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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

531ST MEETING - OPEN SESSION

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THURSDAY,

APRIL 6, 2006

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The meeting was convened in Room O-1G16 of One White Flint North, 11545 Rockville Pike, Rockville, Maryland, at 8:30 a.m., Dr. Graham B. Wallis, Chairman, presiding.

MEMBERS PRESENT:

GRAHAM B. WALLIS, Chairman

WILLIAM J. SHACK, Vice-Chairman

GEORGE E. APOSTOLAKIS, ACRS Member

J. SAM ARMIJO, ACRS Member

RICHARD S. DENNING, ACRS Member

THOMAS S. KRESS, ACRS Member

MARIO V. BONACA, ACRS Member

DANA A. POWERS, ACRS Member

OTTO L. MAYNARD, ACRS Member

JOHN D. SIEBER, ACRS Member-at-Large

ACRS STAFF PRESENT:
JOHN G. LAMB, ACRS Staff
JOHN T. LARKINS, Executive Director, ACRS/ACNW, Designated Federal Official
ERIC A. THORNSBURY, ACRS Staff

NRC STAFF PRESENT:
JAMES ANDERSEN, NRR/DIRS
CHRISTIAN ARGUAS, NRR/DRA
MARK BLUMBERG, NRR/DRA
K. M. CAMPE, NRR/DRA
STEVE DINSMORE, NRR/DRA
RAY GALLUCCI, NRR/DRA
DENNIS HENNEKE, NRR/DRA
MICHAEL JOHNSON, OE
RALPH LANDRY, NRR
JOSE MARCH-LEUBA, ORNL
ALEX MARION
ROBERT RADLINSKI, NRR/DRA
SUNIL WEERAKKODY, NRR/DRA

GE NUCLEAR STAFF PRESENT:
JENS ANDERSON
WAYNE MARQUINO
BHARAT SHIRALKAR

VIA TELEPHONE:
RALPH BERGER, Enercon
AL SCHNEIDER, Enercon

I N D E X

P R O C E E D I N G S

8:31 A.M.

CHAIR WALLIS: The meeting will now come to order. This is the second day of the 531st Meeting of the Advisory Committee on Reactor Safeguards. If you're wondering why it's the second day, we had a closed meeting yesterday with no transcript. So it is the second day.

During today's meeting the Committee will consider the following: Application of TRACG Code to ESBWR Stability; Hazards Analysis Associated with the Grand Gulf Early Site Permit Application and the Associated NRC Staff's Evaluation; Safety Conscious Work Environment/Safety Culture; Draft Final Regulatory Guide, "Risk-Informed,

Performance-Based Fire Protection for Existing Light Water Nuclear Power Plants and the Preparation of ACRS Reports.

A portion of this meeting may be closed to discuss General Electric proprietary information applicable to TRACG code.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Dr. John T. Larkins is the Designated Federal Official for the initial portion of the meeting.

We have received no written comments or requests for time to make oral statements from members of the public regarding today's sessions.

A transcript of portions of the meeting is being kept and it is requested that the speakers use one of the microphones, identify themselves and speak with sufficient clarity and volume so that they can be readily heard.

I will begin with some items of current interest. Mr. John Lamb, who has been with the ACRS for a year, will be leaving to join the EDO's office, as a Senior Operation's Assistant on April 10th. On behalf of the Committee, I'd like to express my appreciation for his outstanding technical support to the Committee. He reviewed numerous matters, including license renewal applications, fire protection issues, revisions to Regulatory Guides, operating plant issues and Generic Letters.

MEMBER DENNING: Do we have to let him go?

CHAIR WALLIS: Yes, well, that was what I was going to say, his dedication, hard work, professionalism and ability to identify issues in his areas of responsibility for consideration by the Committee are very, very much appreciated and thank you and good luck.

Is John here? Thank you, John.

(Applause.)

I should probably say, good luck, too.

We have some other items of interest in the handout of items of interest, you'll notice that several Commissioners have made speeches and they're listed here and also an item of interest is that Brian Sheron is going to become the Director of Research as of May 1.

We have some other personnel matters. Antonio Dias will join the ACNW staff on April 10th. He has a Ph.D. in Nuclear Engineering from the Massachusetts Institute of Technology. Were you going to say what was that or who is that? Antonio Dias, George.

Do you want to make a statement, George?

(Laughter.)

Thank you.

Antonio Dias joined the NRC in November 2001 as a Technical Reviewer in the Spent-Fuel Project Office. He was involved in the review of the software transportation and storage applications in the areas of thermal criticality and containment. He also participated in inspections of storage sites and their related procedures.

Prior to joining the NRC, Dr. Diaz worked for several years as a consultant, providing services to many U.S. utilities, as well as EPRI. His main area of expertise is the simulation of multi-dimensional time-dependent neutronic and thermal hydraulic oscillated events for light-water reactors. He was involved in validating and benchmarking most of the current EPRI codes related to this line of application. He was also part of the development team for the EPRI three-dimensional nodal core simulating code. His involvement with U.S. utilities was mostly as a reviewer of their methodologies for core safety analyses.

Please welcome, Antonio Diaz. Is he here somewhere? Yes.

(Applause.)

We also a new member of the ACRS staff, Michael Junge. He will join on April 17th. He will be working on several subcommitteees including Plant Operations, Fire Protection and License Renewal. Mike has a Bachelor's degree in Nuclear Engineering from the University of Maryland at College Park. He started work in 1981 as an Operations Engineer at Calvert Cliffs. He obtained a Senior Reactor

Operator's license and worked on shift was a Control Room Supervisor and Shift Engineer. He joined the NRC in 1989 as a Reactor Systems Engineer in Diagnostic Evaluation in Incident Investigation Branch. He returned to Calvert Cliffs in 1991 where he progressed through various positions including General Supervisor of Maintenance Assessment and Principal Engineer of Auxiliary Systems. He returned to the NRC in 2004 to the Office of Nuclear Regulatory Research where he worked on various projects including the pressurized thermal shock project.

Please welcome Michael. Is Michael here? Thank you.

(Applause.)

Now we will proceed with our business. The first item on the agenda concerns the TRACG code and its use for analyzing ESBWR stability.

I believe the first speaker is going to be Bharat Shiralkar from General Electric.

Please go ahead.

MR. SHIRALKAR: Good morning. My name is Bharat Shiralkar from G.E. and Dr. Jens Andersen who is sitting over there will be helping me with this presentation.

What I've done is we've got three or four proprietary charts and I'd like to close the session at the very end to go through them. And within the non-proprietary presentation, there are a couple of charts on which I've taken off the numbers, but you have the proprietary version which has numbers.

TRACG Code is a G.E. proprietary version of TRAC which evolved from the National Labs, particularly Los Alamos, and incorporates with some G.E. proprietary models, particularly the PANAC 3D neutron kinetics and has been extensively qualified against data from various test facilities.

The NRC is certainly not new to TRACG because it's been approved already for several applications for BWR transience and ATWS or pressure events for BWR stability in support of --

CHAIR WALLIS: Has been approved for BWR stability. So our concern will particularly be how this is applied to ESBWR

MR. SHIRALKAR: Yes.

CHAIR WALLIS: Thank you.

MR. SHIRALKAR: And has been approved for ESBWR LOCA applications.

What I'd like to do today is to point out some differences between the ESBWR and operating BWRs to tell you what some of the major differences are that we are considering.

We go through some of the TRACG qualification possibility analyses fairly briefly because I think we've been through some with the Subcommittee at the last meeting. And then talk a little bit about the application methodology that we use with TRACG.

Next slide.

(Slide change.)

MR. SHIRALKAR: The main difference, the obvious difference in the ESBWR and operating BWRs is that the ESBWR has a tall chimney to boost flow, natural circulation flow and natural circulation plan. So we need to evaluate the possibility of what we call loop oscillations that are driven by perturbations in the chimney density, in addition to the normal density of wave oscillations that we consider for operating plants.

If you look at that figure, you'll see there are a couple of other differences as well. The downcomer is wide open to boost flow and this actually favors what we call the bore-wide mode of stability, instability, rather than the regional mode of stability because of an open region. And also, the core is shorter. It's one meter shorter than operating plants and that reduces this pressure drop. So that is a significant improvement in stability performance.

Can we go to the next chart?

(Slide change.)

MR. SHIRALKAR: The other difference is that the ESBWR core is larger than operating plants today. The largest operating plant today is the ABWR in terms of core size, has 872 bundles. The ESBWR will have 1,132 bundles so you can see on that figure the vast curve is where the shroud would be for the ABWR relative to the ESBWR size.

And what that does is having a large core with more bundles is that we have to evaluate what we call the regional mode of oscillations more carefully. This means that the different regions with the core can be less coupled electronically and it can have the possibility of regions operating out of phase, oscillating out of phase with each other. So the larger core is going to favor the regional mode of oscillation.

Next chart.

(Slide change.)

MR. SHIRALKAR: I'd like to show you the range of the ESBWR parameters relevant to the operating BWRs possibility. I'm sorry, this is kind of hard to read.

The left hand, the little insert figure there shows the operating map in terms of power versus flow which is plotted on a core bundle basis so that you can compare different plants on any equivalent term. And it shows the power flow maps for some operating plants on the ABWR and also show the ESBWR curve, shown as the red curve there.

You can see, obviously, the flow rate is going to be quite a bit larger than for operating plants at natural circulation. All the instability events we had with operating reactors are in the top left hand curve of that map, natural circulation. You can see it's quite far removed from where the operating point of the ESBWR is.

The rate of condition for the ESBWR is actually closer to what we call the MELLLA plus point or the upgraded plant operating at somewhat reduce flow. And the decay ratio would then be expected to quite a bit lower than for natural circulation of operating plants.

CHAIR WALLIS: So this plant, this figure shows that the power per bundle is significantly lower than you have experience with already, is that right?

MR. SHIRALKAR: The power per bundle, yes. It's lower than what it would be for an operating plant rated conditions, yes. The flow would be lower as well.

The box on the right-hand side, is there some way I can point to this?

CHAIR WALLIS: You just have to describe it. We're in a circular mode here, we can't see that one. If you point to that one, we can't see this one.

I think you best just talk about it.

MR. SHIRALKAR: I'll just describe it.

MEMBER MAYNARD: Sherry is using a cursor which will show on all the screens.

CHAIR WALLIS: And Sherry knows what to point out?

(Laughter.)

MR. SHIRALKAR: The first one, I'm comparing different parameters here that are important for stability. The first one is the dynamic void coefficient. And that is in the range of the operating plants. So you expect the core to be similar to the operating plants and the void coefficient is in the range of the operating plants.

The second row shows the average exit quality which is given by the power to flow ratio, basically. And that tends to be near the top end of the operating plants which is at the MELLLA plus point of the operating plants. And the same thing for the third row which is the hot bundle exit quality which again is in the top end of the operating plant region.

The next row shows the ratio of fuel time constant to the flow transit time. The importance of this is that the larger that number, the more damped the feedback from the fuel would be to the heat flux. And so the operating plants would have a ratio of like three to five and for the ESBWR, the ratio is six to seven, primarily because the transit time is smaller. So the oscillation time is smaller for the ESBWR because of the shorter fuel line and so you get a larger ratio and more damping of the nuclear feedback.

The next row shows the ratio of the harmonic sub-criticality to delayed neutron fraction. The sub-criticality is a measure of how likely the plant is to have regional oscillations. The smaller the sub-criticality, the more likely you are to excite that mode, the regional oscillation mode. And the ESBWR because it's larger in size is going to have a smaller sub-criticality and is more likely to excite the regional mode than the operating plants.

And the final one is the ratio of the

single phase, two-phase pressure drop and that is significantly better for the ESBWR than the operating plants and that's because of the shorter fuel length and the smaller two-phase pressure drop in the region above the rods of the fuel.

So all of these factors are favorable, except for the one that has to do with the regional mode of oscillation.

MEMBER ARMIJO: Bharat, I have a quick question. Is the fuel still a 10 by 10 lattice? Is it more open, less open?

MR. SHIRALKAR: It's a standard G.E. 14 light fuel. It is one meter shorter and correspondingly, the length of the rods is going to be larger compared, fractionally larger compared to the standard G.E. 14 which gives you this lower compressed pressure.

The next one, please.

(Slide change.)

MR. SHIRALKAR: This is a conceptual or schematic map, if you will, of the stability map plotted in terms of the sub-boiling number and on the Y axis versus the Zuber number on the X axis. And effectively, this is a non-dimensional sub-cooling versus a non-dimensional power to flow ratio.

And the dashed line that you see, the black dashed line that you see is the boiling boundary, if you will. Anything on the left side of that is single case. When you cross that line, you start producing the first voids, the first bubbles, if you will, in the chimney or the core regions.

This region there which I'll call the Type 1 instability region and that region is where you could have an oscillation, but used by a loop-type oscillation that is produced by density variations in the chimney when you first start the voiding process in the chimney. And I'll explain that a little bit more in the next chart.

Then as you raise the power level, if you go to the right of that chart, then you cross the second boundary and you get into another unstable region which you call the typical density wave or the normal, the oscillation that you might see in a BWR -- operating BWR. If you were to look at a similar map for a forced circulation plant, you would not have that doubling back in the Region 1. So the curve will continue straight upwards.

So we need to consider both these kinds of oscillations, the Type 1 and the Type 2.

Go to the next chart.

(Slide change.)

MR. SHIRALKAR: This shows the mechanism for the Type 1 instability.

CHAIR WALLIS: A question about the last chart. You have a red-dashed line which is the called the ESBWR operation.

MR. SHIRALKAR: Yes.

CHAIR WALLIS: Does it end at the highest value that you're going to get for Zuber number or is it just --

MR. SHIRALKAR: Yes.

CHAIR WALLIS: So it doesn't go outside that stable area?

