet that, then they
16 can take the advantage of the same rule relaxation
17 that this gives.
18 Is that the way you see this?
19 MR. SHERON: It's probably that is how it
20 would be, but, like I said, I haven't really thought
21 through it. I think maybe what the Commission had in
22 mind -- and maybe I am reading too much into it -- is
23 that somewhere down the road, I think there is a
24 desire to move towards total risk-informing of part
25 50. That could even --

1 MEMBER KRESS: That would take a
2 completely different form, I would think.
3 MR. SHERON: Right. And for advanced
4 plants, that may even have 50.46 or something take an
5 entirely different form. I will be quite honest. We
6 have not put a lot of thought into that.
7 VICE-CHAIRMAN WALLIS: Go back to what we
8 heard this morning. The NEI guidance contains a
9 section on risk-informing the sun blockage problem.
10 It looks something like this. It says there's a
11 transition break size and above the break size, you
12 have to define mitigation or you are allowed to show
13 mitigative capability or something.
14 MR. SHERON: Yes.
15 VICE-CHAIRMAN WALLIS: Can they really do
16 that until you have thought this stuff out properly or
17 can you accept their guidance until you have solved
18 this problem? Because they may not be compatible with
19 what --
20 MR. SHERON: The plan right now -- and I
21 have asked my staff that very question. I said, "Gee,
22 how can we go forward with 191 when, in fact, it is
23 really compliance with 50.46 and we're changing it?"
24 Basically the answer is that the break
25 size that we would let the industry choose, for

1 example, if they wanted to go risk-informed on
2 resolving 191 would be bounded as a minimum by what we
3 are considering for 10 CFR 50.46.
4 VICE-CHAIRMAN WALLIS: The problem is,
5 though, you have an NEI guidance, which is setting
6 these rules. Before you have made up your mind about
7 what they should be. It says NEI will preempt your
8 definition of these things.
9 MR. SHERON: No. The staff knows what
10 break sizes we're considering here, and they know what
11 NEI has proposed. Okay? And I was assured that --
12 VICE-CHAIRMAN WALLIS: But you have to go
13 to the Commission with your new --
14 MR. SHERON: That's correct.
15 VICE-CHAIRMAN WALLIS: Are you going to
16 approve NEI stuff before you go to the Commission with
17 your stuff?
18 MR. SHERON: Yes. I mean, we've got to
19 get -- I mean, we can't hold up 191 forever until we
20 solve everything.
21 VICE-CHAIRMAN WALLIS: So there might be
22 some inconsistency later on?
23 MR. SHERON: There's always that low
24 potential, but we're trying to make sure that we think
25 that that potential is minimized, namely that the

1 breaks that we allow NEI to use from 191 we have
2 reasonable assurance would be bounded by ultimately
3 whatever we come up with on revising 50.46.
4 Let's see. Where did I get to here?
5 MEMBER SIEBER: You are down to BWRs.
6 MR. SHERON: The BWROG pilot exemption
7 before including in the LOCA, LOOP in the rulemaking.
8 And we are taking a look at that. This is the
9 exemption to disassociate the assumption of
10 simultaneous loss of off-site power with the LOCA.
11 And so we will be looking at that.
12 I have actually asked the staff if we
13 really need to look at that as a separate rulemaking
14 and an exemption, as opposed to just is this something
15 we can include within the scope for revising 50.46.
16 But I just think there is more to come on that.
17 MEMBER ROSEN: So it's a two-step that
18 you're suggesting. First, rope out maximum break
19 sizes should be and let people use that. And whatever
20 regulatory applications they seek, they try to use it
21 with the staff review.
22 And then later on, disassociate LOCA from
23 LOOP perhaps or some various intubation thereof,
24 recognizing that anything that went before that might
25 have been even more flexible if the LOCA-LOOP

1 disassociation had been in place. But it wasn't. So
2 when you finally get both pieces in place, then you
3 kind of have the maximum realistic.
4 MR. SHERON: Right. And, like I said, I
5 have asked the staff to take a look at whether we
6 really need to deal with that on a separate venue, as
7 opposed to just including it in our 50.46.
8 MEMBER ROSEN: Yes. I think it would be
9 best if we could do it all at once, but I understand
10 the practicalities.
11 MR. SHERON: Yes. So we'll look at it,
12 and we'll see. If we can't do it, we'll certainly let
13 you know and let you know what schedule we're going to
14 work that on and probably be down here talking to you
15 about it.
16 VICE-CHAIRMAN WALLIS: The LOCA/LOOP is
17 requiring that you consider both of them happening
18 simultaneously: the LOCA and the LOOP?
19 MR. SHERON: Yes, yes. And that pretty
20 much says --
21 VICE-CHAIRMAN WALLIS: And you are backing
22 off from that?
23 MR. SHERON: Well, that has been the
24 proposal that you just --
25 VICE-CHAIRMAN WALLIS: But it seems now

1 that LOOPs are more likely these days with switchyard
2 problems and --
3 MR. SHERON: Well, that is different. It
4 is a matter of what is the likelihood that you are
5 going to get a loss of coolant --
6 VICE-CHAIRMAN WALLIS: As the outside
7 system becomes more fragile, --
8 MR. SHERON: Right.
9 VICE-CHAIRMAN WALLIS: -- it seems to be
10 the case. It's more likely that the LOCA itself will
11 initiate a LOOP. And then you will get both of them.
12 MR. SHERON: Well, that is what we need to
13 look at.
14 VICE-CHAIRMAN WALLIS: If you took the
15 grid, they can certainly with a LOCA --
16 MR. SHERON: Right.
17 MEMBER ROSEN: Most of the data to date
18 shows that LOCAs or the surrogates for it, which is a
19 reactor scram, which is what happens after a LOCA, you
20 hope, that LOCA -- unless you have an ATWS, you have
21 a reactor scram. You typically don't lose the LOOP.
22 You don't lose the off-site power supply typically.
23 MR. SHERON: What Graham is referring to
24 is that based on, say, for example, a blackout in
25 August of '93 -- and we have had situations, for

1 example, the Callaway Plant, where the plant itself,
2 they were wielding so much power through its
3 switchyard that when the plant tripped, it dropped the
4 boltage.
5 So the concern is that if the plant itself
6 -- if the grid is not stable, that plant could be
7 holding the voltage up on the grid. If you get a
8 LOCA, it trips the plant off. And that takes --
9 MEMBER SIEBER: Basically takes the
10 switchyard.
11 MR. SHERON: -- takes the switchyard out.
12 MEMBER ROSEN: I understand. Historically
13 LOCAs or trips didn't cause LOOPs, but the
14 circumstances are changing as we speak due to
15 deregulation and other forces.
16 MR. SHERON: Right.
17 MEMBER ROSEN: So you have to take that
18 into account.
19 MR. SHERON: And that's what we need to --
20 MEMBER ROSEN: That is Graham's point, and
21 I agree.
22 MR. SHERON: Yes. And that is what we
23 need to look at.
24 MEMBER ROSEN: As I said, we plan to
25 provide a proposed rulemaking package in about six

1 months' time.

2 MEMBER SIEBER: Yes. Before you move on,

3 I would like to just refresh my own memory about how

4 we got from 1960 to today. And 50.46 is one of the

5 original parts of title X.

6 MR. SHERON: Right.

7 MEMBER SIEBER: In 1974, I think, or '73,

8 --

9 MR. SHERON: Right.

10 MEMBER SIEBER: -- there was an ASLB

11 hearing that took about a year or two.

12 MR. SHERON: Actually, I think, Norm, when

13 did that start?

14 PARTICIPANT: It actually started December

15 '71.

16 MEMBER SIEBER: Yes. And it went on for

17 a long time.

18 MR. SHERON: And then the Commission

19 promulgated the ECCS criteria, I think, '73.

20 MEMBER SIEBER: Right. And up to that

21 point and including at that point, everything was

22 deterministic. A couple of things that were litigated

23 were the peak clad temperature and the oxidation

24 percentage.

25 MR. SHERON: Right.

1 MEMBER SIEBER: And so now I presume that
2 what we're doing is risk-informing that deterministic
3 set of requirements by saying, "I don't have to
4 tolerate such a big break, and maybe there is some
5 room in the final acceptance criteria for oxidation
6 and peak clad temperature."
7 MR. SHERON: You don't have to assume
8 bounding parameters.
9 MEMBER SIEBER: Yes. I could see where
10 you could use best estimate codes and use a better
11 decay heat curve and so forth, but it is not clear to
12 me that what the criteria is for applying risk
13 information to say, "I only have to consider this size
14 break, and I don't need all of this extra equipment."
15 MR. SHERON: Let me --
16 MEMBER SIEBER: And so is the basis for
17 that just the Commission's initiative to risk-inform
18 the regulations? Is that the basis, saying that the
19 risk to the public doesn't really change by more than
20 1.174 will allow?
21 MR. SHERON: We're getting a little bit
22 ahead, but that's really where we're coming from. And
23 that is that, regardless of what changes we make to
24 50.46 --
25 MEMBER SIEBER: The safety of the public

1 won't be affected?

2 MR. SHERON: Right. In other words, the

3 overriding criteria is that -- and I am going to call

4 this basically -- this is almost a risk rule. Okay?

5 MEMBER SIEBER: Absolutely.

6 MR. SHERON: We're not telling licensees

7 how they can use whatever margin they get here. Okay?

8 It is an enabling rule. Some licensees may choose to

9 uprate power. Others may choose to increase peaking

10 factors. Others may come in and say, "I want to

11 change allowed outage times for equipment" and so

12 forth. I don't know what they want to do.

13 MEMBER SIEBER: They don't want to put

14 flow limiters in. They don't want to use --

15 MR. SHERON: What we want to make sure is

16 that whatever changes they make, it doesn't result in

17 any substantial increased risk to the public health

18 and safety. And what our proposal is is that

19 licensees when they come in with changes, any change

20 they intend to make to their plant that emanates out

21 of revisions to 50.46, that they would have to make a

22 submittal to the staff telling us what that change is

23 and provide a demonstration through a risk assessment

24 that they meet the guidelines of 1.174 with regard to

25 delta CDF and delta LRF.

1 MEMBER SIEBER: Right. No significant
2 change in risk, as opposed to no substantial change in
3 risk?
4 MR. SHERON: Right.
5 MEMBER SIEBER: Okay.
6 MR. SHERON: And so that is really the
7 whole underlying premise of this, that we're not
8 telling them what changes they can or can't make to
9 their plant. The only thing we want to make sure is
10 that ultimately the risk to the public health and
11 safety does not change appreciably, which is defined
12 as the criteria in 1.174.
13 MEMBER SIEBER: Okay. I have to ask that
14 question from time to time to make sure that I
15 continue to remember that the risk to the public
16 doesn't significantly change.
17 MR. SHERON: Right. And that is the whole
18 underlying premise of how we are proceeding on this.
19 MEMBER SIEBER: So you don't anticipate
20 another ASLB hearing or anything like that?
21 MR. SHERON: Oh, heavens, I hope not.
22 Well, obviously your rulemaking, any rulemaking I
23 think can be subject to --
24 MEMBER SIEBER: To a hearing, right.
25 MR. SHERON: Right. And I certainly don't

1 have any control over that.

2 MEMBER SIEBER: Okay. But the technical

3 basis and foundation for the changes that are proposed

4 for the rule would likely hold up under hearing

5 conditions.

6 MR. SHERON: We would hope they would,

7 yes.

8 MEMBER SIEBER: Yes.

9 MR. SHERON: Could I have the next slide,

10 please?

11 VICE-CHAIRMAN WALLIS: Presumably this is

12 being done with the expectation that licensees will

13 make use of this new space they have got.

14 MR. SHERON: Yes. And I think once we

15 publish the concept and have our public meeting, we

16 will probably get a better feel for whether the

17 industry feels this is something that would be of

18 benefit to them or not.

19 VICE-CHAIRMAN WALLIS: It seems to have

20 turned around a bit because when we heard about this

21 several years ago, it was the industry that was going

22 to justify why it should be done. Now you seem to be

23 doing it yourselves. And then they are going to come

24 along and see if they want to use it.

25 MR. SHERON: The best I can say is that

1 the industry hasn't come forth with any justification
2 --
3 VICE-CHAIRMAN WALLIS: I am surprised
4 because they promised us all kinds of --
5 MR. SHERON: -- to support this. And I
6 think as part of the Commission's initiative to
7 risk-inform part 50, this is why we are taking it on.
8 Anyway, the rule concept I think I
9 discussed will divide the break spectrum into two
10 regions delineated by break size, which we call this
11 transition break size right now. As I said, breaks in
12 the smaller break region between basically zero and
13 this transition break would still meet all of the
14 current 50.46 criteria.
15 And then the criterion analysis
16 assumptions in this region II area, which is the
17 breaks larger than the transition break up to the
18 double-ended guillotine, would be relaxed, but they
19 still have to demonstrate mitigation capability up to
20 the double-ended guillotine. Okay?
21 This is consistent because if you think
22 about it, long-term cooling is part of that
23 demonstration. Okay? So it says that, for example,
24 the sumps still have to perform up through the
25 double-ended guillotine. But they can use a relaxed

1 methodology, you might say. In other words, they can
2 assume more equipment is available. They don't have
3 to assume single failures, et cetera.
4 MEMBER SIEBER: But even with region I
5 breaks, you can still use best estimate codes and
6 assumptions.
7 MR. SHERON: Consistent with 50.46, the
8 way 50.46 is, you can use them.
9 MEMBER SIEBER: The way it is today?
10 MR. SHERON: The way it is today, yes.
11 MEMBER SIEBER: Okay. Well, the way it is
12 today, you can't use a best estimate code, right,
13 unless you approve it?
14 MEMBER SHACK: Best estimate and 95
15 percent.
16 MEMBER SIEBER: Yes. Okay.
17 MR. SHERON: Well, I don't think anybody
18 has a best estimate small break code right now for
19 that region.
20 MEMBER SIEBER: Right.
21 MR. SHERON: Okay?
22 MEMBER SIEBER: Okay.
23 VICE-CHAIRMAN WALLIS: Will this
24 mitigation capability be spelled out in the rule or
25 will there be reg guides that define what is meant and

1 what is an acceptable approach and all that sort of
2 thing?
3 MR. SHERON: We're still debating that
4 internally, but I think the thought right now is that
5 if we kept the criteria as general -- in other words,
6 I said it is coolable geometry.
7 VICE-CHAIRMAN WALLIS: But still as vague
8 as possible.
9 MR. SHERON: Well, we would say coolable
10 geometry. And then we would define what would be
11 acceptable in a reg guide, for example. What we don't
12 want to do is preclude, for example, the industry to
13 have the opportunity to provide something different if
14 they wanted to that maybe gave them more margin and
15 still demonstrated that they had coolable geometry.
16 VICE-CHAIRMAN WALLIS: Then you are
17 putting a lot of burden on the reg guide to do a
18 really good job of defining what you mean.
19 MR. SHERON: Yes. But right now I think
20 that is pretty straightforward. The only thing the
21 staff would accept would be 2,217 percent. Okay? But
22 we don't want to preclude the industry --
23 VICE-CHAIRMAN WALLIS: You don't want the
24 new fuel, for example. I mean, that's --
25 MR. SHERON: Well, yes. For the new fuel

1 for the small breaks, I don't want to get into like
2 the peak cladding or something because there are
3 differences in terms of oxidation.
4 MEMBER SIEBER: But there's plenty of
5 margin built into the final acceptance criteria for
6 peak clad temperature and oxidation. As I remember
7 from the hearings, there is 100 or 200 degrees or
8 something like that.
9 MR. SHERON: Yes. I know. Norm, help me.
10 What was the margin on the --
11 MEMBER SIEBER: I think it was 100
12 degrees.
13 PARTICIPANT: I mean, certainly the
14 criteria was set.
15 VICE-CHAIRMAN WALLIS: It's a good thing
16 Norm is still around.
17 PARTICIPANT: Not for long, I'm afraid.
18 MEMBER SIEBER: I'm here.
19 PARTICIPANT: Actually, I don't want to
20 say how much margin there is or is not because it's
21 very plant-dependent. It's very design-dependent and
22 so forth. But if you were to look at a typical PWR,
23 it's also going to be very model-dependent. It's
24 going to depend on what model you choose for metal
25 water reaction and that sort of thing.

1 So right now you could arguably say that
2 there may be 200 degrees difference between what the
3 margin would be if you used a best estimate metal
4 water reaction versus whether you used a big
5 adjustment water reaction.
6 But I think the question is more how much
7 -- so it looks like you have more margin if you use a
8 better estimate model.
9 MEMBER SIEBER: Yes.
10 PARTICIPANT: So I wouldn't want to say.
11 We have done some sensitivity studies that show that
12 if you change the power by even less than ten percent,
13 if you have a conservative model, you may not have
14 very much margin at all between the embrittlement
15 criteria of 2,217 percent and where you can't control
16 the reaction anymore.
17 So I don't think you can say precisely
18 where it is, but it may only mean that you have a
19 slight, a very slight, margin, say maybe just a couple
20 of percent in power or even less, depending on the
21 models that you may use and the plant that you are
22 analyzing for.
23 I don't know if that helps much or not,
24 but it's very dependent on a number of things.
25 MEMBER SIEBER: Thank you.

1 MR. SHERON: Next slide, please. I think
2 I've discussed some of this stuff already. We're
3 going to select the break size. And I think I said we
4 have already tentatively picked some numbers that we
5 would propose.
6 VICE-CHAIRMAN WALLIS: Isn't there a 10^{-5},
7 which is appearing in --
8 MR. SHERON: The Commission said that that
9 could -- I think they used that as an example.
10 VICE-CHAIRMAN WALLIS: I thought it was
11 actually stated as being the case.
12 PARTICIPANT: "For example."
13 VICE-CHAIRMAN WALLIS: Oh, it says "For
14 example"?
15 MR. SHERON: "For example." Okay.
16 VICE-CHAIRMAN WALLIS: I'm looking at the
17 latest --
18 MR. SHERON: Yes. And I think we have
19 actually used the 10^{-5} as a starting point and then,
20 again, as I said, we accounted for uncertainties in
21 margin and also practical considerations in terms of
22 plant design to come up with a proposed break size.
23 VICE-CHAIRMAN WALLIS: Yes. It says, "For
24 example," but then it says, "Frequency of 1 in 100,000
25 is an appropriate mean value." So that's not saying

1 it's just for example. I mean, it is saying it is.

2 MR. SHERON: Yes. But they also said that

3 we can pick the break size I think consistent -- what

4 did it say here? -- with --

5 VICE-CHAIRMAN WALLIS: I mean, it's sort

6 of an example of something already that is being

7 decided. For example, here is what it is. It's not

8 --

9 MR. SHERON: Selection of maximum break

10 size should use reg guide 1.174 approach. Okay? So,

11 again, it says, you know, if you want to pick a

12 frequency associated with a break size, then what the

13 SRM is saying is 10^{-5} is appropriate. But 1.174 says

14 when you risk-inform a decision, you take into

15 consideration a number of other factors:

16 uncertainties, margin, et cetera. And so we will be

17 doing that.

18 So it doesn't mean that you just go to the

19 curb and go to 10^{-5} and then go up and see what break

20 size that is. You then have to take an adjustment.

21 You say, "Is that risk-based or is that

22 frequency-based versus risk-informed?"

23 Anyway, as I said, we haven't cast

24 anything in concrete right now. We've got some

25 preliminary thoughts on it. And I said we will be

1 down with the committee I'm sure discussing this at
2 length.
3 Changes to proposed plan operations or
4 design as a result of the rule must be reviewed by the
5 staff. We don't expect --
6 VICE-CHAIRMAN WALLIS: That's a surprising
7 new statement. That would be true of anything that
8 changes to proposed plan operations or design. Well,
9 maybe not.
10 MR. SHERON: No. I mean, for example,
11 licensees right now I think could change. They could
12 use different fuel in their design as long as it still
13 is bounded by the current ECCS analysis without coming
14 in, in other words.
15 MEMBER SIEBER: 50.59.
16 MR. SHERON: Yes, 50.59. And we're saying
17 50.59 doesn't apply here if you are going to make a
18 change. We want to make sure this is the -- this is
19 basically the concern. Let me call it the tentacles
20 about unintended consequences. We want to make sure
21 that licensees don't use any margin here
22 inappropriately and inadvertently or whatever and
23 increase --
24 VICE-CHAIRMAN WALLIS: What would be your
25 standard review plan that will guide the staff?

1 MR. SHERON: I imagine we will eventually
2 develop one for that. I mean, right now we would look
3 at these as just any of the license amendments. And
4 they would be reviewed under that basis.
5 MEMBER SIEBER: The key phrase there is
6 "as a result of rule" --
7 MR. SHERON: Yes.
8 MEMBER SIEBER: -- because they are
9 allowed to make changes if they meet the former
10 acceptance criteria.
11 MR. SHERON: Correct.
12 MEMBER SIEBER: Okay? It's only when they
13 use the new margin they get from applying this rule.
14 MR. SHERON: Right. And we want to make
15 sure, for example, some licensees doesn't apply the
16 rule and decide they can take both low-pressure pumps
17 out of the plant for some reason or maybe they want to
18 change their tech spec on a low-pressure pump and take
19 it out of service for three months or something.
20 We're not sure that's a smart thing to do.
21 MEMBER SIEBER: Right. I'm certainly not
22 precluding that we might want to revise this down the
23 road once we get some experience and familiarity with
24 the implementation of the rule.
25 Submittals must be risk-informed. We

1 think if we are going to risk-inform our regulations,
2 then PRAs and risk play an integral part, a much more
3 integral part of our decision-making. So we would
4 expect the licensee to submit a PRA analysis,
5 demonstrating that whatever changes they are proposing
6 to the plant as a result of using the rule, that the
7 change in core melt frequency in LRF would be
8 consistent with the criteria in 1.174.
9 We also think that the PRAs need to meet
10 the appropriate PRA quality and scope requirements.
11 And that will be, again, we could discuss that,
12 probably at a different meeting, but consistent with
13 the PRA quality plan and so forth.
14 MEMBER SIEBER: What the licensees
15 currently submit to the staff is a reloaded safety
16 evaluation, which is basically a letter that says, "We
17 ran our appendix K model, and everything looks okay."
18 MR. SHERON: Right.
19 MEMBER SIEBER: And it will then say,
20 "Here are some tech spec changes we may need and here
21 are the peaking factors."
22 MR. SHERON: Right.
23 MEMBER SIEBER: Okay? A new submittal
24 under the revised rule is going to have to have a lot
25 more information for the --

1 MR. SHERON: If they're using this
2 risk-informed 50.46.
3 MEMBER SIEBER: That's right. That's
4 right.
5 MR. SHERON: If they're staying under the
6 old 50.46, --
7 MEMBER SIEBER: It's still a letter.
8 MR. SHERON: -- then it's still a letter.
9 Right.
10 MEMBER SIEBER: Okay. The new submittal
11 would be a big document. It would be a report that
12 described how the best estimate model was applied and
13 what the assumptions were --
14 MR. SHERON: Well, I would assume --
15 MEMBER SIEBER: -- and what the risk
16 information basis is.
17 MR. SHERON: We're certainly not trying to
18 make this such an onerous rule that nobody wants to
19 use it. In other words, if a delta risk is small, if
20 this is just like, for example, a power uprate --
21 MEMBER SIEBER: Right.
22 MR. SHERON: You know, when we first
23 started doing the measurement on certainly recapture
24 uprates, the staff was taking like a year. We were
25 just chewing up resources. And I looked at it. And

1 I said, "Wait a minute. 1.6 percent?" I said, "That
2 doesn't even register on a risk scale." Okay?
3 MEMBER SIEBER: Tune in tomorrow morning.
4 MR. SHERON: And so we --
5 MEMBER SIEBER: We are going to be talking
6 about that.
7 MR. SHERON: Well, I know on the --
8 MEMBER SIEBER: Right.
9 MR. SHERON: What I am saying is when we
10 first looked at the measurement uncertainty uprates,
11 the risk increase associated with a recapture, 1.6
12 percent, was negligible. And the question was, why
13 was the staff spending so much time doing these
14 reviews?
15 MEMBER SIEBER: Right.
16 MR. SHERON: So we streamlined that
17 process. And now we can crank those out. And I think
18 the goal is six months for those.
19 Again, I would expect that if a licensee
20 would come and their changes were small and not very
21 significant or controversial in what they were
22 proposing -- I'm not expecting reams and reams of
23 paper. Okay?
24 MEMBER SIEBER: On the other hand, one
25 submittal that describes the code would have to be

1 made to get the code approved, --

2 MR. SHERON: Yes.

3 MEMBER SIEBER: -- which would be separate

4 from the reload safety evaluation.

5 MR. SHERON: Yes, yes, normally just the

6 way we do code analyses.

7 MEMBER SIEBER: Right. Thank you.

8 VICE-CHAIRMAN WALLIS: While we are on

9 this slide update, 1.174, this is all plant-specific

10 at the bottom here. But the first bullet is generic,

11 isn't it? The break size delineation is determined in

12 some generic way, although, in fact, it does depend

13 upon the sale of the plant. For a very old plant, it

14 might well be that the likelihood of a break is

15 bigger. It's not plant-specific, this break size

16 delineation?

17 MR. SHERON: Well, right now what our

18 analyses and our proposal is that we don't believe we

19 need to identify plant-specific break sizes.

20 VICE-CHAIRMAN WALLIS: So there's nothing

21 there about the age of the plant or the --

22 MR. SHERON: Well, we put --

23 VICE-CHAIRMAN WALLIS: -- particular

24 temperatures or particular heat of the metal or

25 surveyor material, metallurgical thing which is

1 different between plants?

2 MR. SHERON: No because I think, first

3 off, we're not smart enough to know what the relative

4 susceptibilities are for plants based on different

5 heats of material and so forth. Secondly, I think the

6 way we're defining this new transition break size

7 probably accounts for all of those variations.

8 VICE-CHAIRMAN WALLIS: So it's on the

9 upper bound of something?

10 MR. SHERON: Okay.

11 MEMBER SIEBER: On the other hand, there

12 is a difference in the transition break size between

13 PWRs and BWRs.

14 MR. SHERON: Yes, there is.

15 MEMBER SIEBER: So that is the only

16 exception that I am aware of.

17 MR. SHERON: Yes. I mean, right now, I

18 mean, I'll just tell you right now. Right now for

19 PWRs, we are thinking about 14 inches --

20 MEMBER SIEBER: Right.

21 MR. SHERON: -- and for BWRs 20 inches.

22 MEMBER SIEBER: Right.

23 MR. SHERON: Okay? Keeping in mind BWRs

24 are not LOCA-limited. So this may not be a big impact

25 on --

1 MEMBER SIEBER: Yes. And they're lower
2 pressure, too. So you can tolerate a bigger break.
3 MR. SHERON: But, again, the staff will
4 come down. And they will tell you ad nauseam about
5 how they derived those break sizes.
6 MEMBER SIEBER: They have. They have
7 already.
8 MR. SHERON: Okay. Good. Next slide.
9 Again, we talked about this. I'm not going to dwell
10 on it. Just the future estimates of the LOCA
11 frequencies, validate the basis for plant changes. We
12 may require plants to take compensatory actions, which
13 means put equipment back in or whatever, change tech
14 specs, whatever, without a formal backfit process.
15 And the other thing is that originally, I
16 think the Commission was talking about having this
17 LOCA frequency updated every ten years. I think
18 that's not in there.
19 And the staff endorses that because why
20 wait ten years? I mean, if there is new data that
21 comes in two years later, you're not going to wait ten
22 years or eight years later before you deal with it.
23 You should deal with it when it comes in.
24 So the idea is that presumably we are
25 going to monitor data. The Office of Research, NRR is

1 going to monitor pipe break frequency data. And if we
2 see anything that leads us to say we need to update
3 this study, we will go ahead and do it. And if the
4 answer comes out that we have to change something,
5 then we will do it at that time. We're not going to
6 wait ten years.
7 Use of the rule is voluntary, as I said.
8 So this is really up to the industry.
9 VICE-CHAIRMAN WALLIS: They're not likely
10 to change the design of the ECCS. They're not likely
11 to take out a pump or do away with an accumulator or
12 something.
13 MEMBER SIEBER: But they could.
14 VICE-CHAIRMAN WALLIS: But they could go
15 to a power uprate. And you might say, "Oh, no. We
16 have learned something. You have got to go back down
17 in power." That would be the kind of backfit?
18 MR. SHERON: Possibly.
19 VICE-CHAIRMAN WALLIS: It probably
20 wouldn't be a hardware backfit of an ECCS.
21 MEMBER SIEBER: They could.
22 MR. SHERON: One thing we have speculated
23 -- we don't know if it's true or not. I mean, I have
24 done analysis, but you could argue a plant does a
25 power uprate. And it turns out that to mitigate the

1 large break LOCA they now need both low-pressure
2 pumps. They can't get by with one the way they had
3 to. Okay?
4 Well, if they had an allotted outage time
5 that takes one pump out of service, you know, in
6 theory, you're saying, "I have an event that could be
7 not mitigated by the design." Okay?
8 So we need to make sure of that, again, if
9 things change, for example, maybe we may not let them
10 take certain equipment out of service for the length
11 of time that they're proposing maybe. Okay?
12 Next slide, please. This is us today
13 meeting with full committee, with you all. And, as I
14 said, I just want to provide a high level in terms of
15 the concept and the schedule we are working on. We're
16 proposing that we have staff meetings with the
17 subcommittees as necessary in July and September to
18 work through the details of a lot of these different
19 issues.
20 And then depending upon I guess the
21 subcommittees, the outcome of those, and your desires,
22 we're willing to meet with you as necessary throughout
23 the fall because we would like a letter from you
24 ultimately to the Commission that hopefully would
25 endorse the approach that we would take.

1 MEMBER SIEBER: You don't want that until
2 the fall? You don't need a letter now?
3 MR. SHERON: Right.
4 MEMBER SIEBER: Okay.
5 MR. SHERON: If you want to write one that
6 says we're doing great, that is always helpful, but --
7 MEMBER SIEBER: Well, we might write a
8 different one.
9 MR. SHERON: Then we don't want a letter.
10 Next slide, please. This just kind of
11 reiterates the letter you wrote, I think, the
12 Commission. All I can remember is the Commission, the
13 EDO. You know, you said you support a wide range of
14 applications if they are criterion 1.174-satisfied.
15 "Recommend explicit criteria for mitigative capability
16 up to the double-ended guillotine." And I think we
17 are going to try and do that.
18 "Recommend explicit criterion for late
19 containment failure be included." Let me chat a
20 little bit about that. That is basically late
21 containment failure criteria.
22 We discussed that. And I think the
23 concern is -- there are two concerns. One is timing.
24 Okay? In other words, if we're going to get a rule
25 out of here in six months -- you know, this is sort of

1 breaking some new ground here and the like. And we're
2 afraid that if we were to go off and develop a late
3 containment failure criteria and try and promulgate it
4 through the process, it would delay the whole approach
5 here.
6 Number two is that it's probably not
7 unique to 50.46, okay. It's just like LRF and 1.174
8 is applicable to the whole range of risk-informed
9 submittals or applications that we deal with. We
10 think that a late containment failure criteria would
11 be better served if it were basically vetted through
12 1.174 revision. I think we're willing to consider
13 taking that on maybe on a longer schedule, but we
14 would think that it would be more applicable across
15 the board, rather than to one particular rule. So
16 that would be our proposal, is that we take that on
17 under 1.174, maybe on a different schedule than what
18 we're on with 50.46. But we recognize it's a
19 legitimate concern, and there is some merit to it.
20 The other reason, too, is I want to point
21 out is that, for example, security concerns. You
22 know, one of the recommendations we had originally
23 from NSIR was we should have explicit language in this
24 rule about making sure that any changes they make
25 don't adversely affect security. And we said, wait a

1 minute. That's kind of generic to any licensing
2 change that would come in, okay. It's not just unique
3 to 50.46, so why stick all these different little
4 requirements in these individual rules. Shouldn't we
5 deal with that on a more generic basis? And so what
6 we decided is we actually have set up a Steering
7 Committee. Susie Black is the chair of it. I keep
8 forgetting the name of it, but basically it's like a
9 safety-security interface committee. And what their
10 job is, is to look at licensing actions, licensing
11 issues that may have security implications, and decide
12 whether or not they deserve a full-blown security
13 review. And so the plan right now is that the
14 question of having a generic requirement on the books
15 for licensees to be required to consider security
16 matters when they make design changes, and vice versa
17 is being taken up by Susie's committee in terms of
18 where is the right place to put that in the
19 regulations and make it across the board.
20 One of the things we're doing right now,
21 for example, on just license amendments, non-50.46, is
22 that the plan is to develop screening criteria. Any
23 time a license amendment comes in, the Project Manager
24 will basically screen that license amendment against
25 these criteria, these screening criteria, to see if it

1 trips any of those. And if it does, then there's a
2 concern that the license amendment could affect
3 security.
4 For example, manual actions - someone
5 comes in and wants to substitute manual actions.
6 Well, from a security standpoint, maybe that's not the
7 right thing to do. So the point is, is if the Project
8 Manager does the screening and it trips the criteria,
9 then the Project Manager would forward that license
10 amendment to Susie's committee, which is made of NSIR
11 and NRR folks and stuff.
12 They would look at it in more detail, and
13 they would make a determination whether NSIR, for
14 example, needed to do a full-blown security review on
15 it, and we would factor that in. So our proposal is
16 that, for example, any security implication here be
17 dealt with on the generic basis, and Susie's committee
18 is going to handle that. And we would propose that
19 for late containment failure criteria, that we deal
20 with that more as a revision to 1.174 generically
21 across the board.
22 MEMBER SIEBER: Well, late containment
23 failure because of emergency planning is really not a
24 health and safety issue, as much as it is a land
25 containment issue, so I think it fairly lays outside

1 of the primary responsibilities of the Commissioners
2 right now.
3 MR. SHERON: And like I said, we're not
4 adverse to taking it on. I think just on the time
5 scale we would like to put that on a separate one.
6 MEMBER POWERS: Yes, I agree with that.
7 VICE CHAIRMAN WALLIS: While you're on
8 security, your predictions for the frequency of a
9 double-ending guillotine break of the biggest pipe in
10 the plant is so low, about the only way to make it
11 happen, you're going to have the largest breakdown in
12 security.
13 MR. SHERON: Yes, somebody —
14 VICE CHAIRMAN WALLIS: That seems to be
15 more important than this negligible frequency in a
16 normal operation.
17 MR. SHERON: Yes. Except no one knows how
18 to put a frequency on that.
19 VICE CHAIRMAN WALLIS: But it would seem
20 that when everything else becomes absolutely
21 minuscule, that's what you've got left.
22 MR. SHERON:: Right. The committee also
23 recommended a metric for max break size should be LOCA
24 initiating event frequency. And I think, as I said,
25 we agree that that's something — that should

1 basically be a starting point, but we have reasons
2 that we need to add some margin on that for other
3 reasons; mainly because the event frequency, and
4 you'll hear more about it I think this afternoon, but
5 that didn't consider certain initiating events like
6 heavy low drops and seismic and the like, so we put
7 some margin in there, and we'll talk about that later.
8 Let's see. Next slide, please. I'm
9 almost done. Additional criteria for guidance beyond
10 Reg Guide 1.14 for tracking cumulative risk are not
11 needed. We would agree with that. We believe that
12 any time a plant comes in for a license amendment
13 change, they'll have to give us initially their
14 baseline risk. And if they've made changes
15 previously, that will show up in that new baseline
16 risk. So what we're looking at is, again 1.174, if
17 you remember, sort of like the closer you get to 10 to
18 the minus 4, the less and less you can do.
19 VICE CHAIRMAN WALLIS: Because we said
20 should help provide, is there any other basis?
21 MR. SHERON: I'm sorry. You're on the
22 second bullet?
23 VICE CHAIRMAN WALLIS: Yes.
24 MR. SHERON:: Oh, I'm sorry.
25 VICE CHAIRMAN WALLIS: Yes, the first one

1 I guess --

2 MR. SHERON: Okay.

3 MEMBER POWERS: Well, can I ask a question

4 about the first bullet?

5 VICE CHAIRMAN WALLIS: Yes, go ahead.

6 MEMBER POWERS: Well, 1.174 asks for the

7 risk of everything save sabotage accidents.

8 MR. SHERON: Well, it says when you make

9 a risk-informed decision, here are the five factors

10 that you need to consider, which go beyond just

11 probability or frequency.

12 MEMBER POWERS: But just what it asks

13 about risk, it asks you for the risk of shutdown, and

14 the risk of seismic. Nobody ever provides that.

15 We're really not interested in that for this study.

16 Are you really interested in just the risk during

17 power operations?

18 MR. SHERON:: Yes. But, I mean, again

19 consistent with the PRA quality plan and so forth,

20 which I think, ultimately, is supposed to get us to

21 the risk of plants in other modes besides just power

22 operation.

23 MEMBER POWERS: Yeah, but I mean why would

24 you care?

25 MR. SHERON: Well, yeah. If it really

1 doesn't matter to the answer, then you're right. We
2 wouldn't ask for it.
3 MEMBER POWERS: I mean, shutdown risk is
4 — I mean, you don't have double-ended guillotine pipe
5 breaks during shutdown accidents, I presume.
6 MR. SHERON: Well, yeah, but they may more
7 likely to occur because there's more people running
8 around in the plant.
9 VICE CHAIRMAN WALLIS: There may be no
10 pressure.
11 MEMBER POWERS: No pressure is what I
12 would think would be —
13 MR. SHERON: But it may be more
14 susceptible to sabotage. I don't know.
15 MEMBER POWERS: Yes, but there's no
16 measure of that in Reg Guide 1.174.
17 MR. SHERON: Right. Last slide, please.
18 I think we've talked about this. The next steps would
19 be to finalize the conceptual basis for the rule, try
20 to get a "Federal Register" notice out hopefully in a
21 couple of weeks, which we'll discuss the rule
22 framework and the conceptual basis for the rule. I
23 think we have an ACR Subcommittee scheduled for July
24 23rd, and we have a public meeting scheduled — well,
25 I think that's going to slip to July 26th, because by

1 the time we get the "Federal Register" notice out, I
2 don't think it's going to leave enough time for people
3 to really digest the framework itself. So we would
4 probably reschedule that into August, but we will have
5 a public meeting to gather input for the reg analysis.
6 And I think once we get feedback from the Subcommittee
7 meetings and so forth, and then we get I think a draft
8 rule together, we'd probably be ready to come down to
9 the full committee and make another presentation.
10 MEMBER SHACK: When is your "Register"
11 notice going to go out?
12 MR. SHERON: Do we know? Do we have a
13 schedule yet, Vic, for the "Federal Register" notice?
14 Yes. Originally, we were talking like July 2nd or
15 something, and we've — do we have a new schedule?
16 PARTICIPANT: No, we don't.
17 MR. SHERON: Okay. Basically, what
18 happened is we have a draft "Federal Register" notice.
19 We have a draft package to go out with that on a
20 conceptual basis for the rule and stuff, but we got
21 the SOM, and we did have to make some changes to that
22 package, both packages to make sure it was consistent
23 with the SRM. And we had a meeting just yesterday
24 with the staff, and the agreement was, is that the
25 staff is going to revise their input to that package

1 and get them to Dick Dudley by tomorrow. He's going
2 to package it up, get it out to the staff on Friday,
3 everybody gets the fun job over the weekend to look at
4 it.
5 Next Tuesday, the Steering Committee is
6 going to meet and go through that package. And I'm
7 guessing if we're satisfied at that point, then
8 hopefully it will be ready to move and go out.
9 Anyway, that pretty much completes my
10 presentation, so if there's any other questions, I'll
11 be glad to take them. Otherwise, I'll let you get on
12 to your next presentation.
13 VICE CHAIRMAN WALLIS: I have a question.
14 Which ACRS Subcommittee is this?
15 MEMBER SIEBER: Policies and procedures.
16 VICE CHAIRMAN WALLIS: Policy and
17 procedure, because it impacts a lot of other
18 subcommittees.
19 MEMBER SHACK: We've generally held these
20 —
21 VICE CHAIRMAN WALLIS: Right. Thermal
22 hydraulics, and materials.
23 MEMBER SHACK: PRA.
24 VICE CHAIRMAN WALLIS: Right. PRA impacts
25 many subcommittees.