MR. SHIRALKAR: That's the rated condition. Now this map is conceptual. I mean --

CHAIR WALLIS: It's a cartoon?

MR. SHIRALKAR: It's not an ESBWR map per se.

CHAIR WALLIS: Ah, so we shouldn't take it too seriously?

MR. SHIRALKAR: You shouldn't take it too seriously because it actually came from tests that were conducted by Commander Van Der Hagen in Holland. He conducted a map like this.

CHAIR WALLIS: It's qualitatively correct.

MR. SHIRALKAR: Yes.

VICE CHAIR SHACK: Was the previous curve a cartoon then too?

MR. SHIRALKAR: This one, no. This is not a cartoon. This is for the full flow per bundle and the bar per bundle that you get in the BWR.

This one is a cartoon.

This shows the mechanism of the type on inability and these are low frequency loop oscillations, so what's happening is that the initiation of voiding at the top of the chimney, you could use -- you change the driving head for the flow. And that causes some possible oscillation. So the right hand side shows the core and the chimney above it. And the pressure gradient, because of the height of this reactor vessel, the pressure at the bottom of the reactor is about two bars higher than the pressure at the top.

That difference becomes significant at low pressure, starting up, for example. And so then you get a saturation temperature gradient that you see on the right hand side. Now as you heat up the reactor vessel slowly, the blue line on the right hand side you can see the temperature increasing slowly and at some point then the temperature reaches a saturation temperature at the very top and that's because the saturation temperature is falling as you go up and that's where you start getting the first initiation of voids in the chimney.

When you initiate the first voids in the chimney, the lower figure shows that you're going to drop the density in the chimney. You're going to increase the flow coming into the chimney. This then stands to quench the voids and increase that density again and the flow again goes back down. So you get a cycle like that, what we call Type 1 oscillation.

Now these kind of oscillations are not possible during normal operation and that's because the perturbations in the chimney void fraction of density are much smaller. When you first initiate voids in the chimney, the changes in the density are large and at low pressure you get large bubbles in the chimney, significant change in the density in the chimney.

But at normal operation, the chimney is operating around 80 percent void fraction and so the changes in the almost saturated region in that sense, of some of the void fraction. And the perturbations are small and the neutronic feedback would tend to maintain constant void fraction in the critical reaction. In other words, if the flow goes down, the void fraction tends to go up, but then the power comes down to maintain more or less constant void fraction in the reactor. So this effect of the feedback is considerably mitigated.

The next one.

(Slide change.)

MR. SHIRALKAR: I should have said at the bottom of the slide there that TRAC has been qualified against data for this type of instability and I'm going to show you some examples of that.

Next slide, please.

(Slide change.)

MR. SHIRALKAR: Type 2 instability is what we call the standard density wave oscillation and these are like .7 hertz in the ESBWR. In operating plants, they would be on the order of .4 hertz. The difference again is because you have a large higher flow rates and we have a smaller length of the core and so the frequencies here are somewhat higher than operating plants. And these are observed in the ESBWRs and coupled with thermal hydraulic neutronic stability you could have either the core wide or regional modes, out of phase modes, that have been observed in plants. And these are joined primarily by frictional pressure drop perturbations. And TRACG has been qualified against data stability as well.

(Slide change.)

MR. SHIRALKAR: With that, I'd like to move into the TRACG stability qualification basis and I'll show you a few examples, some of the highlights. This was discussed at length in the last Subcommittee meeting.

TRACG has been qualified against a large number of test facilities and operating plants. The chimney void fraction was -- it's a new area because you have now -- a chimney consists of perturbations that are 60 centimeters in each cell. So these look like fairly large regions and we got data from Ontario Hydro in a pipe that was 52 centimeters in diameter which is a fairly large size and we got a large range of void fractions. That has been compared with TRACG.

Type 2 stability tests, we have data from the FRIGG test facility that has been compared against TRACG. We have a number of events and tests from operating plants. The LaSalle core-wide limit cycle event; Leibstadt regional limit cycle stability test; Forsmark stability test; Cofrentes instability event; Peach Bottom 2 stability tests.

And then we have Type 2 stability tests

which are the loop oscillation at the onset of voiding. And those are CRIEPI/SIRIUS.

We also have data from the Dodewaard start up. Dodewaard is a small plant, 183 megawatts, but it's very much like a miniature ESBWR in the sense that it has a chimney region, it has a core region. It is an active circulation plant. It starts up the same way. And we've never seen any type of oscillation in that plant, but we have some comparisons against a typical start up as well.

Next chart.

(Slide change.)

MR. SHIRALKAR: I'm going to show you a few examples of the qualification basis here and Dr. Andersen discussed these in more detail last time and if you want more detail, we can have him come and talk about some of these again.

The Ontario Hydro void fracture tests were performed in large-diameter pipes, 52 centimeter pipes. Measurements were made 7 meters from the inlet which is -- 7 meters is about the length and height of the chimney as well. And the tests were done at 64 bar, 280 degree C. And the tests were performed by circulating the flow with a large pump and then withdrawing liquid from the loop to increase the void fracture in the loop as you went around.

And the right-hand curve shows a typical example of the void fracture changes with time. The vertical axis is a void fracture. The horizontal axis is the time. Void fracture measurements were made with the gamma, gamma beam attenuation method. There are five gamma beams used across the cross section to give you a cross sectional void profile. And void fraction, there were three periods that are marked there that show where essentially steady void fraction conditions were achieved and the flow rates were varied to get a range of void fraction versus flow kind of data.

The TRACG compares quite good. The differences are on the order of 2 to 4 percent.

CHAIR WALLIS: These are just steady void fractions. There's no perturbation propagating this by now?

MR. SHIRALKAR: No, they're steady in the sense that the void fraction will slowly increase over an hour.

CHAIR WALLIS: Right. It would be nice if you also had -- been able to fluctuate the void fraction in some way and see how it propagated.

MR. SHIRALKAR: Yes.

CHAIR WALLIS: Maybe we'll discuss that --

MR. SHIRALKAR: There was some natural fluctuations just because of some flow rate changes.

Next chart.

(Slide change.)

MR. SHIRALKAR: The FRIGG stability tests were conducted in Sweden and this is the natural circulation loop with a 37-odd bundle and the riser region which also acts as a natural separation zone and then the flow is returned, condensed and returned back to the downcomer.

The little figure on the inset on the top right-hand side shows the characteristics of natural circulation flow versus the power level. And you can see that TRACG predicted a natural circulation flow quite well. I think the difference is on the order of 1 or 2 percent.

And then tests were done were the power was increased in steps until the flow became unstable, so you could see oscillations in the inlet flow. And the onset of this instability which is a certain power level that leads to this instability was measured and calculated by TRACG and the lower figure shows these predictions compared to the data at different pressures ranging from 2 MPA to 5 MPA.

And again, TRACG is doing quite well and slightly conservatively in terms of predicting these results.

Next chart.

(Slide change.)

MR. SHIRALKAR: Moving on to some of the plant tests or events that have happened, the LaSalle instability event happened in March of 1988. It was caused by operators testing the RCIC initiation logic and inadvertently caused a trip of both recirculation pumps. The pumps coasted down to a flow of about 30 percent and 43 percent power level and after about 5 minutes or so as the feedwater heaters isolated, the power increased slightly and oscillation started up 5 and a half minutes into the transient. At 7 minutes, the oscillations had grown enough that it caused an APRM SCRAM.

TRACG was used to analyze this event and you can see that the natural circulation flow is calculated quite accurately in the top figure. The lower figure shows the section, the more or less last section of the APRM signal.

TRACG is capturing the frequency quite well and the frequency, the time needed for the oscillation is about 2.2 seconds and TRACG captures that very accurately.

It also predicted the increase in the APRM signal as time went on. Now there was a complication in this event that the feedwater valve actuator was sticking so that was imposing a slower oscillation of 40-second time period, oscillation, on the whole transient. And so every time the feedwater temperature went down a little bit, the power level would go up and then it would come down again, so you can see the slower transient, 40-second wave transient can also be seen.

And eventually, it got to a point where the APRM level went high enough that the SCRAM reacted. And TRACG calculates the behavior, the phenomena quite well.

Next slide.

(Slide change.)

CHAIR WALLIS: Does it keep on oscillating after it's scrammed? The red curve keeps going on?

MR. SHIRALKAR: The red curve actually went on and I think scrammed a little later or maybe the scram was not set in the TRACG calculation.

Jens, can you help us with that?

MR. ANDERSEN: Does this work? Actually,

the plant scrammed and the end of the red curve is an indication of the time where the scram took place. Since this was not a planned test, actually, the only data that were recorded were the last 60 seconds prior to the scram and that's what you see in the figure.

MR. SHIRALKAR: Does that answer your question, Graham?

CHAIR WALLIS: Well, I guess you stop TRACG at a different time than the SCRAM. The blue curve stops before the red curve and that's what puzzled me.

MR. SHIRALKAR: Yes, that's a small difference in the calculation. It's a close ratio for the oscillation, so TRACG reads the APRM setpoint at about 400 seconds whereas the data were more like 408 or 410 seconds into the event, which to me is quite close.

CHAIR WALLIS: Thank you.

MR. SHIRALKAR: The next is the Leibstadt regional oscillation stability test. These tests were actually tests conducted during the start-up of the plant in Cycle 1 in 1984. And these tests were showing four points here. These are points done basically where the pumps are operating at the low speed and the flow control valve position opened for points 4 and 5 and at the minimum position for points 4A and 5A.

And all these cases resulted in regional oscillation, out-of-phase, side-to-side symmetrically, around a line of symmetry.

Next chart, please.

(Slide change.)

MR. SHIRALKAR: This shows TRACG calculations. The top curves just shows that the TRACG is calculating two channels, A and B, on opposite sides of the line of symmetry to be oscillating out of phase.

The bottom right-hand block shows the actual oscillation contour which is the magnitude of the APRM oscillation amount versus the position in the core. So as you move in from the outside to the inside, on one side of the core you have bundles that are 13, 9, 5 and 1. And the maximum amplitude is occurring around position 9 to 11. And on the other side of the core you have numbers 3, 7 and 11.

And TRACG is predicting the magnitude of the contour quite well. And actually, this contour corresponds very nicely to the shape of the regional, the first harmonic of the neutrons. And so the characteristics of regional oscillations have been successfully calculated by TRACG.

Next chart.

(Slide change.)

MR. SHIRALKAR: The oscillation compares, as I showed you earlier, were all limit cycle oscillations. So we wanted to also include some data that produced very low decay ratios because ESBWR was operating not at limit cycle, but at low decay ratios. We wanted to see how TRACG would do when the decay ratios are low like .3 to .2.

And Peach Bottom tests were performed in Cycle 2, 1977. And these are done with the old 7 by 7 fuel and so the plant was extremely stable and the decay ratios ranged in the neighborhood of .1 to .3. Tests were performed at the minimum recirculation speed curve and at one point at a slightly higher flow rate. And these tests were then analyzed by TRACG and you can see on the next chart, it compares with other decay ratios between TRACG and data and I'm not showing the numbers on this chart, but I think the handout that you have shows the numbers as far as the difference is a concern. And we are happy with this kind of error in the predictions.

I should mention that this is one case where the frequency is not calculated as well. The frequency for the oscillation was calculated by TRACG to be around .3 Hertz and the data is more like .4 Hertz. And we are not sure -- this is one of the very few cases where the frequency is different than what is calculated to be.

Normally, the frequency is very easy to calculate based on just the transport time of the wave put through the core.

Next chart.

(Slide change.)

MR. SHIRALKAR: I'm moving on now to some of the Type 1 oscillation tests. And this again is the oscillation that are driven at the onset of the first voiding in the system, a loop-type of oscillation. These tests were performed in Japan by an organization called CRIEPI and the test facility is called SIRIUS. And the test geometry consists of two heated test sections, 1.8 meter long and a 3-meter chimney on top of that.

And the tests were performed by starting with a high subcooling at a given power level and then increasing the temperature of the inlet slowly until oscillations are observed.

Next chart, please.

(Slide change.)

MR. SHIRALKAR: So the chart on the left-hand side shows a comparison of the flow in the downcomer, the inlet flow, if you will, versus time. The dashed curves are the TRACG calculations and the solid curves are the data.

So as we start with the red curve at the bottom, that's the one at the highest subcooling. There is no boiling at all anywhere in the system and there is no oscillation inlet flow. We have to start increasing the temperature, the second curve from the bottom which is at five degrees subcooling. You can see that it has periodic increases in the flow, almost like spikes and they're about 50 seconds, 70 seconds apart.

TRACG calculated that same phenomena. It didn't calculate the frequency correctly. The TRACG is calculating at about 50 seconds and the data is showing about 70 seconds or thereabouts. What's happening here is that when you produce voids at the top of the chimney, you get a sudden increase in the flow. And basically you're getting a large increase in the flow, fills the whole S section with cold water. And then you will wait until that water heats up again to saturation and then can produce the next spike.

So this time period is set not only by transport through the system, but it's set by the time required to heat up that liquid, after it has filled up the whole section. And TRACG is calculating somewhat smaller flows and therefore somewhat shorter times to reheat that section again and cause the next spike. So the frequency is a little off, but the phenomena is as predicted..

And then you go to the next curve which is again, a slightly higher temperature and now the oscillations become more continuous. The heat-up time is now pretty much gone away. And TRACG is not predicting that frequency quite well. It's a little smaller amplitude.

And then finally, the top most curve is where you've got steady voids in the chimney and the situation now has become stable again.

So this can be plotted in terms of the stability map, on the right hand side, shows a stability map that's plotted in terms of the vertical axis being the channel heat flux, sorry, sub-cooling. And the horizontal axis being the heat flux.

So at the given heat flux, as you increase the sub-cooling, you encounter first an unstable point and then if you go on decreasing it, you get to a stable region. And so you can produce a mpa like this, at different heat fluxes, and then again TRACG is predicting the size of that map quite well.