1 MR. SHERON: I would ask the Committee, I
2 mean, if you would tell us what subcommittees want to
3 discuss what aspects --
4 MEMBER SHACK: It will clearly be I think
5 probably joint meetings.
6 MEMBER POWERS: The Pearson Committee
7 doesn't think it needs to review this.
8 MR. SHERON: Okay.
9 CHAIRMAN BONACA: You said the meeting of
10 July 23rd will be moved to August?
11 MR. SHERON: No, no. The July 26th public
12 meeting will probably slip into August, because we've
13 had a delay in getting the "Federal Register" notice
14 out.
15 VICE CHAIRMAN WALLIS: Has anybody got a
16 calendar or something and let us go on. We'll have to
17 look at it internally about who goes to these
18 meetings.
19 MEMBER SHACK: Well, I'm not even sure
20 you're going to be ready to support a subcommittee
21 meeting on the 23rd.
22 MR. SHERON: I'd have to ask the staff if
23 they're going to be, because they're --
24 VICE CHAIRMAN WALLIS: Do we have the
25 staff already?

1 MR. SNODDERLY: It's tentatively scheduled
2 for right now.
3 VICE CHAIRMAN WALLIS: Is it on our
4 schedule?
5 MR. SNODDERLY: Yes. We can talk about it
6 at the PNP and work it out.
7 MEMBER SHACK: You're saying it's not on
8 the schedule?
9 MR. SNODDERLY: It is. I was wondering,
10 because it appears that the -- not it appears - the
11 Commission also did not support the Committee's
12 recommendation for late containment failure criteria
13 at this time, but it did give the staff the
14 flexibility to -- or the staff should include a
15 requirement for containment integrity. Could you give
16 the committee some, I guess, inkling as to what -- do
17 you have any thoughts on that at this time, or do you
18 want to put it off until later?
19 MR. SHERON: Well, I think the thought was
20 that first of all, 50.46 doesn't address containment.
21 And the plan was, as I said, that any changes that a
22 licensee proposes to make to their plant, for example,
23 containment leak rate or anything, would have to come
24 to the staff for review and approval.
25 MR. SNODDERLY: So it would be more of a

1 status quo at this time as far as containment
2 requirements, and it would be possibly looked at in
3 the future as part of a revision to Reg Guide 1.174.
4 MR. SHERON: Yes. In other words, if a
5 licensee came in and requested to change containment
6 leak requirement or some other aspect of containment,
7 we would look at it. I think if it dealt with a major
8 policy-type concern, we'd probably vet it through the
9 Commission and the like, maybe with the committee
10 before we approved it or anything. But again, we
11 would have to look at it from a risk-informed
12 approach; in other words, were we violating, for
13 example, defense-in-depth.
14 MEMBER SHACK: Wouldn't LOCA challenge the
15 design pressure for the containment though, so they'd
16 actually get a break if they got rid of the LOCA, I
17 mean on a design basis.
18 MR. SHERON: Yes, but —
19 MEMBER POWERS: LOCAs don't change.
20 MR. SHERON: A steam line break is still
21 going to be an event which challenges both equipment,
22 as well as the containment. I mean, obviously one
23 concern is that if you change — if the LOCA is not as
24 severe, the environment in the containment is going to
25 be less severe, and there may be proposals to change

1 environmental qualification to certain components.
2 And again, that's something we're going to have to
3 look at. You know, the thought is maybe in that —
4 beyond the transition break region, that the treatment
5 of equipment in the containment might be consistent
6 with, for example, say 50.69.
7 MEMBER ROSEN: I'm looking at our
8 schedule, and I don't see it, the July 23rd meeting.
9 MEMBER SIEBER: It's a secret.
10 MR. SNODDERLY: Let's reassess it and PNP
11 and decide.
12 MR. SHERON: We'll have to take an action
13 to decide when we're going to be ready to come down
14 and make presentations to the subcommittee. I mean,
15 we're going to have each one of these topics, I think,
16 probably have to go through at least some sort of a
17 review, PRA quality, break size, et cetera. How you
18 would like to do that, whether you want to do it with
19 a combined committee/subcommittees, we'd like to know
20 that, and then we can give you a better feel for when
21 we'd be ready to come down and make those
22 presentations. And then we can work with Mike and
23 schedule our —
24 VICE CHAIRMAN WALLIS: July 23rd isn't
25 very far away, and it's going to involve a lot of —

1 a high proportion of this committee to sort it out
2 pretty quickly. I don't want you guys to say we're
3 not ready.
4 MR. SHERON: I agree.
5 MEMBER POWERS: Brian, at the recent
6 American Nuclear Society meeting I was tapped on the
7 shoulders four times by people nominally associated
8 with the industry, expressing concern about the SRM,
9 saying they wanted to chat with me. And I
10 successfully ducked them, so I didn't chat with them.
11 But it clearly is a concern within the nuclear
12 community about change, irrespective of what the
13 change is. There's always changes. Do you understand
14 what the concern is, and what you have planned to
15 socialize this beyond just ordinary public meetings?
16 MR. SHERON: Well, all of our meetings are
17 public where we discuss this. I mean, if we think
18 that there's a need for further meetings with the
19 industry, say after the public meeting and the like,
20 we can certainly schedule those.
21 MEMBER POWERS: Well, I was thinking — I
22 mean, double-ended guillotine pipe break is so
23 ingrained in the mentality of the reactor safety —
24 MR. SHERON: It's an emotional issue.
25 There's no question about it.

1 MEMBER POWERS: I mean, is it appropriate
2 to socialize this at meetings like the American
3 Nuclear Society, and maybe no more detail than just
4 what you've presented here sort of thing.
5 MR. SHERON: Oh, I'm sure that as we
6 develop this, we will be making presentations at
7 various society meetings, as well as other fora to
8 explain it and the like. I mean, I'll be quite honest
9 with you. I know some professors out there right now
10 that have already called me and expressed concern
11 about it. I've been invited up to give seminars on
12 this in the fall in August.
13 MEMBER POWERS: Yes, that's the level of
14 concern.
15 MR. SHERON: Yes, there's a lot of people
16 that are very concerned. And hopefully, as I said,
17 the thing that we are banking on primarily here is the
18 fact that at least initially, we don't want licensees
19 making any changes unless the staff sees them and
20 convinces ourselves that we haven't unacceptably
21 increased or changed risk to the plant, or that we've
22 dug into our margin for defense-in-depth purposes.
23 Yes, defense-in-depth, that's kind of a
24 nebulous area in terms of what is defense-in-depth,
25 what's acceptable, what's not. And we'll just have to

1 work our way through that.

2 MEMBER SHACK: Well, I mean, virtually any

3 of these changes is going to reduce margin.

4 MR. SHERON: Right. But I mean, let's

5 face it. You know, the staff does that all the time.

6 Okay.

7 MEMBER SHACK: You made some comment about

8 avoiding reducing margins. What --

9 MR. SHERON: No, no, no. I didn't say --

10 I said reduce them unacceptably. You don't want to

11 reduce them unacceptably, and that's what 1.174 is

12 geared to do.

13 MEMBER POWERS: Maybe we shouldn't -- and

14 obviously not holding margin as religious. A lot of

15 margin is built in when you're very, very uncertain.

16 As you get more and more knowledgeable, you're willing

17 to relieve margin. And surely, we must know more now

18 than at the time when 50.46 was originally written.

19 MR. SHERON: I remember one time, an

20 engineer from Westinghouse told me - he said if we had

21 to design ECCS systems to a best estimate model,

22 accumulated pressure would not be 600 pounds. There's

23 stuff like that, so there may be benefits to be gained

24 from this with more realistic analysis being allowed.

25 VICE CHAIRMAN WALLIS: But learning

1 something doesn't necessarily mean that you're now
2 able to reduce margin. It may be that what you
3 learned forces you to increase the margin.
4 MR. SHERON: That's true.
5 VICE CHAIRMAN WALLIS: You may be more
6 uncertain than you were before. Your estimate of your
7 uncertainty may actually go up as you learn more, as
8 it seems to do in some areas of material science.
9 MEMBER POWERS: You're not increasing your
10 uncertainty. You're just becoming aware of the
11 magnitude of your uncertainty.
12 MR. SHERON: Well, I think 191 is a
13 classic example of that. Anyway, we've got a lot of
14 work to do. We appreciate the Committee's help on
15 this, your thoughts and advice. This is a tough
16 subject. You know the number of meetings our Steering
17 Committee's had, and a number of animated - I won't
18 call them arguments - but healthy discussion debating
19 a lot of these issues. It's really kind of eye-
20 opening. This rule is a major impact on the design of
21 the entire plant, and we have to be very careful in
22 terms of what we do, and how we do it.
23 VICE CHAIRMAN WALLIS: One of my
24 colleagues, Dana Powers, said you ought to be able to
25 explain it clearly to an academic audience or a

1 professionally competent audience at an ANS meeting,
2 and there ought to be a really believable explanation.
3 It goes beyond just sort of the internal NRC debates,
4 and debates with industry.
5 MR. SHERON: Right.
6 CHAIRMAN BONACA: We have a second
7 presentation.
8 VICE CHAIRMAN WALLIS: Do we have another
9 presentation?
10 MR. ABRAMSON: Good afternoon. I'm Lee
11 Abramson from the Office of Research. I'd like to
12 acknowledge co-authors of this. Actually, Rob
13 Tregoning would have normally given this paper but
14 he's on a well-deserved vacation. And also, part of
15 it will be delivered by Gary Hammer from NRR.
16 This is the outline of the presentation.
17 We're going to just go over very briefly about the
18 previous presentations we've made to this Committee
19 and the various subcommittees, and we'll talk about
20 the elicitation findings and the sensitivity analyses
21 that we have done and are planning to do. And Mr.
22 Hammer will talk about how NRR intends to use the
23 results in the break size selection. And then we'll
24 briefly go over what still remains to be done, the
25 work schedule, and some concluding remarks.

1 First I said, we want to communicate the
2 main purposes to talk about what we've done since the
3 previous ACRS discussion which was last April, and to
4 describe the use of the elicitation results. And
5 finally, to discuss the technical working schedule.
6 You see there's a list of six bullets of
7 various previous ACRS briefings. The most recent one
8 was in March and April, to both a subcommittee and the
9 main committee on our results. And since then, two
10 main milestones since April. We concluded a
11 sensitivity analyses, and we'll be talking to some
12 extent about that. And also, what we have done is we
13 have finished a preliminary NUREG report, and this was
14 just sent last Friday to the elicitation panel
15 members.
16 This slide is taken from the April report,
17 so I'm just going to go over this very quickly. You
18 see here the graph which just summarizes the results
19 we had at that point. It's the total LOCA frequencies
20 for PWRs. PWRs is the blue, and BWRs is the red. And
21 they're summarized first with the mean values and the
22 95th percentiles. The mean values are the lower ones,
23 of course. The 95th percentile is larger, so you can
24 see there - this gives you a sense of it.
25 Now the horizontal axis is the threshold

1 break diameter. And this was translated from the
2 category sizes which the panel used. As the panel
3 decided to break the LOCA sizes into six categories,
4 from one to six. And then what we did — and
5 everything we did was in reference to that. And those
6 category sizes were defined in terms of fuel rates, if
7 there was a break. And then this was translated into
8 break diameters which is more relevant, obviously, to
9 the upcoming rule. And it's different to some extent
10 for PWRs and BWRs because the category sizes were
11 fixed flow rates applied to BW and PWRs since the
12 pipes are different, and the pressures are different.
13 There is a different translation, and you see this on
14 the graph here.
15 VICE CHAIRMAN WALLIS: How many experts
16 were there?
17 MR. ABRAMSON: There were 12 experts all
18 together.
19 VICE CHAIRMAN WALLIS: So getting a 95th
20 percentile from 12 experts is relative magic?
21 MR. ABRAMSON: Well, there was a great
22 deal of processing that went on of that. And I'll be
23 glad to review that —
24 VICE CHAIRMAN WALLIS: Didn't you assume
25 some sort of statistical form or something?

1 MR. ABRAMSON: We assumed — that's right.
2 The whole statistical model that was —
3 VICE CHAIRMAN WALLIS: That's what the
4 ratios are the mean to the —
5 MR. ABRAMSON: That's correct.
6 VICE CHAIRMAN WALLIS: They're always the
7 same.
8 MR. ABRAMSON: There was a great deal of
9 processing of the expert responses, including the
10 statistical models involving normal distributions and
11 so on. I can go over that in a little more detail.
12 VICE CHAIRMAN WALLIS: You don't need to
13 go into detail.
14 MR. ABRAMSON: Pardon me?
15 VICE CHAIRMAN WALLIS: You don't need to
16 go into detail.
17 MR. ABRAMSON: Okay.
18 MEMBER FORD: Really just to check,
19 threshold break diameter means there was a rupture of
20 the throughwall crack?
21 MR. ABRAMSON: The category of LOCAs were
22 defined in terms of flow rate. In other words, there
23 was a pipe break which led to a flow rate or whatever
24 there is - 1,000 gallons a minute, or 5,000 gallons a
25 minute, something like that. And then these were

1 translated — if you want more detail, I'll have to
2 ask somebody else to do that - into equivalent pipe
3 break sizes, which would match those assumed flow
4 rates. All of the judgments, all the responses by the
5 expert panel were strictly in terms of these flow
6 rates.
7 MEMBER FORD: Some had a history of going
8 from cracking to flow rates. There's some calibration
9 against the extensive database.
10 MR. ABRAMSON: Oh, yes. Well, just in a
11 nutshell, we started with existing data, precursors,
12 small pipe breaks, and so on and so forth.
13 MEMBER FORD: Right.
14 MR. ABRAMSON: A number of base cases were
15 developed based on these. There were four. And then
16 all of the judgments of the panel were relative to
17 these base cases, which in turn were based on existing
18 data, and model lines, and so on and so forth, so it
19 was all relative. So, in effect, they had this
20 foundation and we built up on the foundation to
21 meeting in large break LOCAs.
22 MEMBER POWERS: Was the database for pipes
23 in nuclear power plants?
24 MR. ABRAMSON: Yes, although I'm not sure
25 — Nilesh.

1 MR. CHOKSHI: Yes. This was a precursor
2 database, and this was international CSNI, where SKI
3 in Sudan had developed quite a bit of data, and so
4 this was based quite a bit on that.
5 MEMBER POWERS: Yes, I remember SKI data
6 is industrial pipes.
7 MR. CHOKSHI: Well, they also have done a
8 lot of precursor type, internal break. But looking at
9 the precursor leaks, that sort of thing, and
10 calibrating to that —
11 MEMBER POWERS: Well, my real question is,
12 were these pipes in nuclear power plants exclusively,
13 or did they consider pipes in other kinds of
14 situations?
15 MR. CHOKSHI: As far as I recall, this is
16 mostly nuclear.
17 VICE CHAIRMAN WALLIS: The trend here is
18 an inverse cubed law or something. Is there any
19 critical evidence from other pipes for which there's
20 a lot more data that this kind of inverse cubed law
21 works, frequency versus time, with 10 to the minus 3
22 or something? Any kind of —
23 MR. ABRAMSON: As far as I know, the
24 experts did not — would not look at the —
25 VICE CHAIRMAN WALLIS: When you see a

1 pattern like this, you look for some evidence from
2 some -- where you've got more data to see if it's the
3 kind of thing you expect.
4 MR. ABRAMSON: I'm not -- I don't know.
5 Maybe someone else can help. Have there been any very
6 large pipe breaks in history enough to get any kind of
7 a data? I don't know.
8 MEMBER SHACK: But, I mean, your fracture
9 mechanics would predict that kind of a dependence.
10 VICE CHAIRMAN WALLIS: But I'd like to see
11 the data.
12 MEMBER SHACK: Well, it's hard to get data
13 when the --
14 VICE CHAIRMAN WALLIS: Experts in fracture
15 mechanics always ask to see the data.
16 MR. ABRAMSON: Well, my general
17 understanding of this, and I'm not -- I'm a
18 statistician, is that the reason we went through this
19 long involved, expensive expert elicitation process
20 was that there is no data, relevant data, and no
21 calibrated models. And we used what was available,
22 fracture mechanic models and so on, to develop the
23 base cases, so people used what they knew, what they
24 had available. But in effect, they're extrapolating
25 well beyond existing data because there isn't any.

1 VICE CHAIRMAN WALLIS: Well, you could do
2 it for say domestic water supply. You have mains, and
3 you have pipes coming into houses, and you have little
4 pipes that go to the -- there are other situations
5 where you have pipes with a range of size that goes
6 over 20 to 1 or something.
7 MEMBER ROSEN: Not at 1,000 psi.
8 VICE CHAIRMAN WALLIS: I see. Okay. It
9 would be reassuring --
10 MEMBER ROSEN: If we the data, the kind of
11 data you want, we wouldn't be doing this.
12 VICE CHAIRMAN WALLIS: No, he would be
13 doing this too, but you'd have some collaborative
14 information.
15 MR. ABRAMSON: Is that the questions that
16 were asked of the panel were extremely situation-
17 specific. They dealt very explicitly with the
18 degradation mechanisms, the materials, the geometry,
19 and so on and so on, as they affected nuclear plants.
20 So we tried to make this as specific as -- actually,
21 the experts did, because they were the ones who
22 devised to a great extent the questionnaire.
23 MEMBER POWERS: What is the empirical
24 history of success of expert elicitations where there
25 is not a great deal of data? I mean, the classic ones

1 or the one comes to mind immediately is the Royal
2 Academy that announced that based on an expert
3 elicitation, that heavier than air flight was
4 impossible, that the announcement of another academy
5 with the completion and closure of the Maxwell
6 Equations, there was no more physics to understand
7 prior to the discovery of quanti-mechanics and
8 relativity. In fact, there's a number of these, but
9 what I'm asking is, why would we think that an expert
10 elicitation in the absence of data would be of any use
11 whatsoever?
12 MR. ABRAMSON: Well, that's the right
13 question to ask, and the answer is very complex.
14 There is some empirical evidence that ten heads are
15 better than one; that if you give people enough -
16 because there's quite a bit of empirical evidence for
17 that, that if you give people questions, called them
18 overnight-type questions, would you know the answer?
19 But they don't. And you ask them to make a guess and
20 to give their uncertainty values, and actually use
21 this for the training purposes. That if you take the
22 group opinion that it's definitely better, it
23 encompasses reasonably well what the true answer is.
24 So there is some kind of group wisdom that can be
25 tapped by this. So that's the basis for say using an

1 expert elicitation in the first place, but I think
2 much more important is how — you have to look at how
3 this particular elicitation was structured, and the
4 kinds of expertise we brought, and how the issues were
5 decomposed and so on, to be able to make some judgment
6 about whether this is useful or not.
7 We've gone over this in previous meetings,
8 and of course, we'll continue to do this. We are
9 intending to do, and I'm going to refer to it later,
10 a peer review, an external review of part of this;
11 namely, the whole processing information as to how we
12 took the responses from the experts and processed them
13 to come up with the answers we did.
14 MEMBER POWERS: When you say you're going
15 to do a peer review, a peer review with whom?
16 MR. ABRAMSON: What we do is we're in the
17 process now of setting up a panel of two or three
18 people, one or two statisticians, and a decision
19 analyst. And these are people who are generally
20 familiar with how you deal with information of this
21 sort, and how you might be able to process it to come
22 up with some kind of a reasonable group response. In
23 other words, by the processing I mean we took these —
24 literally I think it was sometimes hundreds of
25 responses we got from each expert, and combined the

1 panel and combined it with the experts in order to
2 come up with the number that you see here, with the
3 graph that you see over here.
4 MEMBER POWERS: My recollection is when
5 they had to justify the Alaska pipeline, that they set
6 up an expert panel to answer the question, the
7 probability of a line break because of some concern
8 about the mating habits of Reindeer that I don't
9 pretend to understand or care to understand to be
10 honest with you. But maybe whatever they did to peer
11 review their prognostications and the probability of
12 failure would be an appropriate thing to do.
13 Considered at all?
14 MR. ABRAMSON: Well, as I said, is there
15 are two aspects of this which certainly would be very
16 useful to do an outside peer review. One I've already
17 mentioned, that is the processing. And the second is
18 the whole elicitation process itself - how we — I
19 should say that, as you know, the NRC has used this in
20 a number of instances before, pressurized thermal
21 shock perhaps is one of the more recent ones. They
22 also used an 1150, another application uses this whole
23 idea of expert elicitation, so that this methodology
24 has been around and used in various forms for 15 or 20
25 years. So our plan to review, so we're setting this

1 up already.

2 Another aspect, which we aren't planning

3 immediately but we intend to do in the future, is to

4 have a review of the expert elicitation process

5 itself, how we set it up, how we set up the panel, how

6 they decomposed the issues, and so on and so forth.