Next chart.

(Slide change.)

MR. SHIRALKAR: These are similar tests that were done in that same facility at 7.2 megapascals. So again, the same kind of behavior was observed. When you start getting voids in the chimney, you start this oscillation phenomenon and then as you go to higher temperatures of the inlet, the oscillation stops.

In this case, the data is somewhat better because they measured void fractions as well in the riser section of the chimney section. And the top curves show the comparisons of the void fraction oscillations in the chimney versus TRACG.

And the lower left-hand figure shows the comparison of the inlet flow and again TRACG is doing an excellent job in calculating the void fraction changes and the corresponding inlet flow changes with time.

CHAIR WALLIS: So this is a high-pressure test?

MR. SHIRALKAR: It's a high-pressure.

CHAIR WALLIS: In the same facility?

MR. SHIRALKAR: Same facility, yes. But now with better instrumentation, so they have void fraction measurements.

And the bottom right figure shows again a similar map, if you will, of the unstable region and the boundary that's drawn there, the solid line is a TRACG calculator boundary and then there are some points there that show where the actual measured unstable region was and the correspondence again is quite good.

Now just for a point of reference, I've shown also the actual normal operating conditions for the ESBWR at the bottom there and I don't know if you can see that little point at the bottom, but that's how far the normal state is in terms of the sub-cooling and where we actually get these oscillations.

CHAIR WALLIS: And this test as done with a full-scale --

MR. SHIRALKAR: It was done with a one point meter core with three meter chimney.

CHAIR WALLIS: Not quite full scale.

MR. SHIRALKAR: Not quite full scale. I'm sorry, five meters.

CHAIR WALLIS: Five meters. It's getting

there.

MR. SHIRALKAR: Yes. Next chart.

(Slide change.)

MR. SHIRALKAR: The last one, qualification compares -- and I'm going to show is a Dodewaard start up. This is not a very satisfactory comparison because the plant data are kind of sparse and the instrumentation is all at either the bottom end or out of scale, typically, as far as the measurements at the start-up conditions are concerned.

We especially ran these tests because at about this time, this was about 1992, there was a lot of papers in like, for example, the CRIEPI test and so on in Japan, that talked about Type 1 oscillations. And Dodewaard had never seen these oscillations. So we wanted to see if they could see them by going very slowly and doing these tests at different points.

The bottom line is they never did see anything. They couldn't see any oscillations, but when they went back again and looked at the LPRM signals and did some other correlation analysis of the signals, the topic they could perhaps see a damped oscillation of about 10 second frequency. But there was nothing visible on the instrumentation.

CHAIR WALLIS: So it was 10 seconds, it

was probably a natural circulation type?

MR. SHIRALKAR: Yes. It would have to be at the start-up phase. So what we have in the Dodewaard start up are some measurements that were done at fairly large intervals in time. And then we have to sort of fill in in the middle in terms of what the conditions might have been.

The first plot on the lefthand side is the power as it was raised in the plant. The power was actually calculated two ways. One is from the neutron flux measurements which are more or less continuous. And also, from a more reliable way which is the -- from a heat balance method which is only done at a few points.

The estimated accuracy of these measurements is about 50 percent, plus or minus, at these low power levels. So they're not very satisfactory from a core calibration point of view.

What we did was we actually input the power as measured into TRACG for the simulation. The bottom right hand side shows the pressure change and at the very low end, what was done was we had reasonable measurement of the steam flow, but the pressure accuracy was not very good, so we input the steam flow into TRACG to calculate the pressure. But beyond about 25,000 seconds, we actually input the pressure into the code. So you can think of this more or less as an input to the code.

Next chart.

(Slide change.)

MEMBER DENNING: On that chart, I didn't understand on the lefthand chart, is the one with the oscillations in it, that's the TRACG?

MR. SHIRALKAR: The one in the oscillation is the neutron flow.

MEMBER DENNING: That's the neutron flow.

MR. SHIRALKAR: Out of core, neutron flux monitors and that's the neutron flux.

The points that are shown are the calculated power from the heat balance and the continuous curve is tracked as.

MEMBER DENNING: And the reason for this variability in the neutron flux is just measurement?

MR. SHIRALKAR: Partly measurement and partly, I think, as you pull it out, you get some spikes and it goes down again.

MEMBER DENNING: I see.

MR. SHIRALKAR: Go to the next chart.

(Slide change.)

MR. SHIRALKAR: These are what you might

call the -- the first two blocks I showed you actually inputs the code. These are actually some of the outputs that we compared with, with the code calculations. The lefthand figure is the sub-cooling, the local sub-cooling in a downcomer which is calculated reasonably well. And the righthand curve, actually the one that we're most interested in and that is the downcomer velocity.

Now what Dodewaard was two thermal couples in the downcomer, located at the elevation of the top of the core and the bottom of the core. And the cross correlation of those two thermal couples is to calculate a velocity in the downcomer.

The accuracy of this measurement is about 10 percent at these conditions. So there are not too many points here as far as data is concerned. You can see one point at about 6,000 seconds and then the next one is around 30,000 seconds.

TRACG is calculating some small oscillation in the flow, the flow noise, if you will, around 20,000 seconds. And this is what you call a Type 1 oscillation is when TRACG first calculates voiding in the top of the chimney.

Unfortunately, you don't have measurements here to either confirm or not confirm this. The neutron monitoring instrumentation certainly didn't show any evidence of any oscillation at all or in-flow noise. The data from 20,000 to 40,000 seconds, the velocity is lower than what TRACG calculates and the best guess we have as to why that's happening is that the power that was being used as an input to TRACG is probably a little bit high in this case. And we have evidence from another source and that is that the steamflow rates also are quite a bit higher in the TRACG calculation than in the prime measurements. So we think most likely the reason for that discrepancy between 20,000 to 40,000 seconds is because of the uncertainty in the power measurement.

But the main thing we wanted to get out of this was to see how TRACG would calculate the start-up, calculate large oscillations and you will see the oscillations in the data. As far as that is concerned, we couldn't -- TRACG calculated small oscillations, but nothing was seen in the data.

Next chart.

(Slide change.)

CHAIR WALLIS: Bharat, we're moving to your summary curve, summary slide here?

MR. SHIRALKAR: Yes.

CHAIR WALLIS: In the Subcommittee, we

spent some time on the question of whether or not you were modeling void propagation properly in the chimney?

MR. SHIRALKAR: Yes.

CHAIR WALLIS: You remember, and we talked about artificial Courant number type smearing of this void fraction and I've got -- you probably got this message from me that in your presentation, on page 10, you have a theoretical prediction that voids propagate on change and in your slide study 13233 you put in some perturbations and they propagated on change. But on slide 14, when you were modeling ESBWR, you've got attenuation. It looked as if something was wrong with your Courant number or something.

MR. SHIRALKAR: Yes.

CHAIR WALLIS: Either there's something wrong with TRACG or you have to be very careful about how you use it in terms of Courant number.

MR. SHIRALKAR: Yes. I was going to answer that question in the closed session.

CHAIR WALLIS: That's fine.

MR. SHIRALKAR: I'm going to get to that.

CHAIR WALLIS: Okay, you will.

MR. SHIRALKAR: But you're right, the short answer --

CHAIR WALLIS: You will get to it. That's all I need to know. You'll tell us.

MR. SHIRALKAR: I was coming to the end of my stability qualification, but I do have another small section of the application.

CHAIR WALLIS: Okay.

MR. SHIRALKAR: So bear with me.

CHAIR WALLIS: Thank you.

MR. SHIRALKAR: The stability qualification, the summary, in summary, the natural circulation flow rates are calculated accurately. And the onset of stability was calculated well for the thermal hydraulics stability, the FRIGG test.

For the Type 1 loop oscillations, the CRIEPI test, the loop oscillations and instabilities were well predicted and the impact of the chimney was calculated properly in terms of the void initiating the chimney and driving the loop flow.

The plant instability, also the bore and regional mode were both well predicted, consistent with the uncertainty of the plant calculations. So our summary is that TRACG is capable of performing plant stability calculations.

Next chart.

(Slide change.)

MR. SHIRALKAR: With that, I'd like to move into how we're using TRACG for this application, and given that now we've been showing you some evidence that TRACG is qualified to be used for that application. And we are using TRACG for demonstrating stability margin stream, normal operation and steady points falling and dissipated transients.

We are also using TRACG to calculate start-up projectories and to demonstrate that we have a smooth transition in pressure and power with the minimum of flow oscillation and large MCPR margins. And G.E. is requesting approval from the NRC for the use of TRACG for analyzing and demonstrating compliance with the stability limits for the ESBWR.

Next chart.

(Slide change.)

MR. SHIRALKAR: Types of stability analysis we considered are what we call single channel hydrodynamic analysis which we evaluate from a full response to an inlet core perturbation to a single channel. Typically, the high power channels are perturbed. And we look at the response and extract particular issues from that response.

We also have done what we call a "superbundle", hydrodynamic analysis which is done by perturbing the flow to a group of 16 bundles under a common chimney cell, so we perturb that whole select group of bundles, along with the chimney cell and then look at the response of that cell.

We look at core stability which is evaluated by a power response which results from a core-wide pressure perturbation or a core-wide flow perturbation. And we've done both of them which show compatible results. And regional stability is evaluated by applying -- by evaluating the power response to symmetric out-of-phase flow perturbations. So in this case, we actually calculate the position of the line of symmetry and the regional harmonic and then we apply out-of-phase oscillation of perturbation in flow to opposite sides of the core and evaluate the response.

CHAIR WALLIS: You also will be using TRACG, presumably, for ATWS analysis and that time of thing?

MR. SHIRALKAR: Yes, we will.

CHAIR WALLIS: And we'll have to see how well it works on those, and some sort of independent investigation with you, I think.

MR. SHIRALKAR: Yes. I think we are doing that --

CHAIR WALLIS: So we're not saying that TRACG can do everything. We're saying it can do -- looks as if it can handle the kinds of things you've listed here.

MR. SHIRALKAR: We think it can do everything, but I haven't shown that to you yet.

(Laughter.)

CHAIR WALLIS: Well, it can make some sort of prediction of everything. The question is how good is that.

MR. SHIRALKAR: Next chart.

(Slide change.)

MR. SHIRALKAR: The ESBWR stability licensing basis, now the most limiting point of -- operating point for stability analysis is rate of conditions for the ESBWR. Unlike the operating plants which is an off-rated circulation point, with ESBWR, the most limiting point is the rate of condition and so we have to be sure that we have a large margins at rated condition.

And so we want to establish a high degree of confidence that at rated conditions, the decay ratio are well within conservative design limits for channel stability, core stability and regional stability.

As a backup, the ESBWR would also implement an LPRM-based detect-and-suppress solutation as a defense-in-depth system. This is so-called Option 3 that is currently used on today's plants.

Next.

(Slide change.)

MR. SHIRALKAR: This is an eye test. Sorry. We are applying TRACG in conformance with the code- skewing applicability uncertainty methodology which is a fairly rigorous and systematic methodology for applying the best estimate code.

I'm sorry you can't read this, but let me point out just a few items here that are most important. One is we go through a formal phenomena identification and ranking table to identify the important phenomena and these phenomena are used to establish the model applicability by looking to see whether the model, the code has the appropriate models.

They're also used to evaluate the qualification database and then to perform validation against a representative database for all of these important phenomena. And finally, we established the uncertainty in these important phenomena and then combine it in a statistical basis.

Next chart.

(Slide change.)

MR. SHIRALKAR: In the TRACG application methodology, we calculate the figures of merit for the core, channel and regional decay ratios at the limiting operating conditions.

We statistically account for the uncertainties and biases in the models and plant parameters using the Monte Carlo method and we demonstrate that the decay ratios meet the design criteria with sufficient margin for uncertainties at the 95/95 level.

Next chart.

(Slide change.)

MR. SHIRALKAR: The limiting conditions for stability are actually at the rated condition. At this point, I'm slightly out of order here with one chart, but I want to stop at the end of this chart and go into closed session.

(Whereupon, at 9:28 a.m., the meeting went into closed session.)

O P E N   S E S S I O N

9:46 A.M.

CHAIR WALLIS: It's always a pleasure to welcome Dr. Ralph Landry. We're now in open session.

DR. LANDRY: My name is Ralph Landry from the staff. I think I should apologize at first because if I understood the game plan today I would have put four slides on a page. Unfortunately, I put one slide on a page and you are able to read the slides.

The review --

CHAIR WALLIS: You put all words -- oh, you have got some curves.

DR. LANDRY: We have some curves. We are engineers and we can't get by without putting some plots in.

The review that the staff performed of the application of TRACG to stability in ESBWR was done by a team of reviewers: Veronica Smith -- Veronica Klein -- I don't know where that one came from. Veronica Klein and Peter Yarsky of the staff performed an excellent job in doing this review. We were assisted by Jose march-Leuba at Oak Ridge National Laboratory and Jay Spore now at Information Systems Laboratory.

MEMBER DENNING: They're not going to be here today, that's true, yes?

DR. LANDRY: That's correct. I'm going to do the presentation until the questions come in and then I'll call on Jose and Veronica.

MEMBER DENNING: Okay. I think we should, for the people that were on the Subcommittee, and for those who were not present, should recognize that we did have some excellent presentations from the staff's consultants which I think helped answer a lot of questions.

DR. LANDRY: Thanks, Rich.

CHAIR WALLIS: Move along, we've got a lot of slides.

DR. LANDRY: I can move through the first number of them pretty quickly. The outline of the presentation just covers some of the material that I want to talk about today. Sherry. The previous briefings that we had on TRACG, this just points out that TRACG has been used for other applications, AOOs and operating plants, we applied it to the LOCA and the ESBWR and now we're talking about stability in the ESBWR.