7 MEMBER FORD: In previous subcommittee

8 meetings we have asked the question, the makeup of the

9 panel, to assure ourselves that on the panel there's

10 enough physics, understanding the physics and

11 mechanics of the degradation - and you want to -- I

12 very much hope that when you do your peer evaluation

13 of this exercise, that there are similar experts, not

14 just statisticians.

15 MR. ABRAMSON: Yes. Well, in the second

16 -- for the one that we are planning, the reason that

17 we're -- as I said, we have a small panel. The reason

18 it's so small, we're doing this very, very quickly

19 because we want the results to be available to be able

20 to support the schedule we talked about before. We

21 expect this to be done - right now if we can get all

22 the contractual arrangements in place very quickly, by

23 the end of August we'll have the final report of the

24 panel, so we're only able to use a small panel.

25 As far as the composition of this panel is

1 concerned, is there will be one or two statisticians.
2 The reason for that is because what we're reviewing is
3 essentially the statistical approach. We have this
4 information, we have the responses of the panel, and
5 they were combined using probabalistic statistical
6 models. But that's the most appropriate kind of
7 people to look at it.
8 We do also have a decision analyst because
9 a lot of the expert elicitation methodology was
10 developed to a large extent by people with background
11 in decision analysis and psychology, so we have
12 somebody like that, as well.
13 When we do the review of the — we're kind
14 of planning to do a review at some point in the
15 future. The process itself will have other people.
16 It won't be statisticians primarily.
17 MR. CHOKSHI: Dr. Ford, I think as Lee
18 goes through the presentation, you will see the
19 influence on the research or the processing, that is
20 significant on how we process the data. So that, I
21 think, is which meeting is the next, the review needs
22 to be first. And as we have selected 12 experts, so
23 at least our thinking is that we'll cover a broad
24 spectrum of expertise, as well as the difference of
25 opinion or the views which are — the report part I

1 think is much more solid because we have a large group
2 of -- the processing part I think because it has
3 influence on the final users. And you will see this.
4 MR. ABRAMSON: Thank you. I think the
5 point is well taken, that the structure is based on
6 things that have been done before, both by NRC and
7 elsewhere, so we feel pretty comfortable about the
8 general structure, how we went about it. More, I
9 don't know if "controversial" is the right word, but
10 perhaps questionable, people can question it, is the
11 processing itself. And that's why we're having that
12 particular review.
13 MEMBER KRESS: Do these frequencies depend
14 at all on the quantity of that piping size that's in
15 a reactor?
16 MR. ABRAMSON: Do they depend on what?
17 MEMBER KRESS: The quantity of the piping
18 size that's in a given reactor.
19 MR. ABRAMSON: I'm sorry, what size?
20 MEMBER KRESS: Frequency versus size, pick
21 any size. Does the frequency depend on the amount of
22 that particular piping size --
23 MR. ABRAMSON: Oh, the number of pipes.
24 MEMBER KRESS: The number of pipes. The
25 length.

1 MR. ABRAMSON: Oh, the length?

2 MEMBER KRESS: Or number, however

3 dimension. Number of welds or something.

4 MR. ABRAMSON: Oh, yes, very definitely.

5 MEMBER KRESS: So that was factored into

6 —

7 MR. ABRAMSON: Oh, yes. And I can tell

8 you in general, I mean, it depends on — we were

9 extremely specific, tried to be as specific as

10 possible in forming the questions so the experts knew

11 exactly what they were comparing with what. And they

12 went into the composition of the pipe, and the

13 material, degradation mechanisms, and so on.

14 MR. CHOKSHI: The short answer is it was

15 a system-by-system look.

16 MEMBER KRESS: Okay.

17 MR. ABRAMSON: That's right. We tried, in

18 effect, it was broken down into the smallest

19 components which they could reasonably make some kind

20 of judgments about. So you have the system, sub-

21 systems, and then gradually it would be — and then

22 the frequencies were built up from that just by

23 addition, in effect. They were combined that way.

24 That's right.

25 MEMBER RANSOM: Are these frequencies for

1 a single plant?

2 MR. ABRAMSON: This is more kind of a

3 generic BWR or PWR.

4 MEMBER RANSOM: So like in the U.S., you'd

5 multiply this by 100 roughly, or however many PWRs and

6 BWRs you have.

7 MR. ABRAMSON: If you wanted the total

8 frequency, yes, for this - that's what you would do.

9 That's right, because this is per — actually, it's

10 per reactor year is the — per year rather is the

11 unit, is the frequency. It's frequency per year for

12 an operating plant under these generic conditions.

13 MR. CHOKSHI: And I think going back to an

14 earlier question about the plant-specific differences,

15 those are reflected in the uncertainty bounds.

16 Experts were asked to think about this as a general

17 way to look at BWR, for example. What other

18 configurations and things might affect, so the idea

19 was to capture this uncertainty bound variations.

20 VICE CHAIRMAN WALLIS: Well, I have

21 another — Brian Sheron was talking about the biggest

22 pipe, so really what you care about is the right-hand

23 end here.

24 MR. ABRAMSON: Correct.

25 VICE CHAIRMAN WALLIS: And those are the

1 points which are least consistent with the trends of
2 the other points. You extrapolate the red points up
3 to 20 inches, you go beyond, you get a factor about
4 two or three different from the last two points. So
5 the all about the last two points, which are the ones
6 you're interested in.
7 MR. ABRAMSON: You should not — I would
8 not recommend at all any kind of extrapolation —
9 VICE CHAIRMAN WALLIS: But you see what
10 I'm getting at. The only ones you really care about
11 are the ones on the right hand end, and they're the
12 ones which are least consistent with the trend. So
13 you have to be a little bit more careful about —
14 MR. ABRAMSON: Well, I don't think the
15 trend here is very —
16 VICE CHAIRMAN WALLIS: It doesn't mean
17 anything.
18 MR. ABRAMSON: I don't think it means
19 anything in the sense that this is not a mathematical
20 trend or anything of this sort. This is just what the
21 experts came up with.
22 I should also say what we've done, of
23 course, is we've connected the points, as you can see,
24 with straight lines. This is, of course, a long plot.
25 Connecting the straight lines, but that was just for

1 ease of being able to follow the curves. We make no
2 claim whatsoever about the meaning of the lines
3 between these points.
4 VICE CHAIRMAN WALLIS: But your academic
5 student —
6 MR. ABRAMSON: No, we make no claim —
7 VICE CHAIRMAN WALLIS: Something odd about
8 those last two points.
9 MEMBER ROSEN: Well, I think there's
10 something odder about the ones on the left. I mean,
11 really - look at the very top point. Eighty years I
12 guess that may be, you're going to have a break that's
13 tiny, less than half an inch, only once every 80
14 years. Well, anybody who has been in a power plant
15 knows that's a significant under-estimate. We have
16 many, many more breaks that are tiny, half inch or
17 small, than once every 80 years. My gosh, every plant
18 has had one every year.
19 MR. ABRAMSON: It's not quite that,
20 because that top point is the 95th percentile. The
21 mean value may be a little bit more relevant.
22 MEMBER ROSEN: It's even worse.
23 VICE CHAIRMAN WALLIS: You're saying it
24 should be off the scale.
25 MEMBER ROSEN: Oh, yes, of course.

1 MEMBER SHACK: How many steam generators
2 do you think you've had?
3 MEMBER ROSEN: Well, on the average - ten.
4 MR. SHERON: That number tracks just about
5 to the number of steam generator —
6 MEMBER ROSEN: But there are other tubes
7 in this — there's tubing, sway block tubing, and all
8 kinds of other stuff.
9 MR. ABRAMSON: I believe this is category
10 one. It's at least 100 gallons per minute. I think
11 it's 100 gallons per minute. Can you help me with
12 that, Nilesh?
13 MR. CHOKSHI: This graph may be somewhat
14 misleading. It's a range of flow —
15 MEMBER ROSEN: Well, then the conversion
16 to range is wrong, isn't it? Two-tenths of an inch in
17 diameter gives you 100 gallons a minute at 2,000 psi.
18 MR. CHOKSHI: I can give a range in a
19 second.
20 MEMBER ROSEN: I don't think so. It just
21 seems awfully low to me on the left-hand side. I know
22 it's of less import.
23 MEMBER FORD: I guess we're all going
24 through these calibration exercises from our
25 experience. The comment on the BWRs that it involves

1 all plants makes you wonder, because there are a lot
2 of those which are intermediate break size range
3 there, which we haven't had, 316 ng. There have been
4 no cracks, therefore, no leaks, therefore, no flow
5 rate for many, many years. So I'm just wondering
6 should that -- if it does include those, then the
7 uncertainty range should be much higher.
8 MR. ABRAMSON: I can't respond to that.
9 I don't know. We'll try to find out and check this.
10 MR. CHOKSHI: The categories, I think the
11 first category is greater than 100 gpm.
12 MR. ABRAMSON: Hundred gpm is the range
13 point right now. That's right, it is 100. The next
14 one is 1,500 and so on. Just to point out some
15 general qualitative conclusions, the last two you'll
16 see up on the top two bullets, BW and PWR, so this was
17 reviewed from the April meeting.
18 Just on the third bullet, the expected
19 frequencies are roughly the same, at least
20 approximately for effective break damage between 1 and
21 7 inches for both BWRs and PWRs. And then if you look
22 at the ratios between the means and the 95th
23 percentiles, they're similar. It's a factor of about
24 four.
25 I should point out too, that these numbers

1 are the panel or the group opinions, and they were
2 calculated using from the geometric means of the
3 individual panel responses. So this is the summary
4 value. There was a great deal of variability,
5 diversity among the panel members, and we'll get into
6 a little bit of that later on.
7 All right. This is a summary of the —
8 and again, this is just a summary of some of the
9 points that were made in the April briefing. As I
10 said before, we used a formal elicitation process, and
11 it was done as a function of flow rate, and also
12 operating time. The operating time was current day,
13 which is about average of say 25 years of plant life,
14 15 years into the future, so that would be a total of
15 40 years of life. And then finally, 35 additional
16 years in the future, 60 years, which I guess was
17 chosen because it would be end of possible license
18 extension. So these were the three time periods that
19 we asked the panel about.
20 This was done separately for both piping
21 and non-piping contributions, and then these were
22 added up. And what you saw before was the total of
23 these.
24 Then we developed the quantitative
25 estimates for the — it was done for piping and non-

1 piping base cases, and these were based on — there
2 were four of these. Each one is developed by a member
3 of the panel, and there were various — two were based
4 on data, two were based on models, probabalistic
5 fracture mechanics models. And the experts were free
6 to decide which of the base cases they would start as
7 anchoring their particular responses.
8 And we asked them many questions about the
9 — we developed a long questionnaire, and asking the
10 specific relative values, relative frequencies. That
11 was the form of the numerical values we got, and we
12 also asked them the qualitative rationale, and you'll
13 see this in the report.
14 MEMBER FORD: Could you give an example of
15 quantity of estimate supported by qualitative
16 rationale? And what would be the question be that
17 would illustrate that?
18 MR. ABRAMSON: Well, what we're asking for
19 — when they asked for the numbers they said well, why
20 do you think that this is — why did you come up with
21 this number compared to this? And they might say
22 well, most of these pipes are, for example, steam
23 generator pipes, team generator tubes about which we
24 have a reasonable amount of information. And then as
25 you get larger pipes, larger breaks, they said well,

1 the steam generators don't enter into it any more.

2 But the qualitative rationale, some of

3 these were kind of obvious, or I wouldn't say obvious

4 necessarily, but there was general agreement among

5 them, others just had one or two people, one or two

6 panel members who thought that this was important.

7 I'm sorry. I can't give you any more specifics than

8 that. If Rob were here, he would know. Do you have

9 something maybe you can give an example?

10 MR. CHOKSHI: The question was whether you

11 can correlate qualitative rationale with quantitative

12 number?

13 MEMBER FORD: Yes.

14 MR. CHOKSHI: In fact, the base case -

15 that was precisely the analogies — what they did was

16 there were four people, and two looked at the service-

17 based, experience-based, predict two lines, took five

18 different systems and predicted frequencies, and they

19 wrote PFM models. And then we started looking at

20 them, and they provided what was basis for the

21 differences. And a lot of insights emerged, and then,

22 for example, thermal fatigue, the pattern of crack

23 behavior. You have many cracks, then a single crack,

24 and larger area, and predicted more likely to lead to

25 a large break. So those sort of rationale was

1 provided to look at whether this makes sense.

2 MEMBER FORD: So the quantitative estimate

3 -- the quantitivity of this would be from say the --

4 MR. CHOKSHI: There are a number of --

5 MEMBER FORD: The welds.

6 MR. ABRAMSON: Well, the base cases were

7 developed using whatever codes they wanted to use.

8 But then as far as the panel members were concerned,

9 what they were asked to do is to say all right, here

10 is the frequency for a small break LOCA, a category of

11 this size. How do you think the frequency of a

12 Category 2 or 3 would compare with this? How much

13 less likely is this frequency for this pipe size, with

14 this material, this degradation mechanism, under these

15 circumstances. So we're asked, in effect, to

16 extrapolate the frequencies on the basis of the

17 changes in the physical condition or physical

18 characteristics of the pipe. And all of the questions

19 were in this particular mode.

20 And then as far as the qualitative

21 rationale, they would say well, why do you think it

22 was like this, and how does this compare with another

23 judgment you made? What's driving this, and what do

24 you think is important about this? And that's why we

25 tried to get some specific details about what was

1 driving, in their minds what was driving their
2 particular answer.
3 MEMBER FORD: So the formulation of the
4 question is crucial.
5 MR. ABRAMSON: Absolutely crucial. And
6 the panel spent a great deal of time and effort. We
7 spent a great deal of time in the meetings in
8 developing the questionnaire. And we had a number of
9 iterations in developing the questionnaire. The staff
10 developed something, they sent it to the panel, revise
11 this, so on and so forth.
12 We also changed things as a result of the
13 first two elicitations were, in effect, like trial
14 elicitations, and we did some changing as a result of
15 that, so it was a very iterative procedure. We had a
16 number of meetings. We had I think three meetings or
17 so, three two-day meetings with the panel to do this.
18 And we're having another one, a video conference in a
19 couple of weeks where we've already sent out, as I
20 said, we sent out the preliminary draft NUREG to the
21 panel members, and we're going to try to get their
22 feedback on that. So we try to involve the panel as
23 much as we possibly could given all of the
24 constraints.
25 MEMBER FORD: Will we be hearing much more

1 detail of this when we have the subcommittee meeting
2 in July, August, whenever the --
3 MR. ABRAMSON: Yes. You'll have -- I
4 don't know at what point with scheduling. You'll have
5 the report which we're now in the process of finishing
6 up.
7 MR. CHOKSHI: I was under the impression
8 that we had given an approach presentation earlier.
9 MR. ABRAMSON: We did discuss this in some
10 detail in one of the previous meetings.
11 MR. CHOKSHI: But we can come back and
12 give you more insight.
13 MR. ABRAMSON: We'll have to come back.
14 That's right. I don't think you've received anything
15 in writing yet. We're developing the NUREG now, which
16 will have all of the details of the methodology and
17 the results, and the qualitative rationale, so on and
18 so forth.
19 MEMBER FORD: It's more the questions.
20 MR. ABRAMSON: You'll have the questions
21 too. That's one of the appendices, definitely, the
22 questionnaire. Absolutely.
23 Let's see. In the third bullet, I reviewed
24 this already. The panelists divided the quantitative
25 estimate, and then they said -- or they provided the

1 relationship between the factors and the base cases.
2 Everything was relative. All the questions we asked
3 them were relative to the base case or other
4 conditions, or the previous responses.
5 And a general summary of the results.
6 There was relatively good agreement about the
7 important factors contributing to LOCAs in the sense
8 that in the qualitative rationale, they generally
9 tended to agree on what was important, what was not
10 important.
11 As could be very well expected, there was
12 a great deal of uncertainty and variability.
13 Uncertainty is uncertainty in each experts' judgment.
14 What we did ask each expert, the general form of each
15 response, we asked them to give us three numbers -
16 what we call a mid-value, an upper bound and a lower
17 bound. The mid-value was the — you can call like a
18 best estimate, but more specifically it was supposed
19 to be the median of their subjective distribution in
20 the sense that they say in your judgment, there's a
21 50-50 chance that the correct answer is above or below
22 it, so that's their mid-value. And an upper bound was
23 the 95th percentile, and the lower bound was the 5th
24 percentile of the distribution. So everything we
25 asked them, we always ask them these three numbers so

1 they could express their uncertainty.

2 And what we did then is we propagated

3 these uncertainties throughout, and as might be

4 expected, there was a very large uncertainty in each

5 individual experts' judgment. There was also a lot of

6 difference among the experts. That's what we call

7 diversity among the panel. And this is to be expected

8 because of the nature of the situation. There is a

9 great deal -- there's no data essentially, there are

10 no validated models, and so there's a lot of

11 scientific uncertainty about this. And this was

12 certainly reflected both in the individual judgments

13 and in the difference among the panel members.

14 I should say too that the results were

15 similar to previous studies on NUREG's 57.50

16 estimates, were generally similar with the largest

17 increase in the medium LOCA frequency estimates. This

18 was a much more structured thing than the 57.50.

19 All right. These are some new results

20 which we have not presented yet, because they weren't

21 developed yet, we developed since April. I said what

22 we did is we have what we call our baseline estimates,

23 and these aren't things that we necessarily recommend,

24 but these are just the assumptions, and the models

25 that we used in order to develop as a starting point.

1 But clearly, there are, as you go through the various
2 aspects of this, there are a number of elements of
3 this where different choices could be made. And
4 that's what we did when we looked at the sensitivity
5 studies. And the main purpose is we want to analyze
6 the effect of different assumptions on the LOCA
7 frequencies to determine the full range of supportable
8 quantitative results, so we wanted to make sure in
9 doing our sensitivity analyses that whatever numbers
10 we were going to come up with, at least will bound the
11 range of possible results. We don't want to be too
12 conservative in that point of view.
13 Then there are three general areas where
14 we did the sensitivity analysis. The first one was
15 the analysis of the individual responses. Our main
16 approach was to take the individual responses. There
17 are 12 experts, as I said, and what we did is we had
18 a group of eight of them which presented enough
19 information both piping and non-piping, so we were
20 able to get estimates of total BWR frequencies. And
21 there was another group, largely overlapping, of
22 course, of nine experts who were able to get PWR
23 numbers. So what you're going to see -- what you've
24 seen already and what you'll continue to see for the
25 total frequencies is based on a subset of 8 or 9

1 depending on BWR/PWR on this.

2 So what we did is we propagated these
3 experts responses all the way through. We felt that
4 this was the most reasonable thing to do because at
5 least the experts are more or less self-consistent,
6 and then we combined them afterwards. WE combined
7 over the experts, and we had the bottom line numbers.

8 Now I talk about an over-confidence
9 adjustment, and this is in bold because this is
10 something that does make a difference. The question
11 was how do we know that this has any value whatsoever?
12 Well, a lot of work has been done, empirical work has
13 been done this, and through say these Almanac-type
14 questions. And what comes up time and time again is
15 that the experts are more confident than we have a
16 right to be.

17 We asked them specifically for these --
18 set these three numbers, the upper bound, the lower
19 bound. The upper bound is 95th percentile, the lower
20 bound is the 5th percentile, so between them you have
21 90 percent. So this says that if they are perfectly
22 calibrated, 90 percent of the time the intervals we'll
23 get from these experts are going to cover the true
24 value.