It is currently under review for application to AOOs and the ESBWR and to ATWS stability --

CHAIR WALLIS: Can I just confirm that this application to anticipate operating ESBWRs. Is TRACG approved for use for AOOs and stability analysis in BWRs?

DR. LANDRY: It's approved for AOOs.

CHAIR WALLIS: It's not yet approved for stability analysis of BWRs, is that --

DR. LANDRY: It's been off and on applied, but the staff has not formally reviewed and approved it. It's under review for stability in the operating --

CHAIR WALLIS: G.E.'s presentation says it's been approved for BWR stability.

DR. LANDRY: It's actually under review and that approval will be coming shortly.

CHAIR WALLIS: So they're safe in saying approved for application to BWR stability in support of the detect and suppression methodologies. Is that correct or not?

DR. LANDRY: It's been used for the detect and suppress methodology, but for general stability in the operating fleet it is currently under review.

CHAIR WALLIS: Okay, so we don't have that base to build on. I think we need to know that.

DR. LANDRY: The objective on the next slide, Sherry --

(Slide change.)

DR. LANDRY: -- was to determine the acceptability of TRACG and the prescribed methodology which you've already discussed somewhat with General Electric to predict instability in the ESBWR design.

The next one.

(Slide change.)

DR. LANDRY: Very quickly, some of the instability modes that can occur in a BWR -- are the ones that we are concerned with in here is the density wave stability mode. The control system instabilities are not a factor of the computer code and flow regime loop oscillations as Rich Demming just pointed out, were presented in depth at the Subcommittee meeting by Jose March-Leuba.

The next done.

(Slide change.)

DR. LANDRY: Why is it important to analyze BWR density wave stability? Because a number of events have occurred and this lists those events which have occurred in the United States. There have been other events outside of the U.S. and in each of these cases we see a periodicity on the order of two to three seconds that has occurred in power flow instability.

And the next one.

(Slide change.)

DR. LANDRY: The key question and as you have already pointed out, Mr. Chairman, is can TRACG predict an oscillation in power and flow in the ESBWR? Can it predict a density wave transport through the codes? Do numerics permit the oscillation to occur, while not causing the oscillation. And do the code's numerics permit the oscillation to be damped by the physics of the system, rather than causing the damping such as we just discussed with Courant number and I'll go into in more detail of the study which we did of the Courant number effect. And do numerics prevent a damping to occur?

You already saw and we're not going to project this figure because it's proprietary, the mode for looking at stability in the ESBWR and on page 33 of the handout which I've given you, which is proprietary, we give you the flow power operating map for the operating fleet in the United States. And this is a combination of calculation and empirical data. The plan with use of TRACG is instead of using empirical data and calculation, it uses a purely empirical calculation to predict stability in all three modes, the channel, core-wide and regional or out of phase as was shown in this slide, Slide 31 in Bharat's presentation.

This is a departure in getting away from using empirical information and we, of course, support any time that you can give to a good, solid calculational base for doing the analysis.

If we could go to Slide 8.

(Slide change.)

DR. LANDRY: The scope of the TRACG application is to apply the code to stability and the ESBWR design. This is not a review of the ESBWR design. It is not a review of stability in the ESBWR design. It is a review of the code. But we have to do a calculation based on the physical characteristics of the ESBWR design to determine if it's applicable. And that's where we keep referring back to ESBWR hardware components, the chimney components, natural circulation and so on to support that the code can do the calculation for this design, but we are not passing judgment at this point in time on the design. That will come during the design certification review.

The scope of the review is to look at prediction of oscillations. The use of the code, we have to emphasize is for steady-state conditions, whether they are steady-state operating conditions or steady conditions associated with an AOO. The plant is taken through an AOO and arrives at a new steady-state condition and at that new steady-state condition, the decay ration is calculated based on a perturbation applied to the core.

The code is not used to predict decay ratio or oscillatory behavior during the course of an AOO. You must take the plant to a new steady-state condition to use the code to predict stability. We have reviewed the code for use during early phases of start up and we've specified in the SER that this is until you reach the point of power ascension. We say that because the assumption in the review at this point in time is that you have steady-state xenon, whether it's operating or during the start-up procedure. You're not considering transient xenon conditions.

We have stated in the SER that should the code be used for the ascension phase of power, that you have to run panic 11 module with TRACG which can predict the transient xenon. We have not reviewed that though and should it be used for the transient portion of the start-up phase, we would go back and review panic 11 and the transient xenon condition.

Next slide.

(Slide change.)

DR. LANDRY: The approach that has been taken is that, as Bharat has already said, the application follows CSAU. During the review, we went through an in-depth review of the PIRT, phenomena identification and ranking table. We determined that yes, we do agree with the high and medium-ranked phenomena which have been identified in that table and we feel that the table is appropriate.

We reviewed some specific models which I'll go into in a few minutes. We reviewed the assessment and I'll talk about the assessment very briefly. Bharat has gone through that rather heavily.

I would point out at this time that when we did the review, the assessment, we did not limit the review to the material that was submitted in support of the application of TRACG to stability for the ESBWR. We went back and looked at the assessments that were performed in the TRACG qualification report from a number of years ago, the TRACG SBWR qualification report and the TRACG ESBWR qualification report, in addition to the stability report itself.

So when we did this assessment review, we looked at the entire depth of the assessment program that was used for TRACG to determine yes, it has been shown to be capable for this application. We reviewed the numerics and in a few minutes I'll go through a numeric study that we did, looking at the effect of the Courant number and the integration technique that is used.

We did independent calculations using the TRACG code itself, briefly which I'll talk about in a minute. We did independent calculations using the LAPUR code which is a frequency domain analysis tool, a contractor at Oak Ridge National Laboratory used LAPUR and we did some void modeling reviews which I'll also talk about in a minute.

CHAIR WALLIS: TRACG and TRACE have common ancestry.

DR. LANDRY: Somewhat.

CHAIR WALLIS: You didn't use TRACE. You chose to use TRACG.

DR. LANDRY: Right, because at this point in time, TRACE has not been assessed for application to stability. That's not saying it can't do stability. It's not saying it can yet either, because that assessment for stability application has not been done at this point in time. So we wanted to stay with as few as variables in this review as we could.

If I could have the next slide, Sherry.

(Slide change.)

DR. LANDRY: Key models and phenomena that were under review. This is a natural circulation-driven machine as Bharat pointed out. The driving head is balanced by loop flow losses and Jose March-Leuba went through a detailed discussion at the March Subcommittee meeting on loop flows and why we can focus the review on the density wave propagation.

And the next slide.

(Slide change.)

DR. LANDRY: In the BWR, we have a coupled neutronic thermal hydraulic and density wave feedback system that is considerably different than in a PWR because in a PWR you don't have boiling in the core, so you don't have this strong feedback effect between the voiding and the neutronics that you do have in the BWR which, of course, makes the BWR more susceptible to instability events.

Density wave propagation, of course, depends on the vapor velocity. And if I can go to the next slide.

(Slide change.)

DR. LANDRY: I'll just go through the next couple of slides very briefly because Bharat went through the assessment pretty heavily.

We looked at the assessment that was done on TRACG and determined that the assessment was over a wide range of pressures, heat flux, inlet subcoolings, natural circulation flows, using information from the Dodewaard facility which interested us a great deal because it was a natural circulation of plant with a small chimney, even though it was a considerably smaller plant and has now been shut down. It was still a natural circulation boiling water reactor with a chimney, so we looked at those assessments very carefully and we were very pleased with the assessments. The code did a very good job in comparison to the start-up tests that were run at Dodewaard.

We looked at the SIRIUS tests under CRIEPI. We looked at some of the PANDA start-up tests that were performed.

(Slide change.)

DR. LANDRY: And on the next slide, we looked at operating plant data and in particular, Peach Bottom event. We looked at Leibstadt briefly and some of the assessments that were done against Forsmark.

All of the assessments we felt were showing that the code did fairly well. We were seeing assessments against data, whether they're test data or against actual plant data that were in the 2 to 6 percent uncertainty range. And for a code of this magnitude, looking at data which are not always taken with laboratory grade instrumentation, in an operating reactor, we felt that this was a very good comparison and indicated the code was doing a reasonably good job.

So we felt that the comparisons indicate that TRACG models are adequate for predicting power oscillations in intended design.

Could I have the next one?

(Slide change.)

DR. LANDRY: Models' assessments conclusions. TRACG includes the models required to predict oscillations in the ESBWR. The assessments against available data and operating plant data indicate that TRACG gives consistent results and the accuracy of the TRACG results can be determined by propagation of model uncertainties.

And if I can add just a little side light here, the discussion about use of the normal distribution one sided for tolerance limit methodology versus a use of an order statistic methodology versus other methodologies, the manner in which this is being done by General Electric allows them, if they don't satisfy all the conditions they need to from their chosen statistical methodology, have all the calculations necessary to fall back to a simple nonparametric approach, rather than having to go through and rerun all the calculations because their end metric did not turn out correct. So they have gone the extra step in doing their statistical analysis by including enough calculations in their statistical base that they can fall back to a lesser, if I can call it a lesser level, without the statisticians getting mad, a lesser level of statistical approach and still satisfy all the requirements for that approach.

So we have said in the past when we reviewed the AOO application properly and think that this is a valid statistical approach and we agree at this point that still it is a valid statistical approach.

If I could go to the next one, Sherry?

(Slide change.)

DR. LANDRY: Some of the calculations which we performed on the staff, we went to General

Electric's offices at Wilmington and we audited the calculations which they performed and we also spent several days at Wilmington going through the procedures and working through the procedures which their analysts used to perform the calculations themselves, not just looking at the documentation which was submitted, but we sat down and with our computers, with our analysts and we ran cases ourselves, following the exact procedures that they use. We wanted to do that because when we were doing some independent calculations using TRACG at the staff level, we were not sure how you pull out a channel in data perturbation, so we did our way. We did our own method of cutting out a channel, at a perturbation and follow through and follow the oscillation that occurs. And when we talked with General Electric, they said gee, yeah, that would work, but it wasn't the way they did it. And we got almost identical results doing our methodology.

So we decided that we needed to go down to Wilmington, audit what they were doing and understand the methodology that they were using two so that we could come back and say yes, we agree, not only with the code, but we agree with the procedure for application to code.

The independent calculations that we did at ORNL involved use of LAPORE. We did some chimney-effect calculations which I'll talk about in a few minutes and we did some decay ratio calculations also, using LAPORE, which I'll talk about again in a few minutes.

We did an independent calculation so on the void profile using TRACE, just for calculating void profile of RELAP5 and wrote an independent drift flux model, a simple little drift flux model. And then tracked -- I guess I shouldn't say tracked -- followed the void profile generation and perturbation through the system that TRACG was predicting, what we were predicting with each of these methods and found that for each of the methods, the comparisons were very, very close. It really did not make a huge difference whether you're using TRACE, RELAP5, pure drift flux, TRACG, you're getting a void generation and void density wave motion that was very close with each of these methodologies.

So that gave us a confidence of what this very large computer code was predicting was supported by other codes and even by a small, independent calculational model.

Next.

(Slide change.)

DR. LANDRY: The TRACG procedures, we, on the staff, performed a core-wide decay ration calculation. When General Electric did their calculation and their submittal, they used a pressure perturbation on the core as their perturbation method. We decided to use a flow rate perturbation instead. And when we did the flow rate, if we could look at the next slide, we'll come back to this, Sherry.

(Slide change.)

DR. LANDRY: This is the response that we got using the inflow perturbation to the core. And at the top we put that the decay ratio we were predicting was .33. The perturbation that was predicted using the pressure perturbation of the submittal from General Electric had a decay ration of .29, almost the same. And the frequencies were very close, whether you use a flow perturbation or whether you use a pressure perturbation.

This gave us confidence that the code can take a perturbation and transmit that perturbation correctly.

MEMBER DENNING: You used the second and third node for that calculation?

DR. LANDRY: Correct. The decay ratio

here is predicted as the ratio of the third to second, they're peaks, positive peaks. There are a lot of different arguments of whether you should use the second to first, second to third or third to second or which peaks you should use.

It really is not so important which peaks you use as long as you consistently use the same peaks for every analysis you do.

If we can go back one.

(Slide change.)

DR. LANDRY: The channel decay ratios, calculations which we did, we used various channels for the calculations. We used a number of different axial power shapes and determined that the more bottom skewed power shape was the more limiting.

We looked at the limiting channel selection criteria and we looked at a super bundle and --

CHAIR WALLIS: I'm sorry, you used the second to the third peaks which looks like .5 to me, rather than .3?

It is quite sensitive which one you use and how you use it at this point and if you're going to start arguing about whether it's .3 or .5, it's quite an uncertainty in that, the decay ratio, which may need to be investigated further in your work.

Anyway --

DR. LANDRY: Maybe it was the second to first.

Second to first will give you the .3.

CHAIR WALLIS: I'm just pointing out that we have found as a Subcommittee that you can change the decay ratio quite a lot by picking which peak you want to use.

DR. LANDRY: Right, and our statement on this is as long as you use the same ones in every analysis. You don't --

CHAIR WALLIS: Maybe there's another method which uses the whole curve and optimizes --

DR. LANDRY: All right, then we can get into arguments about you want to go later in the curve if you can, but you don't want to go too late in the curve because the higher harmonics become important and start overriding --

CHAIR WALLIS: Okay, well, we can talk about that in future.

DR. LANDRY: We can talk about that with the operating fleet.

MEMBER KRESS: If you drew a curve through all the peaks, you'd get an exponential decay, you'd have a decay constant with it.

DR. LANDRY: Yes.

MEMBER KRESS: Why didn't you choose that? Wouldn't it be just as good?

DR. LANDRY: This is a technique that's been developed over a number of years. Jose March-Leuba --

CHAIR WALLIS: But this is the elementary -- clearly, you could use a better technique. It's very primitive.

DR. LANDRY: It's a technique that works and it's been so widely used that people understand what you're talking about now.

CHAIR WALLIS: But then you come against CRS and they say ah, but you've used some other peaks. You've got a different number. If you used the whole curve that would have been much more convincing.

DR. LANDRY: And that's why we bring Jose, so Jose can explain it.

CHAIR WALLIS: So he'll do it next time and he'll work it out. We just need a better derivation next time.

DR. LANDRY: Jose can give you an hour and a half lecture if you'd like on it.

CHAIR WALLIS: Let's move on.

DR. LANDRY: Yes, Tom, one of the points that you're making is correct. The most important thing is that we have a decaying perturbation.

MEMBER KRESS: Yes, yes.

DR. LANDRY: That this is not an oscillation that is being sustained or that is growing. The oscillation is decaying. If we can go to the next one, Sherry.

(Slide change.)

DR. LANDRY: This is the super bundle calculation which we performed. The red curve is the hot channel. The light blue is an average channel and the dark blue is the average for the whole super bundle. And simply showing that when you consider the super bundle, a grouping of 16 channels, the hot bundle really doesn't have very much effect at all. The super bundle is going to follow the average perturbation.

We can go to the next.

(Slide change.)

DR. LANDRY: Calculation summary. The staff concludes that we do understand the way the TRACG code operates. We understand the stability procedure that has been proposed by General Electric.

We feel that the procedure that's proposed works because we used a different procedure and still got comparable results.

We believe that the TRACG results are reproducible. We were able to model ourselves and use the code and get almost identical results.

The limiting channel selection criteria has been established properly. We believe that procedures are reasonable and complete. And we believe that the instability modes have been properly identified.

If we can go to the next one and now we'll get into the numerical dissipation question.

(Slide change.)

DR. LANDRY: We on the staff wanted to look at the question of damping and numerical dissipation. To do that, we set up a small, simple problem of a pipe with 26 nodes, 24 nodes up the pipe. Held the pipe at a constant 500 degree K temperature and then perturbed the inlet to the pipe by 20 percent on temperature.

When we did that calculation -- may I have the next slide?

(Slide change.)

DR. LANDRY: Holding the Courant number at

1, and using explicit integration, we see that we get no damping and we get a propagation of the --

CHAIR WALLIS: This is the right answer.

DR. LANDRY: I'm sorry?

CHAIR WALLIS: This is the right answer. The wave simply goes down the pipe.

DR. LANDRY: Correct. This is correct. And in fact, you could almost consider something like a chimney because we are not adding heat. There's no core heat added. This is just a simple pipe.

CHAIR WALLIS: The bubble comes in and it goes up.

DR. LANDRY: That's correct. Or density wave comes in. And we can see with Courant number of 1 and explicit integration the wave is propagated directly up the pipe without any dissipation.

(Slide change.)

DR. LANDRY: On the next slide, we see what happens if you fix the flat number at .75. You get some damping to occur.

(Slide change.)

DR. LANDRY: And on the next slide with the Courant number set at .25, you get considerably more damping.

CHAIR WALLIS: Well, if I look at the

ratio between peaks, I've got a huge amount of decay ratio.

If I look at positive peaks, they don't have a lot of positive peaks -- it's all gone away.

DR. LANDRY: So you have a decay ratio of zero.

CHAIR WALLIS: So artificially damping makes the oscillation disappear in one oscillation. It's amazing.

DR. LANDRY: This is an artificial --

CHAIR WALLIS: I know. This just shows that you have to be careful about how you do your numerical analysis.

DR. MARCH-LEUBA: I'm sorry, this is Jose March-Leuba. You have to do the decay ratio with the same Courant. You cannot do the ratio with the --

CHAIR WALLIS: I'm looking at the same color. I'm looking at the red color --

DR. MARCH-LEUBA: If you stay on the red curve, you see that the top is 5.2 and the bottom is 4.8, so it's plus 20, minus 20.

CHAIR WALLIS: Then it goes to zero.

DR. MARCH-LEUBA: Well, that's because the perturbation disappears. So the perturbation we have .25 is like .95.

CHAIR WALLIS: We should really look at different curves. The wave comes in with a magnitude, the black one, and then it goes out with the magnitude of the blue one.

DR. MARCH-LEUBA: But the ratio is of the same spatial location.

CHAIR WALLIS: It depends on what you are talking about.

DR. LANDRY: The purpose of this was not to look at the decay ratio. The purpose of this was simply to look at the numerics.

CHAIR WALLIS: Well, don't get into that too much. The point here is that the numerics can produce damping of things which is in some way related to decay of oscillations which is in some way related to decay ratio.

DR. LANDRY: But at this point, we were --

CHAIR WALLIS: We've got to be careful when we do this in the future.

DR. LANDRY: Right.

CHAIR WALLIS: That we don't artificially introduce some damping.

DR. LANDRY: That's our point. That's our point.

CHAIR WALLIS: This isn't really a decay

ratio. It's a different question.

DR. LANDRY: This is a different --

CHAIR WALLIS: It is a decay of something.

DR. LANDRY: This is only looking at the propagation of a way up the channel and does it appear to decay --

CHAIR WALLIS: I think Bharat was showing a Courant number of .1.

DR. LANDRY: Well, if you go from 1 to .25, you see a huge difference.

CHAIR WALLIS: Right, so this explains why they were getting this attenuation.

DR. LANDRY: This is with explicit integration.

Now if you look at the next slide --

CHAIR WALLIS: Well, don't they use explicit integration in their analysis.

DR. LANDRY: I'm getting to that.

CHAIR WALLIS: I think they do.

DR. LANDRY: We're getting to that.

CHAIR WALLIS: Are you going to tell us the secret?

DR. LANDRY: Yes.

CHAIR WALLIS: Okay.

(Slide change.)

DR. LANDRY: The next slide shows the wave propagation using a Courant number of .75 which is again that high number we had originally, but within implicit integration and here you see that the propagating wave damps even more than it did with a Courant number of .25 with explicit integration.

This is saying that the integration technique itself will cause the damping. So the purpose of this whole study was to say does numeric system permit a wave to propagate without causing that wave to damp? And we're saying yes, it does, if you use the correct Courant number and you use the correct integration technique, you will propagate the wave without causing numerical dissolution.

CHAIR WALLIS: Now let's be clear. Courant number relates the size of the node to the velocity and the time spent?

DR. LANDRY: Right.

CHAIR WALLIS: And you've got two phases, so one thing is which velocity are you going to use, but apart from that --

DR. LANDRY: This was single phase.

CHAIR WALLIS: If you're going to use -- I know, but if you're going to use a constant time step throughout the whole system, you have a real problem matching the Courant number everywhere, especially during a range of flow rate, the velocity is changing.

DR. LANDRY: And you really have to determine where is it most important to see the oscillation?

MEMBER DENNING: Let me state what I think the caveat that we have to provide is along these lines and that is we've seen here that in order to predict the decay correctly, you have to have the Courant number close to 1. And use the explicit formation.

In the general application that doesn't happen. You model the system differently with varied nodes, nodal sizes, so that you don't have the same Courant number throughout the problem.

So if you understand the basic physics of what leads to the unstable regime, then you can carefully nodalize to make sure that you're properly nodalizing, getting the Courant number close in the right places, but if there's a mode that you don't understand, that there's a mode out there that we haven't pre-identified that it's a node, I mean a means for instability that if you just apply TRACG to it without that core knowledge, you may very well miss it because the Courant number will be wrong in some place.

Now I'm not saying that we don't have an understanding that the various modes and we can't use TRACG cleverly to be able to demonstrate that it's stable within regimes, but if there were a regime out there that we really didn't understand the physics, then just, in general, we don't have the same Courant number throughout the problem and we could very well not be able to have it jump out at us and say here's something we didn't think about originally.

DR. LANDRY: We would agree with you completely on that. And that's what --

MEMBER POWERS: A little clarification. The reason that your non-unity Courant is damping the wave is a numerical diffusion region?

DR. LANDRY: Right. This was purely a study on numerical diffusion or you're talking numerical dissipation whichever term you want to use.

And Rich, yes, we do agree with you.

CHAIR WALLIS: It does -- in their model it does to some extent diffuse and dampen the driving force of void fraction perturbation in the chimney. They have shown by other arguments that that is not a significant physical force, but it could be.

And in the case of the FRIGG test, where you actually predicted instability, presumably that was done right, because they did get this kind of circulation. So we just know we've got to be careful.

DR. LANDRY: Right. Any time you use any of these codes you have to be careful.

CHAIR WALLIS: If you have a huge code and people just use it --

DR. LANDRY: That's why when we're talking about the approval, we're talking about the approval not only of the code, but of the procedure, the process of its use.

Sherry, if we could have the next.

(Slide change.)

DR. LANDRY: The numerical dissipation summary. As we just have gone through pretty heavily, to minimize numerical dissipation, you have to maintain the Courant number close to 1 and you have to use explicit integration where dissipation is important.

TRACG stability methodology minimizes numerical dissipation by setting this variable equal to one and by using finer nodalization toward the inlet of the core.

If we can have the next.

(Slide change.)

DR. LANDRY: At Oak Ridge National Laboratory, a model we set up using LAPORE, this was a quarter core model using PANACEA 3D power distributions, axial nodalization. Jose used the ESBWR specific geometry and was using the model to investigate the effect of the chimney.

When Jose did these calculations, he did the calculation modeling the chimney and then modeling the chimney with an increase of the friction factor by 100 and he found that he had to increase the friction factor by 100 to see an effect, a measurable effect of the chimney. So the conclusion at this point was that on these calculations, the chimney was really not terribly important.

CHAIR WALLIS: Because we knew friction was unimportant anyway.

DR. LANDRY: Right. But this was a way in which we could look at what General Electric was telling us and satisfy ourselves, yes, we do agree that chimney is not terribly important.

(Slide change.)

DR. LANDRY: And on the next slide, we have some of the results of the LAPORE calculations for beginning and end of cycle and in this case we see with the decay ratios that the decay heat ratios are considerably lower than those that were being predicted in the TRACG submittal.

So at least it comforts us that we're not seeing decay ratios twice what they were predicting. It's a lot better to see ratios that are much lower.

(Slide change.)

DR. LANDRY: On the next slide, we've already talked about some of the chimney stability, so if it's okay, I won't go through this in a great deal of detail.

CHAIR WALLIS: I think this may be indicating that when you look at ESBWR design certification, you're going to do some other, some similar sort of checks.

DR. LANDRY: Right. We'll look at the calculation. I think we can skip over to the next slide and get right to the conclusions and this will put us almost right on time.

(Slide change.)

DR. LANDRY: The conclusion which the staff has drawn from the review which we formed is that TRACG is capable of predicting oscillatory behavior in reactor power and flow for the ESBWR and as I've said earlier, this is not an approval of

ESBWR, but only for the application to do the ESBWR analysis. TRACG is capable of tracking a density wave. The numerics will permit an oscillation occur, but not cause the oscillation. Numerics will permit an oscillation to damp without causing or --

VICE CHAIR SHACK: Can instead of will.

DR. LANDRY: Okay. The numerics can permit the oscillation to damp without causing or preventing, if used correctly.

CHAIR WALLIS: Correctly, that's right. Because we know it can damp the Courant number.

DR. LANDRY: But you have to do it right.

CHAIR WALLIS: You have to do it right.

DR. LANDRY: Next slide.

(Slide change.)

MEMBER APOSTOLAKIS: Correctly.

CHAIR WALLIS: But we have an experimental check here, George.

We have an exact solution.

MEMBER POWERS: We just haven't found how to PRA correctly.

MEMBER APOSTOLAKIS: I regret opening my mouth.

CHAIR WALLIS: Please conclude.

DR. LANDRY: Moving right along, TRACG

stability procedure and calculated decay ratio for a steady-state condition, TRACG procedure can be applied to an AOO once a new steady-state condition has been achieved.

TRACG is able to predict oscillations during the start-up trajectory --

CHAIR WALLIS: Why are you restricted there? I mean if it's predicting the AOO, presumably during the fluctuations in the AOO -- it will actually begin to show oscillations if they're beginning to happen.

DR. LANDRY: It predicts the AOO, but the way the procedure is followed for stability you must come to a steady-state condition.

CHAIR WALLIS: It's a crude way of doing decay ratio. If you had an AOO -- if there were big fluctuations continuously and they were growing oscillations on top of them, that would also indicate, presumably, some instability. You don't just have to have a base steady state.

DR. LANDRY: That's a different problem.

CHAIR WALLIS: Right, but during an ATWS, for instance, you might get oscillations superimposed on the transient itself which is quite significant.

DR. LANDRY: We are looking at ATWS right now and we've sent some queries to G.E.

VICE CHAIR SHACK: It's still in the process. I mean if you're going to introduce a perturbation, you have to have state to introduce the perturbation level. But the process almost seems to be set up to look at steady states.

DR. LANDRY: That's correct.

CHAIR WALLIS: That's because of this extraordinary crude way of defining decay ratio. If you're going to look at different frequencies on how they will be amplified, then you get a much better measure of that. Okay.

Let's next time we see you have a better definition of decay ratio.

MEMBER KRESS: We'll have to call it something else because it already has a definition.

DR. LANDRY: Okay, we've noted previously your concern.

The procedures in the licensing topical report are acceptable, but they have to follow procedure that has been provided and the next two slides are slides which refer to which are proprietary and will not be projected.

This concludes the staff's comments.

CHAIR WALLIS: Thank you very much. I

think as a result of your innate professional ability, you've done a very good job presenting this. I give you credit for it, rather than the training you received at the Subcommittee. Congratulate you, very good presentation. I also congratulate G.E. for doing a professional job. I'm very happy to end on time.