25 Well, in point of fact, it only happens

1 between about 30 to 60 percent of the time. This is
2 based on the Almanac-type questions, and we confirmed
3 this again through the training questions.
4 MEMBER KRESS: This doesn't apply to ACRS
5 members.
6 MR. ABRAMSON: No.
7 MEMBER POWERS: Notice the perfect
8 correlation category. How do you think they
9 established that?
10 MR. ABRAMSON: That's right, yes. So
11 experts, anybody, they tend to be over-confident about
12 it. And part of the training was we showed them this,
13 we demonstrated this, we talked about the biases that
14 people are subject to in a sense in trying to get them
15 — by being more aware of the biases that they could
16 be subject to, to try to get them to be more accurate
17 in their responses.
18 Nevertheless, we have our results. And so
19 the question comes, well, we're assuming that the
20 intervals the experts are giving us are 90 percent
21 intervals; when in point of fact, let's say that the
22 upper bound is the 95th percentile. Well, maybe it
23 really isn't. Maybe it should be only 80th
24 percentile, or 70th percentile. And this will really
25 change. This can have dramatic effects on the

1 underlying uncertainty of the answers, so we did a
2 number of over-confidence adjustments of coverage
3 intervals, and I'll tell you about some of the results
4 later. And then does make a difference.
5 Then another aspect, which doesn't really
6 make a difference, is a technical point about the
7 variance of bounds. What we wind up doing is, as I
8 said, we get responses for systems and sub-systems,
9 and then we add them up in order to get the total
10 frequencies. Well, the response is in order to be
11 able to do this addition in a statistical way, you
12 have to assume something about the distribution.
13 Assume that they were logged normal distribution, so
14 what you wind up doing is adding up logged normal
15 distributions. When you add up logged normal
16 distributions, the means will add, because when you
17 add up distributions, it doesn't matter the
18 correlation structure. The mean is always add.
19 However, the variances don't. It depends whether
20 they're independent on the correlation structure, if
21 they're independent or not. And so what we did is
22 there are two bounding cases. One is the independent
23 case, where assume everything is independent. That
24 gives you the lower bound on the variance. And then
25 if you assume what we call the perfect correlation

1 case, that gives you an upper bound on the variance.
2 And what we used for our baseline calculation, we used
3 the upper bound.
4 As a sensitivity study, we looked at the
5 lower bound, and it really doesn't make any
6 difference. We didn't expect it to, so what that says
7 is since we don't know the correlation structure, it
8 makes sense to us that they should be correlated
9 because you're talking about similar kinds of systems
10 and so on, similar kind of degradation mechanisms and
11 so on, so we'd expect the answers would be correlated,
12 but we have no idea how strong the correlation is.
13 And so, we need to consider this, and it turns out
14 using this approach it really doesn't make much
15 difference.
16 Then as I said, what we do is we propagate
17 each of the experts' response all the way down to a
18 bottom line, to a total frequency of a BWR and PWR,
19 and we aggregate these. And the question is, how do
20 we do these? Well, there are a number of ways of
21 doing this. We used as our baseline estimate the
22 geometric mean, but you can also use an arithmetic
23 mean. You could use what's called a trim geometric
24 mean, which is Olympic-type scoring, you throw out the
25 high and the low in an attempt so you won't have too

1 much of an over-influence by the extremes. Another
2 possibility is just to take the medians, so you have
3 even less influence. So these are different ways of
4 aggregating expert opinions.
5 MEMBER KRESS: Can I ask, NUREG 1150 what
6 they did —
7 MR. ABRAMSON: I'm sorry?
8 MEMBER KRESS: NUREG 1150 was an expert
9 opinion that —
10 MR. ABRAMSON: Yes, that's right. And I
11 think I used addition for that.
12 MEMBER KRESS: Well, the answer I got at
13 one time from somebody was that they used the minimum
14 entropy. Do you know what that is, how that would be
15 worked?
16 MR. ABRAMSON: No, actually maximum
17 entropy. I think it might be maximum.
18 MEMBER KRESS: I think they said maximum
19 entropy. Let's go maximum, yes.
20 MR. ABRAMSON: It's maximum entropy, yes.
21 What you use in a maximum - that, I think, might have
22 to do with the prior distribution. They'd use a kind
23 of Baysian approach, and the question is, what you
24 want to do to start out, you have no idea — you're
25 trying to come up with some kind of a distribution of

1 a parameter, and you use a so-called Baysian approach.
2 What you need is you have a prior to start with, and
3 that what you have is then you have your data, your
4 information, and then you combine the two to come out
5 with a posterior. Well, the question is what do you
6 with — what kind of prior do you start with? What we
7 can start with is called a non-informative prior.
8 That was a flat distribution. Another way I guess of
9 doing this to try to come up with an estimate, which
10 is maximum entropy, which is the same philosophy. You
11 try to be very conservative, and to — so that your
12 answer depends as little as it possibly can on the
13 input assumptions.
14 Clearly, since you don't know what the
15 input assumptions are, you want to try to be
16 conservative about that, so I expect that's what they
17 did at some point.
18 MEMBER KRESS: Thank you.
19 MR. ABRAMSON: And that's a procedure,
20 they can do that.
21 Actually, what I just talked about was
22 number 3, the measures of group opinion. That's
23 right, for the mean, the 5th and the 95th percentile,
24 and that's what was in bold. And how you do this,
25 whether you do it arithmetically or geometrically, and

1 so on, can make a significant difference.

2 MEMBER POWERS: When you talk about your

3 experiments with Almanac-type questions, what would

4 that experiential base suggest would be the

5 appropriate common editorial technique?

6 MR. ABRAMSON: It doesn't. It doesn't,

7 because those are individual questions. The

8 appropriate common editorial technique I think here

9 depends — and this is why I think you want to have

10 people with experience and sensitivity to these

11 issues, and that often are statisticians. It has to

12 do with the assumed structure we're assuming, because

13 in order to do this, you have to assume some kind of

14 probabalistic structure for saying that the experts'

15 responses, although they come from a distribution, we

16 pick log normal. And the reason we pick log normal is

17 because all of the responses are on a multiplicative

18 basis. They're a relative basis, and so you have a

19 very skewed distribution of multiplicative basis, the

20 log normal is the natural thing.

21 And I think, too, the geometric mean is a

22 natural thing for that to do that. It all falls out

23 of the structure, which ultimately is based on the

24 kind of information we're getting, kind of responses

25 we're getting from the experts.

1 MEMBER POWERS: I think I'm really asking
2 you a question out of the psychological domain, maybe,
3 because everything you said would be true if I had an
4 inanimate process.
5 MR. ABRAMSON: This is done by a computer.
6 MEMBER POWERS: Yes. Done by a computer,
7 done by a machine, something like that, everything
8 would be true, but experts aren't like that. Experts
9 are affected by lots of things, and not the least of
10 all, who's paying the bill and what kind of way we
11 hold these things are. And what I'm asking you is, is
12 there a literature on this that one can consult?
13 MR. ABRAMSON: There is a literature on
14 it. A lot of it I think is academic in the sense that
15 people think of interesting models, mathematical
16 statistical models they could use for doing this. But
17 there isn't very much in the way of empirical.
18 MEMBER POWERS: It's the empirical base
19 that I' most interested in.
20 MR. ABRAMSON: And you want to distinguish
21 between the individual response that we're getting
22 from the experts, and how we aggregate them. How we
23 aggregate them is another aspect of this, and it
24 really isn't expert opinion. What it is, it's taking
25 this - I won't even call it data - this information

1 that we get from the experts, and how do you combine
2 it in such a way so as to come up with some
3 quantitative results, which are useful for your
4 particular application. And in this case, coming up
5 with LOCA frequencies.
6 MEMBER POWERS: What I'm struggling with
7 is, right now you said we assumed - we took this is
8 natural. I mean, that's a very qualitative
9 indication. And what I'm struggling with is there any
10 hope, any possibility of substantiating any of these
11 assumptions and plausibilities that you've listed out
12 here?
13 I mean, nothing you've said is
14 implausible. I mean, it's clearly thought out and
15 whatnot like that. The question is, is it true for
16 results which you might not like to word the label
17 data, but results that are coming from human beings.
18 MR. ABRAMSON: All right. I think the
19 best you can hope for is that you don't have any
20 significant systematic bias in the result. If
21 somehow, and I don't know it would happen, somehow the
22 panel as a whole was systematically too high or too
23 low, then your ultimate answer is going to be too high
24 or too low. And probably the best way to judge that
25 is to take a look at how this whole thing was

1 structured, the qualitative results and so on and so
2 forth.
3 MEMBER POWERS: Well, I mean, I can look
4 at it, and I can see yes, this is what they did. I
5 understand what was done, and I can even say gee, a
6 lot of these things strike me as good practice. But
7 what I don't know is whether that's the future
8 reliable answer.
9 MR. ABRAMSON: I know. I'm coming to that.
10 So the best you can hope for is that - and we believe
11 we structured it - of course, that's the underlying
12 assumption of this, you don't have any significant
13 systematic bias that you don't know about, because if
14 you did, then you're going to be biased high or low,
15 and you won't even know which way it is. So you look
16 at it, and you look at the responses, now the
17 numerical responses. The rationales often differ,
18 particularly numerical responses different a great
19 deal. So if you make the working assumption that in
20 effect there is no systematic bias, what you're
21 getting then is a great deal of scatter uncertainty
22 about the correct answer, which is somewhere in this
23 cloud of answers.
24 And then question is, given that the
25 answer is somewhere in-between there, how do you take

1 your responses with all the uncertainty and diversity
2 in order to come up with something? Well, we take a
3 kind of a central estimate. That's the geometric mean
4 or the arithmetic, whatever you're doing, with
5 uncertainty about that in the 95th percentile, so what
6 we're trying to do is to take this diversity and the
7 basic assumption is - and this is where the whole
8 expert elicitation process comes in - is that the
9 panel response - there's some wisdom in the panel
10 response that comes closer as a panel than any
11 individual will to the true answer. And that's where
12 the results of these Almanac-type questions come in.
13 I said this has been demonstrated. You do get some
14 very interesting useful results by looking at the
15 panel response Almanac questions.
16 So if you assume the same thing will apply
17 here, then what this says is you should try to get
18 some kind of central estimate of the panel, not the
19 extreme values but central estimate, and this is
20 relatively close to what the correct answer is. So
21 it's this kind of chain of reasoning that we're using,
22 that you can use to justify that this has any
23 applicability.
24 MEMBER POWERS: And I think I understand
25 that. I'm just saying that you have this data point

1 on the Almanac questions.

2 MR. ABRAMSON: Points, actually points.

3 This has been done many, many times.

4 MEMBER POWERS: Right. And now with this

5 stuff with aggregation, is there anything we can do to

6 anchor that, other than its plausibility?

7 MR. ABRAMSON: I don't think so, because

8 I think ultimately for something like this, as complex

9 as this, it's going to be very elicitation-specific.

10 You really have to look at it to see the kind of

11 experts, how the questions would be composed, how they

12 answered, and so on and so forth, to see if this

13 really is worthwhile or not.

14 MEMBER POWERS: We went through all this

15 agony over NUREG 1150, and it appears the field has

16 not progressed much with respect to the empirical

17 database. What you're doing is very much —

18 MR. ABRAMSON: Well, actually, you've

19 anticipated this. These are some of the — on this

20 slide is this is the general philosophy,

21 justification, rationale for this.

22 The purpose of the elicitation is we

23 wanted to estimate the mean, the 5th, and the 95th

24 percentiles of LOCA frequency distribution. This is

25 our ultimate goal as far as the processing is

1 concerned. Group estimate is more accurate than any
2 single estimate. I've referred to that. That's based
3 on this empirical information in these Almanac
4 questions.
5 An implication of that is that the outlier
6 should not dominate the result, because it's the group
7 as a whole, which is more accurate. It's not the
8 outliers. And it should be used as a measure of the
9 panel's — the outliers themselves, they're important,
10 though, because it gives you the panelist variability,
11 so you need to take account of this in some way.
12 MEMBER POWERS: I did see an interesting
13 presentation in the course of doing NUREG 1150, in
14 which the thesis of the presenter was that when you
15 look at historical groups making judgments on things
16 such as is heavier than air flight possible or not —
17 MR. ABRAMSON: Or the speed of light, for
18 example.
19 MEMBER POWERS: That you were far better -
20 if you were a betting man, you always wanted to bet
21 on th outlier, because more than half the time he
22 proved to be the correct one.
23 MR. ABRAMSON: I would suggest, though,
24 that that kind of — this is really well beyond that
25 kind of estimate because this is a very structured

1 thing, and I think in particular what's important here
2 is you don't ask them a yes or no question. You ask
3 them to decompose the question, and particularly what
4 you're doing is you're asking about thing about which
5 they are expert about; namely, degradation mechanisms,
6 pipe materials and so on. And you're asking them to
7 extrapolate from their knowledge and experience to
8 that, so I think that that's a very important
9 difference between these other examples which you may
10 have cited, which you cited.
11 MEMBER SHACK: You're at slide 9. We're
12 already six minutes over scheduled time.
13 MR. ABRAMSON: I'll try to --
14 MEMBER SHACK: Just keep that in mind.
15 MEMBER RANSOM: Just a quick one, is how
16 in that process did the causes for the breaks come
17 into play?
18 MR. ABRAMSON: Are you talking about
19 degradation?
20 MEMBER RANSOM: In other words, water
21 hammer, mechanical accidents. I mean, how do they
22 come into this?
23 MR. ABRAMSON: Well, one of the conditions
24 was degradation mechanisms, what degradation mechanism
25 would be subject -- Nilesh.

1 MR. CHOKSHI: Yes. This elicitation
2 primarily covered the normal operating type of
3 transients. Very large water hammers, or pick
4 earthquakes were not explicitly addressed. And in
5 fact, there's a follow-on activity we are doing right
6 now, is to look at how would those kind of
7 consequential LOCA would impact the selection of
8 design-basis. And I think when you hear Gary Hammer's
9 presentation, he's going to address some of those
10 considerations.
11 MR. ABRAMSON: On the third bullet, just
12 again, this issue about the outliers. A principal
13 benefit was to identify issues and variables other
14 panelists may not have considered. And I said, we had
15 a number of meetings with a lot of feedback to the
16 panelists, so the panelists - and while all the
17 elicitation sessions were individual sessions,
18 everything else was in a group meeting. And in
19 particular, all of the discussion. And also, we did
20 it in our feedback meeting, which we had a two-day
21 feedback meeting - what we did is we did extensively
22 feedback some of the rationale for the answers to the
23 panelists, so they had an opportunity to discuss
24 these. And actually, they were also invited, if they
25 wanted to, to change some of their judgments, if they

1 wanted to.

2 And then as I already discussed briefly,
3 the group mean, the 5th, and 95th percentile estimates
4 - they were determined to be consistent with the
5 structure and results of the elicitation process. I
6 think what we did is we used a ratio, set a ratio
7 structure, and there was a lot of variability among
8 panelists' responses, and our final results do reflect
9 that to the extent that we feel we can do that.

10 Now as I noted before, the purpose of the
11 elicitation and sensitivity analyses is to bound the
12 range of the plausible alternatives. We already
13 discussed the first bullet, that these are various
14 ways of taking the individual results and combining
15 them to come out with the group estimates, or the
16 panel estimates. And those are the ones that you've
17 seen plotted previously.

18 The reason that this makes a difference is
19 the arithmetic results and the highest frequencies,
20 much more than the others. And the medium trim
21 geometric and geometric mean are much closer to each
22 other, and so on. You'll see more detail about this
23 when you see the NUREG.

24 And I've talked about this, the over-
25 confidence adjustment. Experts are generally over-

1 confident. General rule of thumb is that the true
2 coverage level is approximately half the nominal
3 coverage level, so if they're — say they're 90
4 percent confident - in other words, if 90 percent of
5 their intervals were nominally covered, only about
6 half of those do something. That's the nominal one.
7 And what we did is we evaluated the effect
8 of adjusting the nominal coverage level. Well, first
9 of all, the mid-values were not changed, because the
10 over-confidence has to do with the upper and lower
11 bounds. Then we did two kinds of adjustments. There
12 was a broad adjustment where we adjusted everything,
13 and then there were targeted adjustments. And the
14 target adjustments, we looked at those experts who had
15 a very — some had very wide ranges of uncertainty,
16 others had narrow ranges.
17 The ones with the relatively narrow ranges
18 were the ones who adjusted. We felt that those were
19 the ones that were most likely to have been over-
20 confident. That's why their ranges were very narrow.
21 The ones who were broader, we figured were more looser
22 in thinking, so to speak, or well-calibrated. And the
23 fact that they had larger uncertainty ranges to begin
24 with means that they were probably better calibrated.
25 And so we tried various different kinds of adjustments

1 on that. And you'll see the details, we'll give you
2 the details. But it did make a significant
3 difference, as you might expect.
4 Again, continuing with this, the blanket
5 adjustments and the more conservative target
6 adjustments were very severe. In some cases, you got
7 the means were bigger than the 95th percentiles, so
8 that means you had a very, very skewed distribution,
9 and we got very, very high frequencies, so we felt in
10 those particular cases that there was an over-
11 adjustment. It just really didn't make sense. And it
12 turns out that a relatively modest targeted adjustment
13 was relatively well-supported by the results. And
14 essentially, what we did there is we took a — we
15 assumed the nominal 90 percent coverage to 60 percent
16 for four to five panelists.
17 The four to five panelists were the ones
18 who had chosen relatively low uncertainty ratios, less
19 than a factor of 10. Some of the uncertainty ratios
20 went up to 100, so some of them were very wide ranges.
21 And the rationale for doing this is that the ones with
22 large uncertainties to begin with, is they were pretty
23 well calibrated. It was the small ones that needed to
24 be adjusted.
25 I should say also, the increases in the

1 SECY04-0600, this was the SECY paper that was released
2 in April with the preliminary results. And when you
3 use the targeted adjustment, it's generally less than
4 a factor of 3, so we felt that this is pretty
5 consistent with the kind of results we were getting.
6 At this point, I'd like to call on Mr.
7 Hammer.
8 MR. HAMMER: Again, my name is Gary
9 Hammer. I work in NRR. And you'll have to pardon me,
10 I'm not as smooth as Lee, but the good news is I have
11 only two slides, and then I'll give it right back to
12 him.
13 What we at NRR are doing, as Brian
14 mentioned a little earlier, is we're working on the
15 development of the rule for risk-informing ECCS, and
16 one of the activities is to select a break size based
17 on the work which Research has done, which Lee has
18 been outlining. And there are several aspects of that
19 that we wanted to do. And, of course, the elicitation
20 results are a key part of it. But we wanted to be
21 sure that we accounted for the variability and
22 uncertainty that Lee has discussed, and the effects of
23 the sensitivity analyses so that we try to make the
24 best choice we can on a defensible size. And we're,
25 of course, using a frequency metric, not really a risk

1 metric per se, which just based on a frequency
2 initiator.
3 The elicitation results, we kind of see as
4 a starting point. They're not necessarily the bottom
5 line because there are other considerations that we
6 want to take into account. There are — as Lee
7 mentioned, the elicitation process attempts to predict
8 frequencies based on degradation mechanisms for pipe
9 and non-pipe components, but there are other sources
10 of breaks, such as the things that we list here; rare
11 event loadings, including seismic and other loads like
12 severe water hammer pressures. There are
13 consequential LOCAs that being the result of some
14 other initiating event.
15 VICE CHAIRMAN WALLIS: The panel of the
16 experts considered water hammer, didn't they?
17 MR. HAMMER: I beg your pardon?
18 VICE CHAIRMAN WALLIS: The experts did
19 consider water hammer.
20 MR. HAMMER: Not per se. Right?
21 MR. ABRAMSON: No, there was a separate
22 area where they considered seismic loads are the
23 equivalent of water hammers, so there was a small
24 group of about four of them. We asked them questions
25 about this, but this wasn't part of the main

1 elicitation.

2 MR. HAMMER: So there are these other

3 things. Oh, and then there's active system LOCAs, and

4 in that category you can include things like blown-out

5 seals, interfacing system LOCAs, also stuck-open

6 valves, things like that.

7 And all of those things, ultimately, if

8 they're in a similar order of magnitude, they could

9 add to the degradation-related, so that the composite

10 curve could actually be a little higher than just the

11 degradation-related by itself. And we want to -- in

12 accordance with the SRM, we want to consider some

13 defense-in-depth considerations.

14 There are a couple of things there. The

15 ECCS, of course, has a low pressure mitigation

16 capability if we pick the size very small. We could

17 mitigate it completely with a high pressure mitigation

18 capability. Recognizing the uncertainty in the whole

19 process of making the selection, if we're reasonably

20 close to a size big enough to result in a large break

21 LOCA, which would require a low pressure system, then

22 we want to make sure that we at least would

23 incorporate that. And then there's the considerations

24 of security and maintaining plant safety, which Brian

25 mentioned earlier, some of the Reg Guide 1.174

1 considerations.

2 Let's see. Brian touched on this, the

3 advantages of the process are that we're still

4 maintaining a risk-informed approach consistent with

5 the Reg Guide 1.174 framework. And that consistent

6 with the Commission guidance, we're going to maintain

7 the mitigation capability up to the double-ended

8 guillotine break, even above the transition break

9 size.

10 We still have a lot of work to do. We're

11 still trying to finalize our selection, and include

12 all of the additional contributions that we have. The

13 graphic is merely to show you that we're not going to

14 pick a very precise number off of a curve. It's going

15 to be a starting point, and then the estimate that we

16 end up with will have some range associated with it.

17 And then as Lee mentioned, we have some work to do on

18 quantifying the other considerations, particularly in

19 the seismic area. We have some water hammer scenarios

20 that we're looking at that may provide some

21 contribution. That's basically all I have.

22 VICE CHAIRMAN WALLIS: This isn't a

23 continuum, is it? There are pipe sizes of all ranges

24 - you get to big pipes, there's only certain sizes

25 which are there, so if you have a curve, you have to

1 decide where is the cut-off in terms of what is really
2 there.
3 MR. CHOKSHI: Yes. I think when Brian
4 Sheron was discussing is there a plant-specific
5 features or plant features which limits you or which
6 makes sense. So if you come to —
7 VICE CHAIRMAN WALLIS: They're different
8 for each plant.
9 CHAIRMAN BONACA: But you could have
10 intermediate breaks of some type that are non-
11 guillotine breaks. Right?
12 MR. CHOKSHI: Yes. I think the idea is
13 once you pick the break size and it will be applied as
14 if we are a design-basis currently being applied.
15 VICE CHAIRMAN WALLIS: So you could have
16 a partial break then. Is that what —
17 MR. CHOKSHI: I think the current
18 requirements - and Gary can —
19 MR. HAMMER: Yes. Essentially, that's
20 correct. For the transition break size, you would
21 apply that basically anywhere in the reactor coolant
22 system so that you've got the worst location.
23 VICE CHAIRMAN WALLIS: Did the experts do
24 this? Didn't they just look at actual full breaks of
25 the pipe? Isn't there the possibility of a 40 inch

1 pipe breaking with a 20 inch hole in it? Did they
2 look at that?
3 MR. CHOKSHI: Yes, they did look at the
4 radius of the pipe —
5 VICE CHAIRMAN WALLIS: They looked at a
6 whole spectrum of —
7 MR. CHOKSHI: But then if I remember
8 right, for the smaller pipes where the full breaks, I
9 don't remember, but they looked at those questions,
10 and there were some insights for getting —
11 MEMBER SHACK: What they did find was you
12 are much more likely to get a break of a 4 inch pipe
13 than you were to get the equivalent of a 4 inch hole
14 in a 22 inch diameter pipe. You're almost always
15 dominated by the pipe break of the smallest pipe that
16 gave you that size. And that's not unreasonable,
17 again if you look at those kind of fracture mechanics
18 documents.
19 MR. ABRAMSON: Okay. I just have two more
20 slides to finish this. First, the remaining work and
21 schedule. As I earlier said, we are doing this
22 external review to confirm the elicitation analysis.
23 The schedule is to complete it by August 31st, and
24 that will depend, I guess, on whether we can get all
25 the contractual arrangements in place. I think we're

1 on track for that at this point.

2 We're planning to have a panel meeting on

3 the first week in August, and then to get immediate

4 feedback, instant feedback from the panel so we have

5 an idea of where they're going, and then to ask them

6 for a written report by the end of August.

7 Then finishing the NUREG report, we've

8 completed doing that report. It was mailed out last

9 Friday to the panel members, so we're having a review

10 meeting with the expert panel. There's some video

11 conferencing on July 20-21. Then we're applying a

12 draft for NRR review August 6th, in about a month.

13 Then we will have the results of the external review,

14 and also NRR comments, and we'll incorporate that into

15 the NUREG by the end of September, available for your

16 review about a week later, October 4th. And then

17 incorporate the ACRS comments November 30th. And then

18 finally available for public dissemination under the

19 rule. We're trying to be consistent with the SRM in

20 December, so this is our current work remaining and

21 the schedule.

22 And just to conclude with a few remarks -

23 the frequency estimates can be sensitive to the method

24 used to analyze the panelists' input. And the key

25 elements that they are most sensitive to are the over-

1 confidence adjustment and the estimate of group
2 opinion; that is, how we go about aggregating the
3 results.
4 Our whole approach with our conceptual
5 methodology for the risk-informing, it was consistent.
6 We tried to make it consistent with the previous risk-
7 informed practice and policy. I said this, we just
8 adapted the particular elicitation procedure from
9 other things which have been done, both for NRC work
10 and elsewhere. And we still need to do some work to
11 finalize the selection criteria. In a sense, we're
12 doing a lot of study. We have the baseline, we have
13 the sensitivity results. And it's going to be up to
14 ultimately NRR to choose to see which of these they're
15 going to use as the basis for the proposed rule. And
16 I said, we're doing this all in parallel with the
17 proposed rule development. So that's -- anybody has
18 any further questions, I'll try to respond to them.
19 MEMBER SHACK: Well, we're running a
20 little late so it's back to you, Mr. Chairman.
21 CHAIRMAN BONACA: I thought we had also
22 some representative of nuclear industry may want to
23 provide some --
24 PARTICIPANT: No.
25 CHAIRMAN BONACA: None? Okay. Well,

1 thank you, and we'll take a break now and be back at
2 20 of 5. We don't need the transcript any more.
3 We're going to be off the record now.
4 (Whereupon, the proceedings in the above-
5 entitled matter went off the record at 4:25 p.m.)
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on Reactor Safeguards 514th Meeting

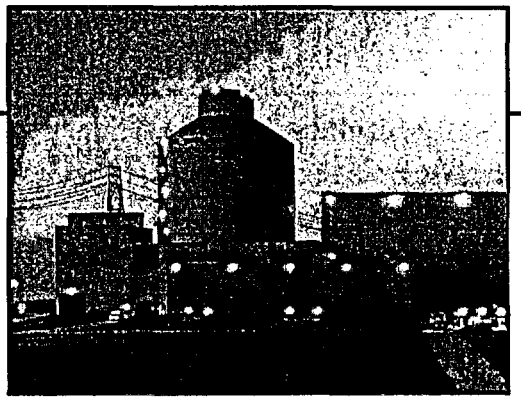
Docket Number: n/a

Location: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Rebecca Silberman

Rebecca Silberman
Official Reporter
Neal R. Gross & Co., Inc.



AP1000 Safety

Westinghouse Electric Company

Presentation to

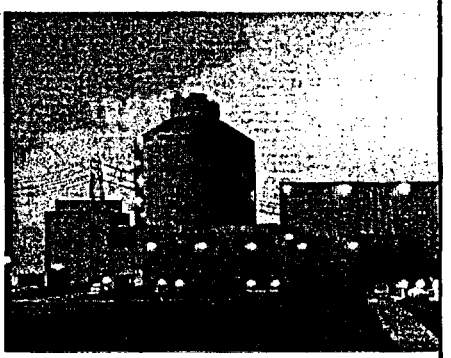
Advisory Committee on Reactor Safeguards

July 7, 2004

BNFL Westinghouse

AP1000 Safety

- AP1000 Comfortably Meets NRC Regulations and Industry Safety Standards
  - **Both deterministic and probabilistic**



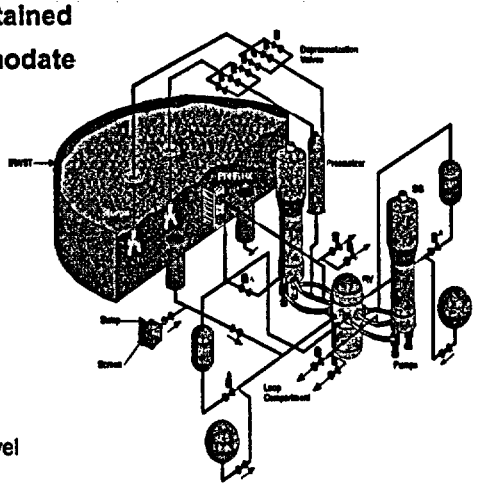
AP1000 Approach to Safety

- **Passive Safety-Related Systems**
  - Use "passive" process only, no active pumps, diesels, ...
    - One time alignment of valves
    - No support systems required after actuation
      - No AC power, cooling water, HVAC, I&C
  - Greatly reduced dependency on operator actions
  - Mitigate design basis accidents without nonsafety systems
  - Meet NRC PRA safety goals without use of nonsafety systems
- **Active Nonsafety-Related Systems**
  - Reliably support normal operation
    - Redundant equipment powered by onsite diesels
  - Minimize challenges to passive safety systems
  - Not required to mitigate design basis accidents

BNFL Westinghouse

AP1000 Passive Core Cooling System

- **AP600 System Configuration Retained**
- **Capacities Increased to Accommodate Higher Power**
  - PRHR HX capacity increased
    - Larger pipe, more/longer tubes
  - CMT volume & flow increased
  - ADS 4 flow increased
    - Larger pipe/valves
  - IRWST injection flow increased
    - Larger pipe/valves
  - Cont. recirc. flow increased
    - Larger pipe/valves, higher flood level
- **System Performance Maintained**



BNFL Slide 4 Westinghouse

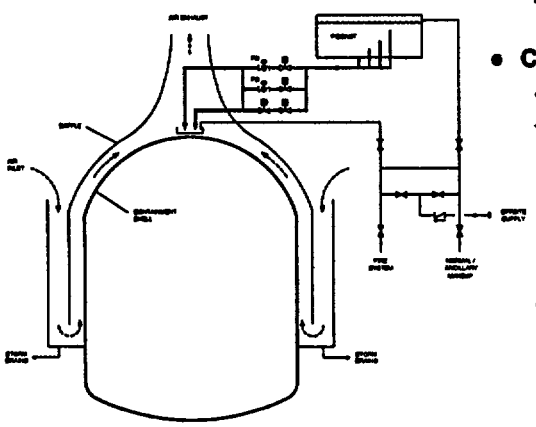
AP1000

Containment Recirc Debris

- **AP1000 Has Robust Containment Recirc Design**
  - Delayed recirc (typically 5 hr), deep flood levels (>10' above screen)
  - Low velocities in containment pools and at screen face
  - No spray to wash down containment surfaces and increase velocities
  - Tall recirc screens (10-13') located well above floors (2')
  - Horizontal plates located just above recirc screens
  - Folded screen designs with large surface area (140 ft2 ea)
  - Cross-connected recirc screens so both always operate
  - Metal reflective insulation used in LOCA blowdown damage zone
  - High density, nonsafety coatings used inside containment
- **COL Item Requires Cleanliness Program to Limit Debris**
- **COL Item Addresses Anticipated New Information**
  - Site specific resident debris data and chemical corrosion test results

AP1000

Passive Containment Cooling

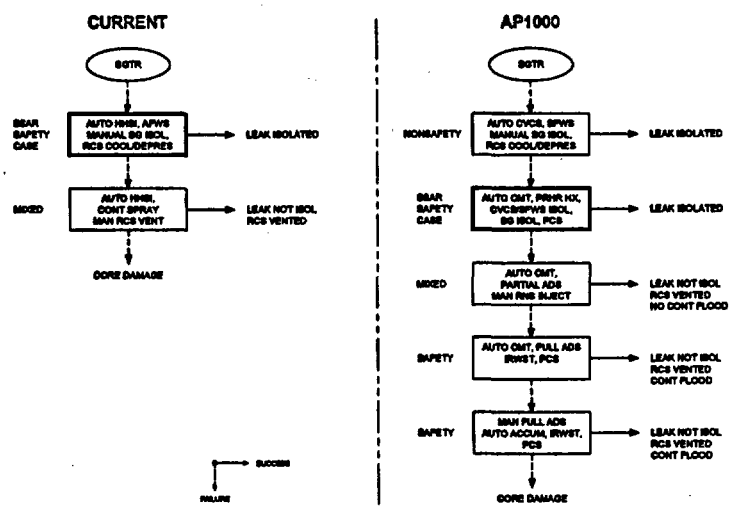


- **Same Configuration as AP600**
  - Except added 3rd diverse valve
    - Addresses T&H uncertainty air cooling
- **Capacities Increased**
  - Containment volume & design pres
  - PCS Water Storage Tank
    - Provides 72 hr drain
      - Afterwards use on/offsite water
      - Air only cooling prevents/delays failure in PRA sequences
    - Flow decreases with time
      - Uses 4 standpipes
  - PCS Flow Rates
    - Same high initial flow
      - Rapidly forms water film
      - Effectively reduces cont pressure
    - Later flows increased
      - Match decay heat

AP1000 Safety Margins - deterministic

	Typical Plant	AP600	AP1000
• Loss Flow Margin to DNBR Limit	~ 1 - 5%	~16%	~19%
• Feedline Break (°F) Subcooling Margin	>0	~170	~140
• SG Tube Rupture	Operator actions required in 10 min	Operator actions NOT required	Operator actions NOT required
• Small LOCA	3" LOCA core uncovers PCT ~1500°F	< 8" LOCA NO core uncovery	< 8" LOCA NO core uncovery
• Large LOCA (°F)	2000 - 2200	1676	2124
• ATWS, Pres (psig) UET (% core life)	3200 5-10%	3200 10%	2800 0%

AP1000 Has More Levels of Defense (SG Tube Rupture Example)



AP1000 CDF and LRF Summary

- **Meets US NRC Safety Goals with High Margin & Low Uncertainty**
  - Demonstrates effectiveness of passive safety features
    - Reduced dependency on operator actions and nonsafety features
    - Low safety risk from floods and fires
  - Severe accidents addressed by design

	Core Damage Frequency		Large Release Frequency	
	At-Power	Shutdown	At-Power	Shutdown
Internal Events	2.41E-07 /yr	1.23E-07 /yr	1.95E-08 /yr	2.05E-08 /yr
Internal Floods	8.80E-10 /yr	3.22E-09 /yr	7.10E-11 /yr	5.40E-10 /yr
Internal Fires	5.61E-08 /yr	8.52E-08 /yr	4.54E-09 /yr	1.40E-08 /yr
Sub-Totals	2.98E-07 /yr	2.11E-07 /yr	2.41E-08 /yr	3.50E-08 /yr
Grand-Totals	5.09E-07		5.92E-08	
NRC Safety Goals	1 E-4		1 E-6	

Organic Iodine Production

Westinghouse Electric Company

Presentation to

Advisory Committee on Reactor Safeguards

July 7, 2004

AP1000

Organic Iodine Production (Issue #6)

- **Acidification of Steam Condensate Draining Down Containment Shell Could Lead to Increased Production of Organic Iodine**
- **AP1000 Can Accommodate Uncertainties in Iodine Production**
  - AP1000 Meets NRC Safety Goals with Significant Margin

	NRC Goal	AP1000	Ratio
Risk Prompt Fatality	5.0E-07	8.4E-11	0.02%
Risk Latent Cancer Fatality	2.0E-06	8.6E-10	0.04%

  - A small amount of CsOH maintains film pH > 7 - no dose impact
    - Only 270 g, 0.1% of available CsOH needed to neutralize acids
  - Even without any CsOH, DBA dose criteria still met
    - Independent of acid production, transport
    - Organic iodine in containment increases from 0.15% to < 0.33%
    - Largest impact is on Control Room dose
      - Dose increase < 5.6%

AP1000

CsOH Expected to Neutralize Acids

- **Severe Accident Sequence Considered**
  - 3BE-1, representative DVI LOCA with failure of 2 ADS 4 vent paths
- **Water Film Residence Times Calculated**
  - Varies from 40 to 230 sec over first 10 hr after accident
- **Additional Acid Sources Considered**
  - Nitric acid from irradiation of water containing dissolved air
  - Hydrochloric acid from cable jacket (Hypalon) degradation
- **CsI Deposition Calculated**
  - Varies over first 10 hr after accident
  - Deposition essentially complete in this time period
- **Small Amount of CsOH Would Neutralize This Acid**
  - 270 g or 0.1% of available CsOH would raise pH > 7
  - Would prevent production of additional elemental / organic iodine
- **No Dose Impact**

Without CsOH, Dose Impact Small

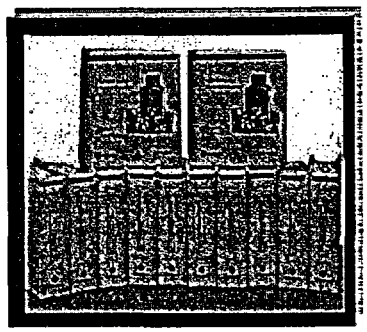
- **All Iodine Transported to Containment Water Film is Assumed to Instantly Become Elemental Iodine**
  - Acid production / transportation are unimportant
- **Elemental Iodine is Assumed to Instantly Partition into Aqueous / Gaseous Concentrations Based on the Water Film Temperature**
  - Water film is conservatively assumed to be saturated, maximizes I_2 gas
- **3% of Elemental Iodine in Containment Atmosphere is Converted into Organic Iodine**
  - Organic iodine increases from 0.15% to < 0.33%
- **Impact on Doses is Accommodated by Margins to Limits**

Site Boundary	24.7 rem increases to < 24.71 rem
LPZ	22.8 rem increases to < 23.16 rem
Control Room	4.8 rem increases to < 5.07 rem

AP1000 Design Certification Nearing Completion

Past Milestones	Target Schedule	
1. W Submits Application	3/28/02	☑
2. Staff Issues Requests for Additional Info (RAI)	9/30/02	☑
3. W Provides Responses to All RAI's	12/2/02	☑
4. NRC Identifies Potential Open Items	2/28/03	☑
5. W Addresses Potential Open Items	4/15/03	☑
6. NRC Issues Draft Safety Evaluation Report	6/16/03	☑

Future Milestones	NRC Target
7. NRC Issues Final SER	September 2004
8. NRC Issues Final Design Approval	September 2004
9. NRC Issues Design Certification	August 2005



AP1000 Review Status

July 7, 2004

ACRS Full Committee Meeting

John Segala, Senior Project Manager
Office of Nuclear Reactor Regulation

Purpose

- Provide overview of the staff's review
- Provide current status of the AP1000 project
- Discuss major schedule milestones
- Discuss two ACRS interim letter issues

Previous Review Milestones

- March 2002 - Completed pre-application review
- March 28, 2002 - Westinghouse (W) submitted DC application
- June 25, 2002 - NRC accepted the application for docketing
- June 16, 2003 - NRC issued DSER with 174 Open Items
- May 18, 2004 – NRC provided responses to the issues in the ACRS interim letter
- May 25, 2004 – Sent advanced copy of FSER to ACRS

Past ACRS Meetings

Subcommittee Meetings

Thermal Hydraulic Phenomena
5 Meetings
March 2001- February 2004

Future Plant Designs
3 Meetings
February 2002 - June 2004

Reliability and Probabilistic Risk Assessment
1 Meeting
January 2003

Full Committee Meetings

9 ACRS Meetings

August	2000 (Pre-Application)
April	2001 (Pre-Application)
March	2002 (Pre-Application)
November	2002
February	2003
April	2003
October	2003
March	2004
June	2004
July	2004

Remaining Schedule Milestones

- July 17, 2004 – ACRS issues final letter
- August 6, 2004 – Division Directors Concurrence
- August 13, 2004 – OGC no legal objection
- August 30, 2004 - EDO memo to Commission w/FSER/FDA attached
- September 13, 2004 – FSER/FDA issued
- December 2005 – Final Design Certification Rule issued

Principal Contributors

Andruszkiewicz, Edward
Attard, Anthony
Bagchi, Goutam
Bajorek, Stephen
Barss, Daniel
Basu, Sudhamay
Bedi, Gurjendra
Behbahani, Ali
Bloom, Steve
Bongarra, James
Brown, Leta
Burkhart, Lawrence
Chang, Kenneth
Cheng, Thomas
Cheruvenki, Ganesh
Chiramal, Matthew
Colaccino, Joseph
Colpo, Sarah
Coyne, Kevin
Cubbage, Amy
Cullison, David
Drozd, Andrzej
Duvigneaud, Dylanne
Elliot, Barry
Fields, Leslie
Forrest, Edwin
Galletti, Greg
Georgiev, George
Gordon, Dennis
Graham, Christopher
Grubelich, Francis
Harbuck, Charles
Hart, Michelle
Harvey, Robert
Hinson, Charles
Hsii, Yi-Hsiung
Iqbal, Naeem
Jackson, Diane
Jensen, Walton
Karwoski, Kenneth
Keim, Andrea
Khanna, Meena
Kim, James
Lauron, Carolyn
Lee, Richard
LeFave, William
Lehning, John
Li, Chang-Yang
Li, Hulbert
Liang, Chu-Yu
Lois, Lambros
Lobel, Richard
McIntyre, Richard
Medoff, James
Mensah, Tanya
Mitchell, Matthew
Murphy, Emmett
Musico, Bruce
Palla, Robert
Parczewski, Krzysztof
Pettis, Robert
Pohida, Marie
Pulsipher, James
Quinones-Navarro, Lauren
Raval, Janak
Rivera-Varona, Aida
Rogers, Billy
Saltos, Nicholas
Scott, Michael
Scott, Wayne
Sebrosky, Joseph
Segala, John
Sekerak, Patrick
Sheng, Chia-Fu (Simon)
Shukla, Girija
Shum, David
Snodderly, Michael
Starefos, Joelle
Steingass, Timothy
Sullivan, Edmund
Sun, Summer
Talbot, Frank
Tardiff, Albert
Throm, Edward
Trehan, Narinder
Unikewicz, Steven
Walker, Harold
Ward, Leonard
Wilson, Jerry
Wu, Shih-Liang