Unless the Committee wants to probe this a little further --

MEMBER POWERS: Just a question of Ralph. You have a numerical construction here where I cannot converge to reality by arbitrarily reducing the time step. That surely must imply something -- there's some application for which this numerical construct is not applicable. It does approach reality as the time step goes toward zero.

DR. LANDRY: I think you can say about any code, Dana, that that's true. You can eventually drive any numerical methodology.

CHAIR WALLIS: So you cannot reduce the delta t.

DR. MARCH-LEUBA: You cannot reduce the delta t unless you cut nodalization in half.

CHAIR WALLIS: So you cannot -- there's no way of approach reality asymptotically without having a whole lot of nodes in which you've matched the

Courant number everywhere.

DR. MARCH-LEUBA: Correct.

CHAIR WALLIS: A little disconcerting if you're going to use it as a tool for a lot of --

MEMBER POWERS: Somehow I was operating on the basis that the Courant number was delta t over delta x squared or something like that.

CHAIR WALLIS: Velocity comes into it.

MEMBER POWERS: Somewhere in there, but there surely must be applications where this numerical construct is just not going to be useful. Do we know are those significant or do we know anything about those?

DR. LANDRY: I know what you're asking and every time we've looked at or developed new codes and looked at codes, not even looking at just Courant, there have always been concerns of where can we drive this code to the results being ridiculous. That's part of the job in writing the code, assessing the code and testing the code to find where can you not go with your code, with your numerical methodology.

Yeah, you can always get to that point. You can drive it, but are you driving it in such a way that you're not anywhere close to a realistic way to use the code too? Then you cut the nodes down so fine and we've seen this with codes, where you can cut the nodalization so fine that your results now start to diverge. Going finer and finer and finer does not always mean better and better and better.

CHAIR WALLIS: I think you have a problem if you sort of decide to fix, by regulation, sort of the nodal structure in a system and then it's good for certain transients, but other ones may give our situation where the Courant numbers in certain places are very bad.

DR. LANDRY: That's right.

CHAIR WALLIS: And then you can't just sort of say well legislatively we're going to say 10 nodes are good enough for the downcomer. There may be certain situations where it's not good enough and you've got to use these codes with a lot of sense and someone who knows what's going on has to experiment with them to see if he's missing something.

DR. LANDRY: And that's why we've tried to be very specific. We've gotten to the point today where we're very, very specific in our approvals, so that we try to stay away from that area where the code is being misused.

CHAIR WALLIS: This is why we've always encouraged you to have your own code with your own experts who know what they're doing, who can explore these things and not be bamboozled by some curves that are shown by some applicant.

DR. LANDRY: Right.

DR. MARCH-LEUBA: Can I say something? I was trying before to hold my tongue, but give me two minutes. You've seen a lot of diffusion by the Courant effect and you are reading it wrongly. Let me take you to the extreme of this chimney and when you're inserting a 100 percent void fraction oscillation, a sine wave on the inlet, and you look around to steady state -- not the steady state, but let it run for an hour. At the outlet node, you still have a sine wave coming out with more amplitude. So the decay ratio of the inlet is 1. The decay ratio of the outlet is 1. So all this diffusion we're seeing --

CHAIR WALLIS: We show it in time, but not in space.

DR. MARCH-LEUBA: Let me complete my argument. So all this compression you see is damping you see is in the space, not in time. And the effect on ratio is not 1 to 1. What happens is the pressure drops and the outlet is now one half of what it would have been and that has an effect on the ratio, which is smaller by a factor of 2.

So it's not a linear --

CHAIR WALLIS: The worse case for a loop oscillation is when you get something like a half wave in the chimney in which case you don't have this problem.

DR. MARCH-LEUBA: Correct.

CHAIR WALLIS: Much less attenuating. It's one thing we went into with the Subcommittee, but we don't have time to go into here.

Any more -- thank you very much. Any more questions?

Then we will take a break for 15 minutes until 10 to 11. Thank you very much.

(Off the record AT 10:35 a.m.)

(On the record at 10:53 a.m.)

CHAIR WALLIS: So please come back into session. The next topic on the agenda concerns the hazards analysis associated with the Grand Gulf Early Site Permit and I turn to my colleague, Dana Powers to lead us through this one.

MEMBER POWERS: Thank you, Graham. Members will remember that a few months ago we wrote a letter concerning the early site permit for the Grand Gulf Site. We were fairly supportive in that letter. We did ask for some clarification concerning some geographical continuation of a shock wave coming from an explosion during transportation accidents on the Mississippi River. The attenuation was attributed in the original application to the 65 foot elevation difference between the river and the river and the proposed plant site. The NRC staff asked the Applicant to provide the attenuation -- the clarification on the attenuation.

The Applicant has, instead, produced a probabilistic analysis on the potential frequency of hazardous explosions on this site. So he's taken a different tact on this particular issue. That poses a problem to us. We didn't anticipate that in our own planning and so there has not been a subcommittee meeting concerning the review of this new approach and it's a fairly extensive approach. The Applicant has looked at three different classes of events that could take place in a transportation accident on the site and, as any probabilistic analysis, one has to look at frequency data bases and some up with disjoint probabilities to multiply together to get the results. So it's a non-trivial amount of material.

And we compounded our poor planning by trying to stick this into one hour and we did not anticipated the extensive interaction, so we've only scheduled the staff and not asked the Applicant to speak. All of this, of course, falls immediately on the shoulders of the staff to make up for our poor planning and so without more ado, I'll turn to the staff who has reviewed the Applicant's submission. They have critically reviewed it and have amended it to come up with the input for their safety evaluation report.

MR. ARAGUAS: Before I begin, I want to make sure that the people who are supposed to dial in are, in fact, on the line. Do we have those folks?

MR. BERGER: Ralph Berger here.

MR. SCHNEIDER: And this is Al Schneider.

MR. ARAGUAS: Okay, perfect. Do we expect anybody else? Is that it? Would you guys mind introducing yourselves again?

MR. BERGER: This is Ralph Berger.

MR. SCHNEIDER: And this is Al Schneider with Enercon.

MR. ARAGUAS: Okay, thank you, and for those of you who don't know me, my name is Chris Araguas and I am the Project Manager for the Grand Gulf Early Site Permit. Before we address the concern that was raised or who we resolved this concern that was raised during the December 8th meeting, I just wanted to quickly go through the topics we plan to cover today. As you can see, they're listed on the second slide. That's the first is to over essentially the purpose of today's meeting and then I'd like to follow essentially with what Dana -- reiterate what Dana mentioned which is essentially how we got here. And then I will follow up with the remaining milestones leading up to the issuance of the early site permit.

At that point, I'll turn it over to Dr. Campe, who will run through the regulatory requirements pertaining to the review of potential hazards in the vicinity of the proposed site and then he will also talk to the Applicant's analysis. And we do have the Applicant here in the event that you guys want to direct your questions to them. And then we will follow with the NRC's evaluation and ultimately, our conclusions.

The purpose of today's meeting is to provide both an overview of the Applicant's ultimate methodology regarding the evaluation of the potential accidents along the Mississippi River and the staff's conclusions on the Applicant's -- essentially it deferred from the Reg Guide approach, the Reg Guide

1.91 approach, which is essentially what was assumed to be what they had come in through.

THE REPORTER: Can we have that question again?

MEMBER KRESS: Yes, I'm sorry. I asked what was this an alternate methodology to.

GENERAL COUNSEL CARSON: And the last thing is to address any of your questions at the end of our discussion. As I mentioned and as Dana went through, on October 21st, 2005, the staff issued its final Safety Evaluation Report for the Grand Gulf Early Site Permit Application and on the 8th we met with you -- December 8th, we met with you to discuss the results of our evaluation.

Following that on December 23rd, the ACRS provided the EDO its final letter report and in this report the ACRS documented the concerns raised during this December 8th meeting. Following that letter, in January of 2006, the staff held a conference call with the Applicant in which it requested that the Applicant provide further information to demonstrate compliance with 10 CRF Part 100.

On the 22nd of February of this year, the staff received the Applicant's alternate methodology regarding this evaluation of potential accidents along the Mississippi River and on the 8th of March, the Applicant submitted Revision 3 to the Grand Gulf Early Site Permit Application. Following that on March 27th, 2006, the staff issued a memo to ACRS with the staff's revised evaluation of Section 2.2.3 of the final Safety Evaluation Report which leads us to today's meeting.

As I mentioned, I just wanted to quickly go through the remaining milestones leading up to the issuance of the early site permit and that is following today's meeting, we will be awaiting a letter from the ACRS outlining the conclusions on the staff's evaluation. On April 14th of this month, the staff plans to issue its final Safety Evaluation Report as a NUREG and once the Atomic Safety and Licensing Board has both the final Safety Evaluation Report and the final Environmental Impact Statement in hand, they will provide a date as to when they want to conduct their mandatory hearing and --

MEMBER POWERS: Let me ask you a question about the letter you expect to receive from us. Do you expect that letter to readdress the entirety of the submission or just address this amendment?

MR. ARAGUAS: Yeah, I would assume it would just be a supplement to that initial letter you sent out on the 23rd, just closing out the issue today, hopefully. And following the hearing, we'll have the final decision on the early site permit. And now I'm going to turn it over to Dr. Campe.

DR. CAMPE: As has already been --

CHAIR WALLIS: Can I ask who Dr. Campe is? Is he an NRC staff member?

MR. ARAGUAS: Yes, I apologize. Did you want to introduce yourself?

DR. CAMPE: Yes, I'm an NRR Division --

CHAIR WALLIS: Just for the record, thank you.

DR. CAMPE: Right. As has already been mentioned, and as you see in the first slide here, there's an item identifying Reg Guide 1.91, which has to do with a bounding type analysis if one chooses to take that approach which is what the Applicant had initially submitted. And the results of that analysis did not meet the criteria 1.91 unless one came up with some additional mitigating factors. In this case there was a claim for attenuation of the shock wave due to this elevation difference.

MEMBER KRESS: Where did the one psi come from? Is that over-pressure that would possibly lead to a core damage to much less --

DR. CAMPE: I don't know the precise answer to that. It's -- it is -- it goes back quite aways historically. My general understanding is that that is a measure of where there might be some structural damage to safety-related systems but even that, it's a very conservative view because --

MEMBER DENNING: I think it's more in the regime of you break windows and you could damage very minor --

DR. CAMPE: Right.

MEMBER POWERS: It's where conventional buildings start to suffer some minor amount of damage.

DR. CAMPE: So it's a bounding analysis where --

MEMBER KRESS: So if one were thinking core damage frequency, it's really a conservative --

MEMBER POWERS: It's a threshold for when you go and start looking in more detail.

DR. CAMPE: Yeah, it goes in line with some of the other elements in Reg 1.91. For example, the amount of material involved in the assumed inventory for an explosion are bounding values for the various types of transportation items such as barges or trucks or things of that nature.

Having no real basis for going forth in

this direction because there was no verifiable basis for the attenuation factor, the Applicant chose an alternate method which has been done many times before and that is in the form of a screening analysis. The major differences here are that you now delve into the actual real life data in terms of what is being shipped, how often what type of quantities per shipment and that sort of thing. And this, then is assessed on a probabilistic basis, still of retaining the 1 psi criteria.

MEMBER KRESS: Well, one doesn't invoke a probability that you'll have the explosion at a particular point, just the frequency of it passing by?

DR. CAMPE: No, no, no, frequency is just one element. I'm just -- sample, it certainly does go into the likelihood of a spill occurring and then in the event of a spill, what is the likelihood of an explosion.

MEMBER KRESS: Okay, thank you.

DR. CAMPE: Then briefly, just to characterize, describe the Applicant's analysis, they did perform an initial screening of essentially everything that's going down on the river past the site, looking for those things that would be identifiable as hazardous substance so that you can dismiss things like corn or coal or things of that nature. Then the commodities that were identified were screened or data were obtained for these commodities in terms of quantities and frequency of shipment, along with physical properties and that sort of thing.

MEMBER KRESS: Excuse me, back to my previous question, you get the probability of a spill by just data but that's a probability of a spill anywhere on the river?

DR. CAMPE: The attempt is to make it as site specific as one can. For example, there's a general recognition that conditions are different whether you're in open sea, in port areas where there's high traffic density or inland waters, rivers, so that differentiation was folded into the analysis to look to what extent the data can be gleaned to something that is applicable to the Mississippi River in the vicinity of the site.

MEMBER KRESS: Okay, I appreciate that.

DR. CAMPE: But it's not focused to the point of so many feet here from here to there. It's the Mississippi River as a navigable water was one source of data for this that was relevant.

MEMBER KRESS: Okay, that's likely to be

a conservative estimate.

DR. CAMPE: It was done in -- every step of the way there was due reflection of the conservatisms whenever there was something that was not precisely, no.

MEMBER POWERS: One of the things that I didn't quite understand, in researching the data base, they, of course, found data for ocean-going events, port events, and this is not one of those positions. It's a part of the river where there are no real cross-traffic. There's a port, it's kind of a pseudo port. So you can understand why they excluded that, but they also seemed to exclude events that had occurred on rivers other than the Mississippi. And I didn't understand, why wouldn't those be applicable?

DR. CAMPE: I can only say that in a large sense, the conditions may vary from one inland waterway to another, just by the very nature of the size of the river and the characteristics of the river itself. I can't think of any other reason why you would want -- why one would want to exclude data on an inland river.

MEMBER POWERS: It's very explicit that they did so and, I mean, that's the only thing I could think of is that you know, what's the other inland river way that's going to be -- have a high frequency since for this analysis, the Ohio is considered part of the Mississippi. The only other one I could think of off-hand was the St. Lawrence Seaway and maybe that's so different that you just don't count it.

MEMBER ARMIJO: Could I ask a question? Is there any reason why explosives, construction, military applications, I mean, legal not terrorists, why they aren't included in this list?

DR. CAMPE: What is included in the list is what was found in the actual -- actuarial data of what was being shipped on the Mississippi River.