Contractors

- Brookhaven National Laboratory
  - Mechanical and Civil/Structural Engineering
- Carl J. Costantino Engineering Consultants
  - Structural and Earthquake Engineering
- Energy Research, Inc.
  - Severe Accidents
- Information Systems Laboratories, Inc.
  - RELAP5 Input Development
- Sandia National Laboratory
  - Aerosol Removal

RAIs

- We issued 742 RAIs
  - General - **3**
  - Mech. Eng - **70**
  - Structural Eng. - **19**
  - Seismology - **23**
  - Hydrol. and Meteor - **5**
  - Geotech. Eng. - **3**
  - Inservice Inspection - **3**
  - Component Integrity - **29**
  - Materials Application - **12**
  - QA and RAP - **8**
  - Emergency Preparedness - **3**
  - Containment Systems - **11**
  - Technical Specifications - **53**
  - ITAAC - **1**
  - Initial Test Program - **18**
  - Fire Protection - **11**
  - Chemical Technology - **4**
  - Auxiliary Systems - **22**
  - Instrumentation & Controls - **48**
  - Electric Power - **15**
  - Reactor Systems - **189**
  - Meteorology - **8**
  - Effluent Treatment - **11**
  - Radiological Impact - **13**
  - Radiation Protection - **11**
  - Human System Int. - **44**
  - PRA - **99**
  - Generic Issues - **6**

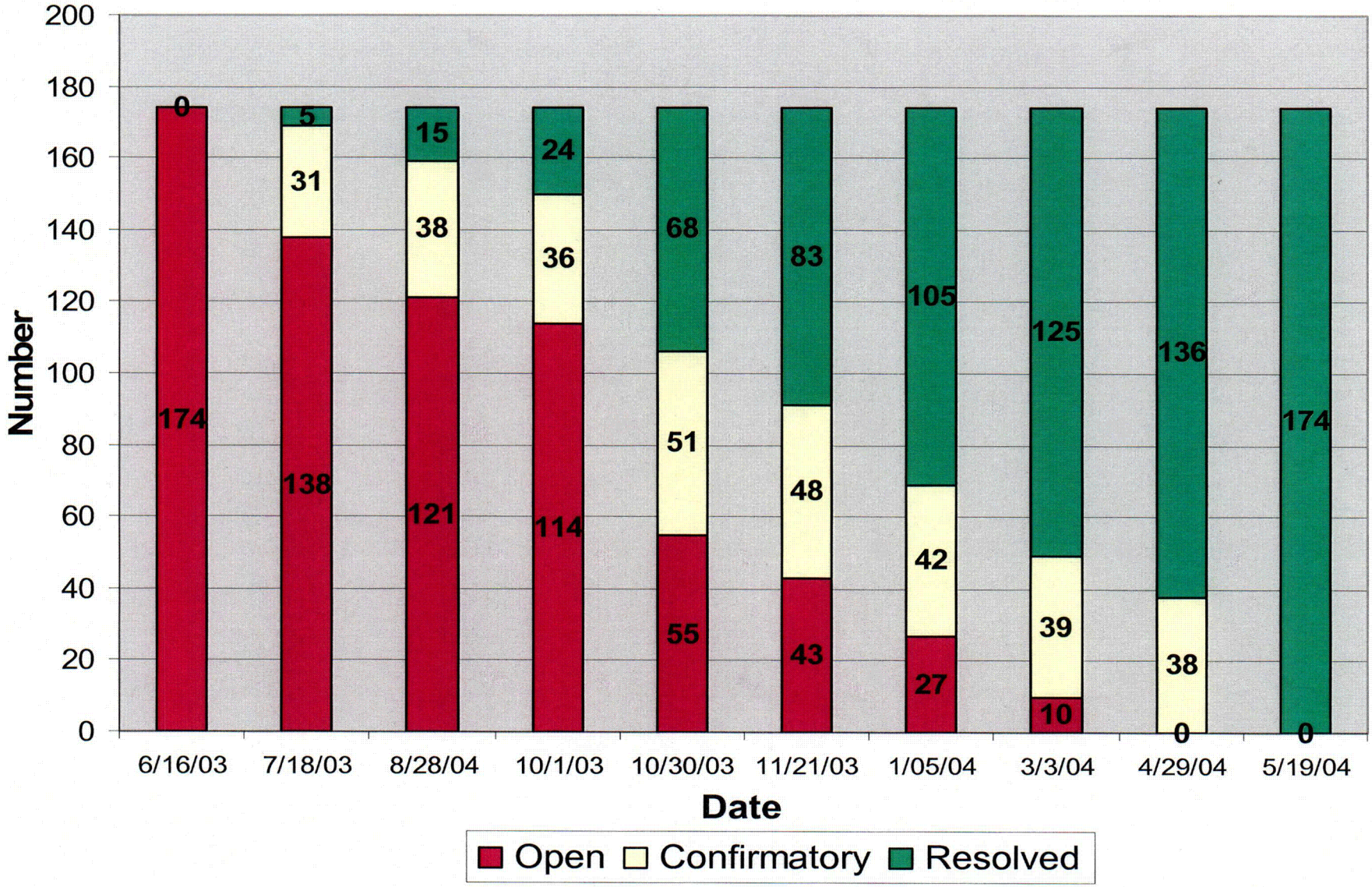
DSER Open Items

174 Open Items

- (as compared to over 1300 for AP600 DSER)

- Chapter 1 (Introduction) - - - - - - - - - - - - - - 3
- Chapter 2 (Site Envelope Char) - - - - - - - - - 6
- Chapter 3 (Structures, Comp., Equip.) - - - 30
- Chapter 4 (Reactor) - - - - - - - - - - - - - - - - - 3
- Chapter 5 (Reactor Coolant System) - - - - 3
- Chapter 6 (Engineered Safety Features) - - 9
- Chapter 7 (I & C) - - - - - - - - - - - - - - - - - - - 0
- Chapter 8 (Electric Power Systems) - - - - - - 1
- Chapter 9 (Auxiliary Systems) - - - - - - - - - - 7
- Chapter 10 (Steam and Power Conv.) - - - - 3
- Chapter 11 (Radioactive Waste Man.) - - - - 0
- Chapter 12 (Radiation Protection) - - - - - - 0
- Chapter 13 (Conduct of Ops) - - - - - - - - - - 3
- Chapter 14 (Verification Progs) - - - - - - - - 43
- Chapter 15 (Transient & Acc. Anal.) - - - - - 6
- Chapter 16 (Technical Specs) - - - - - - - - - 3
- Chapter 17 (Quality Assurance) - - - - - - - - 5
- Chapter 18 (Human Factors) - - - - - - - - - - 7
- Chapter 19 (Severe Accidents) - - - - - - - - 36
- Chapter 20 (Generic Issues) - - - - - - - - - - 2
- Chapter 21 (Testing & Comp Code Eval.) - - 4
- Chapter 22 (RTNSS) - - - - - - - - - - - - - - - - - 0
- Chapter 23 (Review by the ACRS) - - - - - - 0
- Chapter 24 (Conclusions) - - - - - - - - - - - - 0

AP1000 DSER Open Item Status



C01

ACRS Interim Letter Issues

- Issue 1 - Automatic Depressurization System (ADS)-4 Squib Valve Function
- Issue 2 - Assurance of Long-Term Cooling (Strainer Blockage)
- Issue 3 - Code Deficiencies
- Issue 4 - Range of Pi-Group Values
- Issue 5 - In-Vessel Retention/Fuel-Coolant Interactions
- Issue 6 - Organic Iodine Production
- Issue 7 - Catastrophic Failure of the Steel Containment

Issue 2 - Assurance of Long-Term Cooling (Strainer Blockage)

- <u>ACRS Interim Letter Issue</u>:
  - AP1000 is a robust design to prevent screen blockage.
  - ACRS recommended ITAAC to ensure compliance with GSI 191
- <u>Staff Conclusion</u>:
  - Robust design which is less susceptible to debris blocking of the screens
  - Regulatory process exists to address significant adverse findings from continuing resolution of GSI-191

Open Items

- <u>6 DSER open items related to</u>:
  - Debris loading of IRWST screens and recirculation screens
  - Debris through reactor coolant system break
  - Chemical effects

Robust Screen Design

- Recirculation screen robust design to prevent screen blockage
  - Folded screen design with large surface area (140 ft^2)
  - Cross-connection pipe between the two recirculation screens
  - Tall recirculation screens (10 ft and 13 ft)
  - Bottom of recirculation screens 2 ft above the floor
  - Horizontal steel plates (10 ft in front and 7 ft to its side) located above recirculation screens
  - Screens protected by a trash rack
  - Low transport velocities in containment pool
  - Low flow velocities at the screen surface

Robust Screen Design (cont.)

- No safety-related containment sprays
- Metal reflective insulation used in LOCA blowdown damage zone (20/45 inside pipe diameters)
- High density, nonsafety coatings used inside containment
- Long time (up to 5 hours) before recirculation
- Deep containment floodup levels (~ 25 ft)
- Water level at beginning of recirculation is about 10 ft above top of recirculation screens (i.e. floating debris will be clear of screens)
- Backflow initially through recirculation screens due to higher water level in IRWST

ITAAC

- ITAAC verifies as-built screen design
  - location of the plates above containment recirculation screens
  - screen surface area
  - location of bottom of containment recirculation screens
  - type of insulation
  - dry film density of the coatings

COL Action Items

- COL applicant will develop a containment cleanliness program to limit debris
- COL applicant will perform an evaluation consistent with RG 1.82, Rev. 3 to confirm adequate long term cooling
  - Site specific resident debris
  - Post accident water chemistry
  - Applicable research and testing

NRC Review

- Staff review based on current state of knowledge
- Staff plans to:
  - Issue FSER and FDA on September 13, 2004
  - Complete design certification rulemaking by December 2005
  - Complete GSI 191 by December 2007

NRC Regulatory Change Process

- If new information is identified post FDA
  - Pre-design certification rulemaking:
    - 10 CFR Part 52, Appendix O, Item 5 and 10 CFR 50.109
      - Adequate protection, or
      - Compliance backfit
    - COMSECY 94-003
  - Post-design certification rulemaking/pre-COL:
    - Generic Backfit – 10 CFR 52.63(a)(1)
      - Adequate protection, or
      - Compliance backfit
  - Post-COL application:
    - Plant Specific Orders - 10 CFR 52.63(a)(3)
      - Adequate protection, or
      - Compliance backfit, and
      - Special Circumstances

Screen Design Conclusion

- Robust design which is less susceptible to debris blocking of the screens
- Regulatory process exists to address significant adverse findings from continuing resolution of GSI-191

Issue 6 - Organic Iodine Production

- <u>ACRS Interim Letter Issue</u>:
  - Water film pH determines iodine behavior
    - pH < 7 leads to production of elemental iodine some of which is subsequently converted into organic iodine
    - To prevent organic iodine production the film pH should be maintained above 7

Organic Iodine Production (cont.)

- W calculations determined:
  - Film pH is maintained above 7, assuming the amount of CsOH present in the DBA source term
  - A minimum of 270 g of CsOH (0.1% of available CsOH) is sufficient to keep pH above 7
  - The DBA dose criteria still met, even if assume no CsOH present
    - Increased amount of assumed organic iodine in containment from 0.15% to 0.33%
- Staff audited W calculations
  - Staff found the calculations to be acceptable
  - Staff agreed with W conclusions

AP1000 Summary

- All DSER open items resolved
- All ACRS issues addressed
- NRC staff still on schedule to issue FSER by September 13, 2004
- Questions or comments?

Background Slides

COL Action Items

- DCD Section 6.3.8.1, "Containment Cleanliness Program"
  - The Combined License applicants referencing the AP1000 will address preparation of a program to limit the amount of debris that might be left in the containment following 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 COL item 6.3.8.2.

COL Action Items (cont.)

- DCD Section 6.3.8.2, "Verification of Water Sources for Long-Term Recirculation Cooling Following a LOCA"
  - The Combined License applicants referencing the AP1000 will perform an evaluation consistent with Regulatory Guide 1.82, revision 3, to demonstrate that adequate long-term core cooling is available considering debris resulting from a LOCA together with debris that exists before a LOCA.
  - As discussed in DCD subsection 6.3.2.2.7.1, a LOCA in the AP1000 does not generate fibrous debris due to damage to insulation or other materials included in the AP1000 design.
  - The evaluation will consider resident fibers and particles that could be present considering the plant design, location, and containment cleanliness program.
  - The determination of the characteristics of such resident debris will be based on sample measurements from operating plants.
  - The evaluation will also consider the potential for the generation of chemical debris (precipitants).
  - The potential to generate such debris will be determined considering the materials used inside the AP1000 containment, the post accident water chemistry of the AP1000, and the applicable research/testing.

Date: July 8, 2004

From: Susan G. Sterrett SG Sterrett
To: ACRS Members
John P. Segala, AP1000 Project Manager
James E. Lyons, Program Director, New, Research & Test Reactors Program

Subject: **NRC Response to Concerns About AP1000 Design Certification**

In Letter "Response to Concerns About the AP1000 Design Certification" from James E. Lyons to me, dated April 20, 2004, the NRC responded to questions I had raised in earlier communications ("Heat of Solar Radiation and AP1000 Ultimate Heat Sink" dated July 31, 2003; "AP1000 Fluid Systems Design and QA Procedures", dated July 30, 2004, and in several ACRS meetings).

The occasion for this memo is the last ACRS meeting at which the AP1000 design certification application will be discussed prior to the expected Final Design Approval, to be held July 8, 2004. Attached is a summary table showing the question I asked, the NRC response in Mr. Lyons's letter, and my comments as to issues that I feel were not adequately answered.

Mr. Lyons's letter directed me to reply to Mr. Raj Anand, AP1000 Project Manager, should I have questions on the NRC response in his letter. Mr. Anand is no longer associated with the project, but I have discussed the contents of the NRC's letter, and the general points I make in the attached summary, with Mr. John P. Segala (AP1000 Project Manager) of the NRC staff.

At the time of this writing, neither the AP1000 Safety Evaluation Report prepared by the NRC staff, nor the transcript of the June 25th ACRS Subcommittee on Future Plant Designs (which was dedicated to the AP1000 design), are publicly available, so the attached summary was written without being able to refer to them. I have been informed that the AP1000 Safety Evaluation Report will not be publicly available until after FDA (Final Design Approval) is granted.

A.	**HEAT OF SOLAR RADIATION** *"Whether and, if so, how , heat of solar radiation is taken into account in design of AP1000 Passive Containment Cooling System :* *(i) temperature of concrete building, whose walls form air passages used for cooling,* *(ii) temperature of PCS water tank.* *...Noticed site parameters do not include geographical latitude."*		
	Question Asked In Letter: Sterrett to ACRS 7/30/03	**NRC Response Lyons to Sterrett 4/20/04**	**Status**
	(i) Is Effect of Solar Heat Load On Concrete Building (concrete wall temps.) Accounted for in Analysis?	Answer did not address effect on concrete wall temps.	Question not addressed.
	(ii) Is Effect of Solar Heat Load on Passive Containment Cooling System Water Temperature Considered?	-- Judged "negligible" due to large tank volume. (p. 4) -- "TS requirements & actions taken will bound any possible solar radiation effects." (p. 5)	Not enough info (publicly) available to evaluate this brief response. Seems answer should cite values of relevant parameters used, such as site latitude. Question is: Whether plant able to operate and stay within TS limits for sites with high heat of solar radiation (not whether TS's exist that will ensure plant shutdown if temperature limit exceeded.) NRC design cert. means plant operable and safe w/in site parameter envelope. (In summer, when solar radiation is high, people's lives depend on electricity for air conditioning, so response should address climactic conditions for which plant is designed to be operational, not appeal to TS's requiring shutdown.)

B.	**FLUID SYSTEM DESIGN** *"Whether NRC asks for proof that the various fluid system parameters reported in the AP1000 design certification application (and used in the [safety] analyses & evaluation) are actually justified by a detailed [fluid sytsem performance] design?"*		
	Question Asked In Letter: Sterrett to ACRS 7/31/03	**NRC Response: Lyons to Sterrett 4/20/04**	**Status**
	(i) Have signed-off fluid system performance calculations been done?	No, not expected due to Westinghouse approach of using DAC. (p. 3)	Answer is based on a misunderstanding -- fluid system performance is <u>not</u> one of specified areas to be addressed by DAC. (Thus, req't. that DCD submittal is to include level of detail corr. to stage of operating license (except for: site-specific info, details covered by DAC in specified areas, etc.), is not met. This req't. is one of most basic elements of Part 52 approach to design certification. It is a requirement that it be done before FDA granted.)
	(ii) Have "L/D criteria" for systems [other than primary safety systems] been generated to ensure fluid system performance criteria exist?	--- NRC will verify calculations through "appropriate use of ITAAC of design & construction activities." (p. 3) --- NRC will review adequacy of licensee design engineering during construction phase (p. 2)	-- ITAACS are supposed to provide check on as-built design, not eliminate need for basic system design prior to FDA milestone. -- Turning back clock to unsatisfactory pre-TMI situations. Kemeny commission cited dangers of licensing process wherein NRC attention is on primary safety systems and problems found at late stage require design changes, when economic & political pressures not to change are great.

C.	**DESIGN CONTROL** *(specific questions listed below)*		
	Question Asked in Letter: Sterrett to ACRS 7/30/03	**NRC Response Lyons to Sterrett 4/20/04**	**Status**
	For AP600 documents referenced in design cert. submittal, who decides/ what process used to determine/declare applicable to AP1000?	--- Westinghouse has stated that continuous QA program spanning AP600 and AP1000 has been used. (Westinghouse's QMS) NRC reviewed QMS in 1996 for conf. w/ 10CFRAppB (p. 3) --- AP1000 was derived from AP600 design. AP1000 project-specific design control process specified all documents generated for AP1000 design subject to independent review. (p. 4)	Answer describes design control only for <u>new</u> documents generated for AP1000. ---Does not describe process of comprehensive review to determine which things need to be changed in deriving AP1000 from AP6000. ---Does not address QA control over claims in DCD that AP600 documents apply to AP1000 design. (Exs.: topical reports such as Adverse Interaction Report) -- Does not answer question of existence of process by which changes are communicated to affected technical groups for implementation in rest of affected design documents.
	What was process for generating overall plant parameters for AP1000?	--- AP1000 not an uprating of AP600. --- NRC prepares SER for AP1000, and NRC review of AP1000 is independent of AP600; "scope and contents of [design cert.] application equivalent to level of detail found in an FSAR for current operating plant. (p.2)	Since SER will not be publicly available until <u>after</u> FDA (Final Design Approval) granted, cannot tell now if NRC review addressed question in some manner. Can say now: Would seem that the question of how all of plant parameters are interrelated (e.g., consistency of plant heat balances w/ plant systems parameters & site parameter envelope) should figure in NRC review.