MEMBER ARMIJO: It doesn't preclude that other things could be shipped in the future.

DR. CAMPE: Theoretically, yes. You could have -- this is a what if statement that holds in every case.

MEMBER POWERS: You might on this list, just clarify for the members what's meant by acyclic hydrocarbons.

DR. CAMPE: I don't have a detailed precise answer for that. My general understanding is, it is a grouping that is on the basis of chemical properties that are applicable to a group of substances that have similar properties.

MEMBER POWERS: Well, in particular, it includes acetylene.

DR. CAMPE: Correct. The screening and analysis which I'll go into a little more detail later, but just at this point, just to introduce the fact that there were three basic elements in that analysis segregating the potential events into events that are analyzable by different methods. And those were three types of possibilities. One was where you have the potential for detonation of a confined folding of flammable vapor. The other one is where the flammable substance is released in a spill and a vapor cloud is allowed to form and ignition takes place in which a way that it is essentially in situ or in the immediate vicinity of the mishap itself.

And finally, recognizing the fact that there is a possibility of delayed ignition, modeling them takes into account the possibility of vapor cloud forming, not igniting immediately, drifting, introducing meteorological factors and drifting towards the site and then evaluating the over-pressure at that point. So these were the three basic elements of the analysis and as I mentioned before, the measure, the criterion for this was whether or not you exceeded 1 psi at the proposed site.

MEMBER APOSTOLAKIS: Well, I would like some clarification here.

DR. CAMPE: Yes.

MEMBER APOSTOLAKIS: The way I understand it, Regulatory Guide 1.91 imposes this traditional deterministic requirement that the over-pressure should be less than 1 psi.

DR. CAMPE: Correct.

MEMBER APOSTOLAKIS: Does the Review Standard 002 change that to a probabilistic criterion? I mean, what is the difference between potential for greater than 1 psi and the requirement of over-pressure at site be less than 1 psi? Are you allowed to use probabilities to show that the likelihood of the over-pressure is very small?

DR. CAMPE: That is essentially the approach taken here, right. It's --

MEMBER APOSTOLAKIS: The NRC has approved this at some point. Is that part of the review standard or -- I mean we're taking a deterministic criterion and all of a sudden we are assigning probabilities to it.

DR. CAMPE: The --

MEMBER DENNING: Yeah, they can't -- at least with the simplistic calculations, they cannot meet the deterministic criterion. So the analysis that we see is indeed a risk analysis that says the probability of this event is so low that it can be --

MEMBER POWERS: And the licensee -- I mean, the Reg Guide only prescribes an approach that's acceptable to the staff. The Applicant is always allowed to take his own approach to this.

DR. CAMPE: The Review Standard does talk about probabilistic approaches as a method of doing that.

MEMBER APOSTOLAKIS: Does allow it.

DR. CAMPE: Correct.

MEMBER APOSTOLAKIS: And there is an idea or a suggestion as to what kind of probability is considered very low?

DR. CAMPE: 10^{6} is the acceptance criteria.

MEMBER APOSTOLAKIS: That's low. That's per year?

DR. CAMPE: Correct.

MEMBER APOSTOLAKIS: Okay.

DR. CAMPE: Having developed a list of materials that had the characteristics in terms of flammability properties and other physical properties, generated a list of materials that then were analyzed specifically for the over-pressure hazard and the list, as you see here, is -- identifies materials such as crude petroleum, gasoline, liquified natural gas, naphtha, cyclic hydrocarbons, which as pointed out earlier, was -- includes the commodity acetylene and finally, benzene, toluene, alcohols and ammonia.

The data that we're used in obtaining the information about the commodities and their shipment frequencies, quantities, are listed in Slide 10. It identifies the Army Corps of Engineers, the Water Borne Commerce Statistics Center, data that was specifically referred to as past the point data for 2003/2004. This is what was actually going past the site.

MEMBER KRESS: The Applicant developed this?

DR. CAMPE: Correct. And the frequencies then were listed in the submittal both in terms of the tonnage, the average, the maximum tonnage, the average tonnage, the number of times per year. Now, the three elements of the analysis that I had identified before are outlined here in a little more detail. Just very briefly on the confined explosions, the assumption is that in the event of a mishap, you lose the contents, the liquid contents of the container that's containing the substance to such an extent that now you have the remaining volume filled with a vapor that's within the upper and lower probability limits and it's a fairly straightforward calculation, if you detonate this, what the over-pressure would be.

MEMBER KRESS: If you have 50 drums of gasoline, do you use all 50 of them or just one?

DR. CAMPE: I'm not sure that that was looked at specifically in terms of drums because that would give you a lower insult than if you had lost your containers. So normally, in the analysis, what it was assumed that the entire cargo was available for the spill.

MEMBER KRESS: That's really my question, yes.

DR. CAMPE: And then, actually, the volume then was determined by taking the densities involved of both the liquid and the vapor and when you spilled all of this, what was the remaining volume in terms of vapor is what was used in the explosion analysis. And in the event of the vapor cloud formation, the two alternatives were you had initial early ignition or delayed ignition, there would be resulting differences in the analysis, the major difference was that in the latter case with cloud delayed ignition and drift, you had to invoke some kind of meteorology characteristics and again, the meteorology that was used there was conservative in the sense that there was a -- Class D stability was used and wind speed, if I can recall correctly, I think it was one and a half meters per second.

MEMBER POWERS: One aspect, especially on the confined and the vapor cloud at the mishap location that I did not understand was some substantial argument is made in the course of the presentation that barges are transported up and down the river in gangs. And so if I have a mishap on one barge, it's relatively inconsequential to the site. It may be very consequential to the remaining barges and their event seem to me could pose a threat. Is there a reason that they didn't look at one barge triggering another barge, triggering a third barge?

DR. CAMPE: The staff looked at that very same question and we, in fact, submitted a request for additional information from the Applicant regarding that. However, it was -- there are two parts to that. The potential for simul -- or detonation from multiple barge spills to be additive for over-pressure calculations would necessarily invoke simultaneity. That the spill and ignition and detonation would have to occur at the same time.

This issue has been addressed on a number of occasions in the past in much more severe situations than this. I can point to an example where actual -- analysis of actual munitions, ordinance involving military explosives in railroad cars, which are very closely coupled. They're much more intimately coupled in terms of proximity. The final results of the analysis were that you're really -- if you had separation of events by even relatively short periods of time, milliseconds, you had then, identifiably individual events rather than an additive single event.

So in our minds the simul -- these events made it very unlikely that you would have to contend with multiple detonation occurring at the same time. However, what is a lot more realistic to consider is in the event of a mishap involving multiple barges the rupture and spill of your materials. There you do not have that restraint of simultaneity. You have a chance to spill quantities that are not necessarily limited to a single barge.

The response we had was, I believe reasonable in that the quantities that were analyzed and used in the analysis, the shipping quantities, invariably were larger than the sum total of the individual holdings of each barge. In other words, the barges by and large in the shipment data, showed non-maximum capacity in multiple barge shipments. So the quantities involved covered that eventuality of -- or that question of multiple spills whether or not you considered it.

Also there was the consideration of compartmentized containers which would make it difficult to do -- to -- or a low likelihood of rupture, simultaneous rupture of all the separate compartments. And in addition, more and more of the shipping is now going into double-hulled structures. So, again, the question of simultaneous rupture and spill of everything in a particular tow, at least on a quantitary basis, there's a reasonable argument that that's a very low likelihood. So we have looked at the multiple barge scenarios.

MEMBER POWERS: Well, maybe just one other question. Thinking again, about the confined or the mishap location explosion, what the Reg Guide asked you to look at and what was looked at is what the over-pressure is at the site itself. But it seems to me that there's also some threat from missiles generated by the explosion itself. Now, I recognize getting a missile of sufficient size to travel a mile and a half and hit, I mean, the probability is very low but did anybody look at that probability?

DR. CAMPE: The analysis did not explicitly include that. On the other hand, the staff would be looking at -- this is a normal part of site hazard review, it's site proximity missile. Usually that comes into play when the geometry is such that you have a nearby event, something that's essentially at the -- let's say almost at the site boundary where you -- the event itself generates a multitude of missiles and it's just a question of whether one or more of these may be energetic enough to do some damage.

Here we have a situation where you have, as you had pointed out, something a little over a mile in distance. So by inspection you can say the event itself, the initiation of a mishap happening, a spill occurring and then ultimately an explosion taking place, is already a relatively low likelihood number. Now, in addition you have to contend with the solid angle suspended by the site versus the source of the missiles and by the time you take into account the strike probability, if you will, the perception is that the number would be extremely low and for that reason, it would not be looked at.

It would certainly be looked at if this was right -- differently if it was right at the site where geometry did not play a key role.

MEMBER ARMIJO: I have a clarification. What is the boundary for that one and a half mile? Is that the middle of the channel or is that the shoreline? Where are we measuring from?

DR. CAMPE: I believe it's the near shore of the river. It's not the mid-point of the river or anything like that.

MEMBER ARMIJO: So if a barge runs aground, spills something, explodes right along the shoreline, would these calculations be --

DR. CAMPE: Uh-huh, right, that's how it was modeled, right.

MEMBER KRESS: I'm curious about the calculations. I'm envisioning you take a given amount of vapor and put it in a volume and do an adiabatic burn to get the pressure and then you do a $1/R^2$ attenuation up to the site. Is it something like that?

DR. CAMPE: Uh-huh, for which part, for the missile calculations?

MEMBER KRESS: No, no, no, for the

explosion over-pressure.

DR. CAMPE: For the over-pressure you go through a -- what is usually referred to as the TNT equivalency approach where you take that amount of vapor in the volume --

MEMBER KRESS: I see.

DR. CAMPE: -- then you convert that to an equivalent mass of TNT and again, using the Reg 1.91 type of conservatism of 240 percent conversion.

MEMBER KRESS: Okay, I understand, thank you.

MEMBER SIEBER: Reg Guide 1.91 does not discuss missiles.

DR. CAMPE: No.

MEMBER SIEBER: And so really the Applicant is addressing the question with regard to the Reg Guide and that confines itself to the explosive aspect.

DR. CAMPE: Right, but missiles -- missiles normally are considered when they are relevant to the accident scenario.

MEMBER SIEBER: But not under that Reg Guide.

DR. CAMPE: No.

MEMBER SIEBER: Right.

MEMBER POWERS: But just to elaborate a little on Dr. Kress' comment, the Reg Guide in its references also go through when 1/R and $1/R^2$ are the appropriate dissipation rates there. Just anticipating where you were going.

MEMBER KRESS: Thank you.

DR. CAMPE: Now, getting into a little more detail on the three elements of the analysis, with respect to the confined explosions, the results show that none of the commodities that were identified have the potential for exceeding the 1 psi at the site. However, with respect to vapor cloud explosions, the -- most of the commodities did have the capacity of exceeding the 1 psi at the proposed site. There were a few commodities such as the alcohols, ammonia and acetone that were not in that grouping because of very high solubility in water so that spills were envisioned interacting intimately with the river water and there was very little opportunity for formation of a vapor cloud.

And then finally LNG was not included by the Applicant because of the argument that detonability explosion likelihood of LNG was -- in an unconfined vapor cloud format was very unlikely.

MEMBER POWERS: Let me ask a question

about that. It seems to me, my recollection is that when people looked at the possibility of setting up an LNG terminal on the Charles River in Boston, that they looked at the potential for having a spill of liquified natural gas into the Charles River and getting a fluid interaction not dissimilar from pouring water on molten lava and calculated the detonations would come from that. Was that looked at here?

DR. CAMPE: I'm not aware of that particular scenario being explicitly looked at by the applicant or the staff for that matter. However, even though I may be getting a little bit ahead of myself here on this slide, the staff did not use that same approach as the Applicant in that we did recognize the potential for LNG of -- under certain circumstances yielding an over-pressure and an explosion and detonation type of event. So for that reason, in the staff's confirmatory analysis, we included LNG in our list when we did the risk estimation.

Finally, in the third possibility is where you have a vapor cloud that undergoes delayed ignition so there's an opportunity for it to drift in whatever direction and then of course, one assumed in the analysis that the direction is towards the site. In that analysis, the only substance that produced -- had the potential for producing an over-pressure greater than 1 psi was identified as acetylene.

Having done this type analysis for each of these substances, the Applicant had estimated probabilities for exceeding 1 psi, as indicated in this slide, in the range of somewhere on the order of 10^{-10} to 10^{-8} explosions per year which then, of course, has to be aggregated into a total risk and a total probability when you consider all the commodities that were analyzed was estimated to be about three times 10^{-8} explosions per year.

The staff, in looking at the analysis that was submitted, saw that the approach, the basic approach of a screening analysis using actual shipping data, was a reasonable one. It's done in many cases in various modes of transportation, not just aircraft, railways, trucks and so on. However, there were some isolated elements in the analysis that were difficult to verify or accept and so we -- the staff did a confirmatory analysis in which it used those parts of the Applicant's data that were reasonably established and then introduced our own assumptions and modeling where we felt there was insufficient conservatism or insufficient verification.

The staff used, as indicated on Slide 14 here, maximum shipping frequencies for the commodities. The mishap rate was intended to cover whatever uncertainties there may be by a sufficient margin, so a 10^{-5} mishaps per barge river mile was used when, in fact, we have references that indicate that it would be something -- for inland waterways such as the Mississippi it would be significantly less.

The spill rate was obtained by using data in the submittal and it was simply obtained by taking the spill rate per year per mile, dividing it by the mishaps per year per mile, to give a specific spill rate per mishap. The spills themselves as the data shows, vary in frequency as a function of the size of the spill. As one might expect, the likelihood of a small spill is much, much greater than one that is catastrophic you might say, losing the entire cargo.