Risk-Informing 50.46 ECCS Acceptance Criteria

Briefing for ACRS Full Committee

Brian Sheron, ADPT/NRR

July 07, 2004

Background

- June 99 SRM directed staff to determine how best to proceed with risk-informing Part 50
- June 99 thru March 03 staff performed feasibility studies and technical analyses
- March 03 SRM directed staff to propose a rule providing a risk informed alternative maximum break size for LBLOCA in 12 months
- SECY-04-0037- Staff requested additional policy guidance on alternative break size rule

Staff Actions Pending SRM

- Formed inter-office Steering Committee
  - NRR (Lead), RES, OGC, NSIR
    - Meets weekly to provide guidance and resolve key issues
- Established Division leads for key tasks
  - Break size definition
  - LOCA and PRA success criteria
  - Rule framework
  - Assessment of impacts and potential consequences
  - PRA quality and scope requirements
  - Adequacy of RG 1.174 guidance
  - Security impacts

Staff Actions (con't)

- Established streamlined schedule for rulemaking
  - Meeting with ACRS Full Committee in July and in Fall
    - Several subcommittee meetings also expected
  - Federal Register Notice to be issued early July will discuss conceptual outline and summary description of rule
  - One public meeting for regulatory analysis inputs (July 26th)
  - Package to EDO November 30th
  - Package to Commission December 15th
  - Requesting CRGR waiver of draft rule review

SRM on SECY-04-0037

- Selection of max break size should use RG 1.174 approach, initiating event frequencies from expert elicitation process, and other relevant information
- Allow operational, as well as, design changes
- Restrict changes where engineering margins are necessary to meet RG 1.174 principles or security considerations
- Mitigation of LOCA up to DEGB should be required and changes to this capability should be controlled by regulation, commensurate with risk

SRM on SECY-04-0037 (con't)

- Backfit analyses should not be required to reverse changes needed to maintain compliance
- Use of BE codes should be encouraged, but not required
- Pursue requirements for future plants separately
- Review BWROG pilot exemption before including LOCA/LOOP in rulemaking
- Provide proposed rulemaking package in 6 months

Rule Concept

- Rule will divide break spectrum into 2 regions delineated by break size
- Region I breaks must meet all current 50.46 criteria
- Criteria and analysis assumptions for Region II breaks will be relaxed, but mitigation capability must still be demonstrated up to full DEGB

Rule Concept (con't)

- Break size delineation will be based upon frequency and other considerations
- Changes proposed to plant operations or design as a result of rule must be reviewed by the staff
- Submittals must be risk informed
  - Meet criteria of RG 1.174
  - Meet appropriate PRA quality and scope requirements

Rule Concept (con't)

- If future estimates of LOCA frequencies invalidate basis for plant changes made under the rule, the staff may require compensatory actions without formal backfit process.
- Use of the rule is voluntary

Staff Plan for ACRS Interactions

- **Meet with Full Committee on July 7th and provide high level briefing**
  - **Rule Concept**
  - **Schedule**
- **Propose Subcommittee meetings in July and September to present details**
- **Full Committee Meeting(s) in Fall**
- **Request letter**

ACRS Letter on SECY

- Supports wide range of applications if RG 1.174 criteria are satisfied
- Recommends explicit criteria for mitigative capability up to DEGB
- Recommends explicit criterion for late containment failure be included
- Recommends metric for max break size should be LOCA initiating event frequency

ACRS Letter on SECY (con't)

- Additional criteria and guidance beyond RG 1.1.74 for tracking cumulative risk are not needed
- Expert elicitation results should help provide a basis for a new maximum break size

Next steps

- Finalize conceptual basis for rule
- Federal Register Notice
  - Rule framework
  - Conceptual basis
- ACRS subcommittee on July 23rd
- Public Meeting on July 26th to gather inputs for regulatory analysis

GSI-191
Generic Letter 2004-XX

Presenters
Dave Cullison, 301-415-1212
NRR/DSSA/SPLB

ACRS Full Committee Meeting
Rockville, MD
July 7, 2004

Overview

- Purpose:
  - Obtain ACRS endorsement of GSI-191 GL 2004-XX
- Conclusion:
  - Issuance of Generic Letter 2004-XX will confirm the continued compliance with the long term cooling requirement of 10 CFR 50.46 by addressees in light of the new information coming from the efforts to resolve GSI-191

Public Comments

- Union of Concerned Scientists
- Nuclear Energy Institute
- Progress Energy, Inc
- Tennessee Valley Authority
- Westinghouse Owners Group
- Nuclear Utility Backfitting and Reform Group
- Westinghouse
- Florida Power & Light
- Duke Power
- Mr. Lanson Rogers
- Strategic Teaming and Resource Sharing (STARS)
- Dominion Resources
- State of New Jersey

Public Comment Major Issues

- Industry comments - make GL action oriented. Similar to Bulletin 96-03, which dealt with strainer clogging for BWRs
- Emphasis on Compliance
  - UCS - "The NRC must either require compliance determinations or abandon its risk-informed regulatory initiatives."
  - Industry - NRC approach it from a design basis standpoint
  - Industry - Methodology too conservative for compliance confirmation
  - Industry - Plants already comply with current licensing basis
- Backfit
  - Draft GL was not a backfit
  - Industry believes information request a backfit
- Schedule
  - Industry - timeline does not provide for enough time after issuance of letter to respond

Changes to Generic Letter

- Process
  - Purpose
  - Requested Actions/Information
  - Backfit Determination
- Upgrading licensing basis
  - Changing staff position on adequacy of current sump analyses Process:
- Compliance with of 50.46(a)(3)(ii)

Generic Letter - Purpose

- Request that addressees submit information to the NRC to confirm compliance with 10 CFR 50.46(b)(5), which requires long-term reactor core cooling, and other existing regulatory requirements listed in this generic letter. This request is based on the identified potential susceptibility of pressurized-water reactor (PWR) recirculation sump screens to debris blockage during design basis accidents requiring recirculation operation of the emergency core cooling system (ECCS) or containment spray system (CSS) and the potential for additional adverse effects due to debris blockage of flowpaths necessary for ECCS and CSS recirculation and containment drainage.

- Require addressees to provide the NRC a written response in accordance with 10 CFR 50.54(f).

Regulatory Requirements

- 10 CFR 50.46(b)(5) states "Long-term cooling. After any calculated successful initial operation of the ECCS, the calculated core temperature shall be maintained at an acceptably low value and decay heat shall be removed for the extended period of time required by the long-lived radioactivity remaining in the core."

- 50.46(a)(3)(ii) ....Any change or error correction that results in a calculated ECCS performance that does not conform to the criteria set forth in paragraph (b) of this section is a reportable event as described in §§§§ 50.55(e), 50.72 and 50.73. The affected applicant or licensee shall propose immediate steps to demonstrate compliance or bring plant design or operation into compliance with §§ 50.46 requirements.

  - An exemption from the requirement to take "immediate steps" may be necessary upon determination of noncompliance.

Generic Letter → Requested Action/Information

- Requested Action:
  - The Generic Letter is an information request only
- Within 60 days of the issuance of the guidance for performing the requested evaluation, addressees are requested to provide information regarding their planned actions and schedule to complete the requested evaluation

Generic Letter → Requested Information
Continued

- No later than September 1, 2005, provide the following information:
  - Provide confirmation that the ECCS and CSS recirculation functions under debris loading conditions are or will be in compliance with the regulatory requirements.
  - A general description of and implementation schedule for all corrective actions, including any plant modification that may be necessary to ensure compliance. 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. If all corrective actions will not be completed by December 31, 2007, describe how the delays are consistent with the 10 CFR 50.46(a)(3)(ii) requirement to take immediate steps to demonstrate compliance.

Generic Letter → Requested Information
Continued

- September 1, 2005 submittal (continued)
  - A submittal that describes the methodology that was used to perform the analysis.
  - The result of the analysis including the minimum available NPSH margin for the ECCS and CSS pumps with an unblocked sump screen
- Changes to licensing bases
  - Licensing Actions
  - Exemption Requests
- Programmatic controls for material in containment
- Provide JCO, if needed

Backfit Analysis

- Generic Letter requests information only - no backfit
- Simplified cost/benefit analysis is currently being performed at the request of the CRGR

Passive System LOCA Frequencies for Risk-Informed Revision of 10 CFR 50.46

Robert L. Tregoning
Lee Abramson
RES

Charles Hammer
NRR

Advisory Committee on Reactor Safeguards
July 7, 2004

LOCA Frequency Presentation Outline

- Presentation Objectives.
- ACRS Presentation History & Recent Program Milestones.
- Elicitation Findings.
- Sensitivity Analyses.
- Use of Results in Alternative Break Size Selection.
- Remaining Work and Schedule.
- Concluding Remarks.

Presentation Objectives

1. Communicate research conducted since the previous ACRS discussion (April 15, 2004).

2. Describe use of elicitation results in 50.46 rule development.

3. Discuss remaining technical work and schedule related to the elicitation.

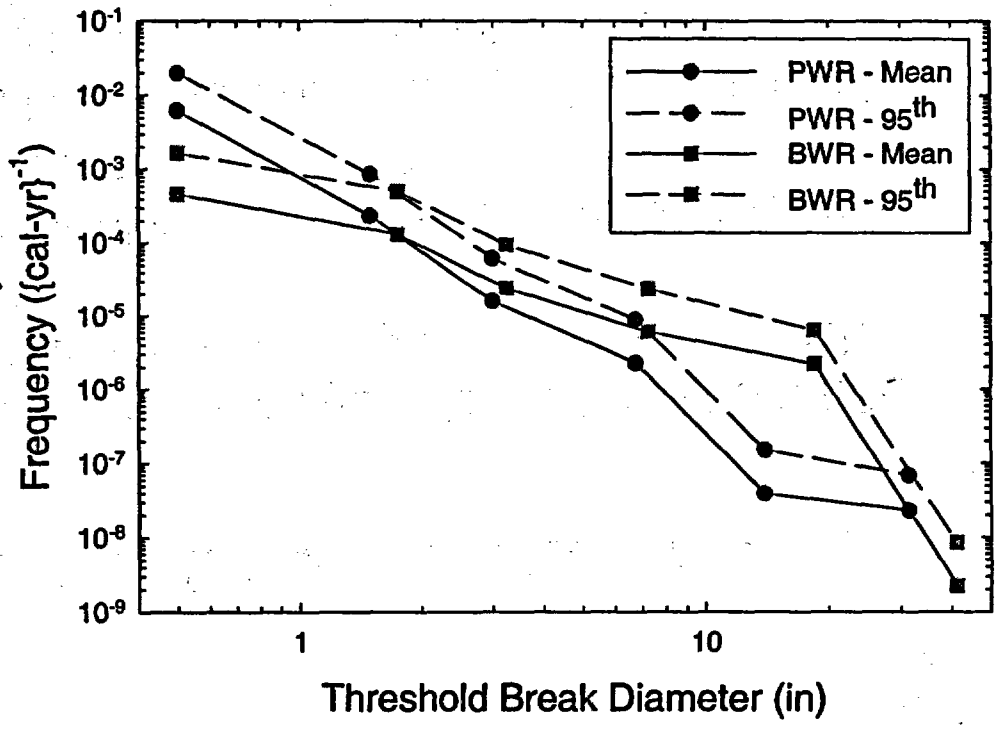
Previous ACRS Briefings and Recent Program Milestones

- Previous ACRS briefings
  - March/April, 2004: RPP Subcommittee and main committee on expert elicitation results.
  - November, 2003: RPP subcommittee on expert elicitation approach and base case development.
  - July, 2003: Main committee on the status and approach of expert elicitation.
  - May, 2002: Combined M&M, THP, R&PRA subcommittee briefing on interim LOCA frequency elicitation and LOCA break size redefinition plans.
  - June, July, November, 2001: Overviews of LOCA frequency and break size redefinition effort provided to outline its importance within 10 CFR 50.46 revision framework.
  - March, 2001: Technical issues necessitating LOCA reevaluation.

- Program milestones since April 2004
  - Completed sensitivity analyses: May 15th.
  - Preliminary NUREG report (main body) sent to elicitation panel members: July 2nd.

Total LOCA Frequencies: SECY-04-0060 Results

- BWR.
  - Decreases are gradual with LOCA size due to IGSCC concerns.
  - Only non-piping failures contribute to largest (41" effective diameter) breaks.
- PWR.
  - Smallest LOCA frequencies are high due to steam generator and CRDM concerns.
  - Non-piping frequency contributions are also important largest LOCA sizes.
- BWR & PWR expected frequencies are similar for effective break diameters between 1 and 7".
- BWR and PWR ratios between means and 95th percentiles are similar.



Summary of Important Elicitation Findings

- NRC used formal elicitation process to estimate generic BWR and PWR LOCA frequencies as a function of flow rate and operating time considering both piping and non-piping contributions.
- Developed quantitative estimates for piping and non-piping base cases which were used to anchor subsequent elicitation responses.
- Panelists provided quantitative estimates supported by qualitative rationale.
  - Determined important contributing factors (piping & non-piping systems, degradation mechanisms) governing LOCA frequencies.
  - Provided the relationships between these factors and the base cases.
- Results.
  - Relatively good agreement about important factors contributing to LOCAs.
  - Large individual uncertainty and panel variability in quantifying the frequencies associated with these contributing factors.
  - Results are similar to NUREG/CR-5750 estimates with biggest increase in medium LOCA frequency estimates.

Analysis of Elicitation Responses: Sensitivity Analyses

- Analyze the effect of different assumptions on the calculated LOCA frequency estimates to determine the full range of supportable quantitative results.
- Analysis of individual responses.
  - **Overconfidence adjustment of coverage intervals.**
  - Propagate system uncertainties variance bounds.
    - Lower bound: Independence.
    - Upper bound: Perfect correlation.
- Aggregating expert opinions.
  - Individual vs. group estimates of piping and non-piping contributions.
- Estimating group opinion.
  - **Measures of group opinion for mean, 5th and 95th percentiles.**
  - Measures of panel variability.

Estimating Group Opinion: General Philosophy

- Purpose of elicitation is to estimate the mean, 5th and 95th percentiles of the LOCA frequency distribution.
  - Group results more accurate than any single estimate.
  - Outliers should not dominate results, but should be used as a measure of panelist variability.
  - In general, principal benefit of outliers is to identify issues and variables that other panelists may not have considered.

- The group mean, 5th and 95th percentile estimates were determined in manner consistent with the structure and results of the elicitation process.
  - Panelists provided ratios relative to base cases.
  - Significant variability among panelist responses.

Estimating Group Opinion: Sensitivity Analyses

- Arithmetic mean, median, trimmed geometric mean, and geometric mean of individual results evaluated as measures of group opinion.
- Arithmetic mean results in highest frequencies.
  - Difference from other estimates is a function of the spread among panelist results.
  - Most dependent on the results of the experts with the highest frequencies.
  - Increases generally less than a factor of ten.
  - Occasionally, greater than factor of 10 difference: One high expert.
- The median, trimmed geometric mean, geometric mean values are closer to each other and consistent with the structure of the elicitation.

Analysis of Elicitation Responses: Overconfidence Adjustment

- Experts are generally overconfident about their uncertainty.
  - Demonstrated using almanac-type questions with known answers.
  - Rule of thumb: true coverage level is approximately half the nominal coverage level.
    - Nominal elicitation coverage level: 90% (95th – 5th percentiles)
    - Implication is that true coverage level is about 50% (75th – 25th percentile).
- Evaluate the effect of adjusting the nominal coverage level.
  - No change in the mid value responses
  - Broad adjustment: All responses.
    - Adjust responses to 50% coverage level.
    - Adjust responses to 60% coverage level.
  - Targeted adjustment.
    - Provide greatest adjustment for panelists with the least uncertainty.
    - Vary the adjustment of remaining panelists.
    - Three different adjustments examined.

Overconfidence Adjustment: Sensitivity Analyses

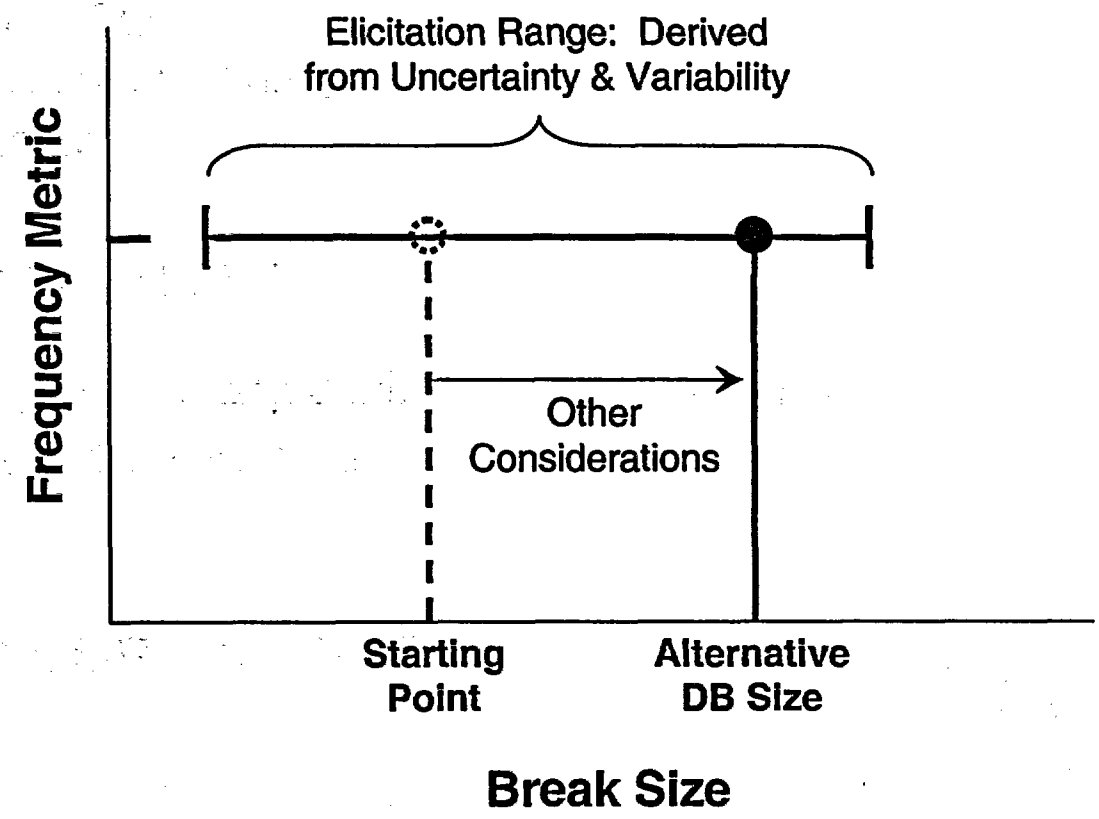
- All blanket adjustment and more conservative targeted adjustment schemes are too severe.
  - Means > 95th percentiles.
  - Unrealistically high frequencies.
- Only a modest targeted adjustment appears to be supported by the results.
  - Convert 90% coverage to 60% coverage for 4 – 5 panelists with lowest uncertainty ratios (< 10).
  - No adjustment for remaining panelists.
- Implication is that other panelists did not underestimate their uncertainty.
  - Elicitation training may have helped.
  - The relative ratio structure of the elicitation may have helped.
- Increases in SECY-04-0060 estimates due to targeted adjustment are generally less than a factor of 3.

Elicitation Results: Use in Alternative Break Size Selection

- Develop acceptable break size ranges from elicitation results.
  - Account for panel variability and individual uncertainty.
  - Consider effects of sensitivity analyses.
  - Select appropriate frequency metric (e.g. mean or 95th percentile) and criteria.
- Use elicitation results as starting point.
- Adjust break size within elicitation range using other considerations.
  - LOCA frequency sources not addressed in the elicitation.
    - Rare event loading (e.g. seismic, severe water hammer).
    - Consequential LOCA contributions (e.g. crane drops).
    - Active System LOCA contributions (e.g. seal LOCAs, ISLOCA).
  - Defense-in-depth considerations.
    - Ensure LPSI trains remain within original design basis.
    - Ensure that changes maintain plant safety & security.

Selection of Alternative Break Size

- Advantages.
  - Risk-informed approach consistent with RG 1.174 framework.
  - Maintains mitigation capability up to DEGB.
- Upcoming decisions.
  - Choose frequency metric and criteria.
  - Finalize elicitation range based on sensitivity analysis results.
  - Quantify the magnitude of the other considerations.



Remaining Work and Schedule

- Confirm elicitation analysis: external review.
  - Evaluate the processing of the elicitation input to calculate LOCA frequencies.
  - Schedule: Completion by August 31st.
- Finish NUREG report.
  - Preliminary report: completed.
  - Review meeting with expert panel: July 20 – 21.
  - Draft for NRR review: August 6th.
  - Incorporation of external review and NRR comments: September 30th.
  - Available for ACRS review: October 4th.
  - Incorporation of ACRS comments: November 30th.
  - Available for public dissemination with the proposed rule: December 2004.

Concluding Remarks

- LOCA frequency estimates can be sensitive to the method used to analyze panelists' input. Key elements are:
  - Overconfidence adjustment.
  - Estimate of group opinion.

- Developed conceptual methodology for risk-informed selection of alternative design basis break size.
  - Consistent with previous risk-informed practice and policy.
  - Work remains to finalize selection criteria.

- Technical basis document for the elicitation study is proceeding in parallel with and in support of proposed rule development.