There was a frequency -- spill size frequency correlation that the Applicant performed to allow one to establish a relationship between size and frequency in order to address each individual commodity when calculating the risk. The method of calculating the correlation was somewhat difficult to take into account because the binning that was used was variable, it wasn't a constant binning. The size of the spill was -- one bin was let's say from 10 to 100 gallons, then the next one is 102, 1,000, 10,000 I can't remember the exact numbers but the bin size was variable. And then mid-points of these bins were used as the data points.

It just is not as rigorous as one could make it. The staff did a more traditional approach of developing a probability distribution function, using a log normal representation, a reliable representation. The net result of the confirmatory analysis on the frequency distribution of spill sizes, it turns out that it didn't make that much -- in fact, it made a very small difference between the two approaches. We believe this is fortuitous in this case and it's largely because the relationship between the spill size and frequency is a monotonically decreasing function. That's what the actual data indicate. So it's a well-behaved function and so the treatment of binning a zone is not as sensitive to it. Had the data been in some other functional form this may not be the case.

Finally, given the spill, what is the likelihood of an explosion? The Applicant looked at actual data and made an estimate of that likelihood and it was estimated to be, as indicated here, .008

explosions per spill. Here again, the Applicant went further by making an assumption that the actual likelihood is a factor of 10 lower than that because there was some reason to believe that not all of the fuel inventory was involved in the detonation that was recorded in the actual mishap description.

CHAIR WALLIS: I'm sorry, you said the Applicant didn't feel this was the NRC's analysis?

DR. CAMPE: I said there were parts of the Applicant's analysis that we used --

CHAIR WALLIS: That you used, okay.

DR. CAMPE: -- if we found it was reasonable. We did not find a factor of 10 reasonable. There was no visible basis, verifiable basis.

CHAIR WALLIS: Okay, thank you.

DR. CAMPE: So we went ahead and used the 008 rather than the factor of 10 reduction.

CHAIR WALLIS: Thank you,

DR. CAMPE: And finally, the risk at length, this is the distance of river on either side of the site beyond which you would be too far away to put it in so many words. And we confirmed that they did a reasonable estimation of that. It was in the range of a little over two miles to three miles.

MEMBER POWERS: To calculate --

DR. CAMPE: Please go ahead.

MEMBER DENNING: I was just going to ask with regards to the correction of the density function treatment that they did for spill rates, have you modified your SER to comment on that and to put in your corrected analysis?

MR. ARAGUAS: Yes, that's correct, we did modify the SER to incorporate the comments that Kas previously just make.

MEMBER POWERS: Dr. Denning, were you going to ask about the calculational tool used to find these distances?

MEMBER DENNING: Well, specifically, I had some concerns about the ALOHA code that I had commented on and I was wondering whether you had taken a look further at whether there's any validation of that ALOHA Code for this type of analysis.

DR. CAMPE: We did not evaluate the ALOHA code, per se. We did have some questions that we had asked the Applicant regarding some of the characteristics of the code to give us a basis for to what extent we can rely on it. It didn't seem to me like there were any potential for precipitous type of anomalies that would say they're way off. There may be some questions of accuracy but we didn't go into th extent of evaluating the code itself.

The analysis then yielded similarly a range of likelihoods for exceeding 1 psi on the basis of our confirmatory analysis and the range, as indicated in Slide 15, is roughly a range of order of magnitude 10^{-8} to five times 10^{-7} per year and if you add up all the commodities, you get on the order of 10^{-6} explosions per year as the likelihood of exceeding 1 psi.

In conclusion, then, I think his has already come out in the --

CHAIR WALLIS: Well, when you say order of you mean, one tons or three tons? What does that mean, order of?

DR. CAMPE: I'm sorry?

CHAIR WALLIS: When you say order of 10^{-6} do you mean it's between five 10^{-7} and three 10^{-6}? What do you mean by order of?

DR. CAMPE: Approximately something in that range. In other words, if I had a number like let's say eight time 10^{-5} that would be considered --

CHAIR WALLIS: The criterion is 10^{6} isn't it, one times 10^{-6} is the criterion you're using?

DR. CAMPE: The criterion is --

CHAIR WALLIS: Or is it a very fuzzy criterion?

DR. CAMPE: It is fuzzy in that you will always find the modifier approximately or about in the Reg Guides, in the Standard Review Plan, it's treated that way because the numbers themselves are not that precise and it would be difficult to prescribe precision to that.

MEMBER POWERS: Had you not put the approximate sign in front of it, we would have interrogated you on the opposite.

MEMBER DENNING: We wouldn't put much credence in the number itself but just from curiosity sake, when you added up all the numbers, what did you get?

DR. CAMPE: I don't have this on a slide, it wasn't --

MEMBER DENNING: To what significant --

DR. CAMPE: -- 10^{-6}. It was something close to that.

MEMBER DENNING: But it was above 10^{-6}, wasn't it?

MALE MEMBER: (Inaudible)

CHAIR WALLIS: So it was less than 10^{-6}.

DR. CAMPE: It was slightly less.

MR. BLUMBERG: It was on the order of nine times 10^{-7}.

THE REPORTER: And your name is?

MR. BLUMBERG: Mark Blumberg.

CHAIR WALLIS: So less than, I understand.

MEMBER POWERS: Well, Graham, you're understanding nonsense. No one is going to stake his reputation on this number being less than --

CHAIR WALLIS: I understand that, too. I understand less than. What you mean by approximately could be an order of magnitude.

MEMBER POWERS: If we were standing here arguing 10^{-3} was less than -- was about 10^{-6}, it might be a subject for discussion.

DR. CAMPE: This is also in the backdrop of the guidance that we have in the Review Plan that says in actuality, if you take 10^{-6} -- the reason 10^{-6} is an acceptance criterion, is that if you have qualitative arguments of conservatism that allow you to believe that it is actually something far less than that, then that's the situation we're in, if you take all the conservatisms that are embedded in here.

Just by way of summarizing and the conclusions, the Applicant's data for estimating the shipping frequencies and quantities, the mishap rates, the spill likelihood, were found to be reasonable and the -- there were some other portions as I had mentioned before were not easily verifiable and we therefore, performed a confirmatory analysis.

The main difference, the main factor, I believe in the differences are the factor of 10 reduction factor that the Applicant had used in lowering the definition of explosion. So the conclusion is that even with the confirmatory analysis and using more conservative values the likelihood of exceeding 1 psi is still within the acceptance criteria.

MEMBER DENNING: Could you provide us with a copy of the modified SER to take a peek at? There was some wording that we had also commented on and we'd just like to take a look at that.

MR. ARAGUAS: Yeah, I can get you a copy right after this meeting.

DR. CAMPE: That ends my presentation, thank you.

MEMBER POWERS: Let me, again, referring to the LNG vapor cloud denotation probability, you essentially took that as one?

DR. CAMPE: I'm sorry?

MEMBER POWERS: Given a spill of liquified natural gas, and the production of a vapor cloud, you took the ignition probability for that as one?

DR. CAMPE: Yes.

MEMBER POWERS: So the intrusion of a liquid, liquid explosion cannot change that ignition probability.

DR. CAMPE: Not -- I can't see how, no.

MEMBER POWERS: I mean, it's just a clarification on what you did. Do members have any additional questions?

MEMBER ARMIJO: I had a question on the maximum shipping frequency. Is that for -- how did you determine that? That's for the future, how many years into the future? How large it's going to be? Was there any adjustments for that?

DR. CAMPE: The principal source of data were actual shipping data for the years 2003 and 2004. And there was some variability in that. We took the larger number and then went on top of that. In other words, for example, I believe acetylene showed 14 shipments one year and nine shipments the next year. We used 20 in our analysis. Now, that might sound somewhat arbitrary, but it's not in the sense that we also looked at the trends --

MEMBER ARMIJO: That saturated?

DR. CAMPE: -- and they're kind of horizontal. And then on top of that, we're also aware of the fact that if you look at barge mishap rates, per se, they have been traditionally dropping down every year.

MEMBER POWERS: I did not communicate this to you but I was struck by the analysis of 914 and you came up with 20 and I said, gee, why is that reasonable. So I did some sort of a poisson analysis and said, indeed had I done it, I would have come up with an 18 or 19. So to the extent that that's comforting, an independent analysis came up and said 10 was not a bad number to guess if you were trying to bound things.

MEMBER ARMIJO: Well, my question is kind of addressing the situation where somebody else has decided that that particular channel is going to be the route where they start putting in 50 barges a year of natural gas. That has been looked at, you know, there's no big plans for changing to something over limits.

MEMBER POWERS: In fact, one of the good things about both the application and the SER, you weren't here for that discussion, is I think they good a fairly aggressive effort to go out and find out what people's planning was. I mean, there was effort in that direction and, of course, that doesn't preclude the fact that tomorrow somebody could come up with something. Maybe we want to address the issue of suppose things change. You know, suppose tomorrow somebody decides we just have to build the world's largest international airport next to the Grand Gulf site to handle all the FEMA people that are flowing into --

DR. CAMPE: Well, I think that concept exists with respect to every operating plant in the country. It's what I would call a what if -- there are two basic ways to look at this. There's the what if question and then there's the trending question. Normally, this is why we look at end of life conditions when it comes to projecting population distributions, traffic rates, whatever in order to assure ourselves that it's not a snapshot picture today and then things will be different later.

The what if question is an open-ended question and I'm not thoroughly familiar with what regulations address that specifically if at all or whether there is just a general understanding that this sort of thing would not go by unnoticed. I cannot answer that.

MEMBER MAYNARD: Well, there's also other restrictions on transportation because nuclear power plants aren't the only thing potentially impacted. You have cities and other things along the waterway that if there's a significant change in what's being transported, there's other requirements and restrictions and other things that come into play for approval of that.

DR. CAMPE: A good example of that is, which is the natural case, is when somebody mentioned about airport building. Airport construction is not within our jurisdiction. We do not have any control over whether an airport goes up or not. FAA, however, does. And whoever is in a position of planning an airport has to go to FAA for permission, the license, what have you. And they go through alternate site studies, environmental impact studies. The FAA does an evaluation and invariably, if they are aware that there is a nuclear plant in the vicinity, as has happened before, they turn to the Commission in saying, "Here is the submittal, the Environmental Impact Statement, the Alternate Site Study, whatever. What do you think"? We have had opportunity to evaluate the alternate sites and say, "The following ones have no problems. These two give us some heartburn", and we provide that input to FAA.

They have a list of factors they evaluate when the approve a site, aesthetics, economic need, and safety, vis-a-vis, a nuclear plant. So those kind of mechanism I would expect to be at play if what if happens.

MEMBER MAYNARD: And the FAA does have requirements. There's restricted areas around power plants right now and they're not going to approve something that would restrict their airflow right around the airport. So there's other restrictions there.

MEMBER POWERS: Correct my interpretation if it's wrong, but my interpretation of what you'd said is that we don't indulge in the what if because it's unbounded, but we have a mechanism to handle if what if becomes reality.

DR. CAMPE: Not quite. If there is a mechanism, what I said was I personally am not aware of it. I would have to defer to people who are in a better position. The legal people would have interpretation of regulations. I cannot, myself, answer that.

MEMBER POWERS: Do members have any additional questions they'd like to pose? Our intention, of course, is to write a letter that will be supplemental in nature. It will speak only to this new addition to the application and to the SER. Thank you very much.

MR. ARAGUAS: Thank you.

MEMBER POWERS: Mr. Chairman, thank you.

CHAIR WALLIS: Thank you. We are going to take a break shortly. I'd like to announce that we intend to have our letter writing sessions and probably also the PMP meeting of this committee upstairs in Room 4B6, which is much more convenient for the showing of our letters on screen and actually talking around the table than this room is.

MEMBER DENNING: In this building.

CHAIR WALLIS: In this building, 4B6. It's on the fourth floor, B6. That's where we intend to go unless you let me know that that would somehow horrify you. When? Today, it will be at 4:45 on the writing letters. When we're writing letters. Our meetings that will be on the transcript will be in here for the next two days. All right?

VICE CHAIR SHACK: 4B6.

CHAIR WALLIS: 4B6. Right, and we'll let you know later again. Okay, we're going to take a break. Since it's difficult for this committee to remember anything other than whole numbers, I suggest we take a break till 1:00 o'clock. I think we might have a good chance of catching up during one of the afternoon meetings. Thank you.

(Whereupon at 11:54 a.m. a luncheon recess was taken.)

AFTERNOON SESSION

1:01 P.M.

CHAIR WALLIS: Please come back into session. The topic now on the agenda is Safety Conscious Work Environment and Safety Culture. My colleague Mario Bonaca is going to lead us through this one.

MEMBER BONACA: Yeah, we're going to hear about NRC safety culture activities and we met in January and we had a subcommittee meeting where we heard a presentation about some of the details, the selection of a thing called components for safety culture, how they were fitted under the three cross-cutting issues that belong to the ROPs now and we have also received a number of procedures, inspection procedures, that really describe how the process is going to be implemented. And one procedure we have not received yet is 93-003 that would describe the way that an independent evaluation of safety culture can be or should be conducted.

And, of course, that's a critical procedure because it would define the constraints for what's going to be done, how do you enter into that procedure, how do you come out of it and how our licensees will come out of it. And that's an important issue.

We're going to hear today progress to date and we have chosen to also probably write a report on this although we have not had in hand final documentation. And the reason is that we would like to contribute to the process of developing this new initiative. So with that, I will turn to Mr. Johnson and we'll proceed with the presentation.

MR. JOHNSON: Thank you. My name is Michael Johnson. I'm Chief of the Office of Enforcement and head of the Safety Culture Initiative. I'm joined by Jim Andersen, who is Chief of the Performance Assessment Branch NRR, who will be making the majority of the presentation this afternoon. And I'm also joined by a host of folks including the Safety Culture Committee members and folks who were in the working group who participated in the development of the activity sitting in the audience.

As was mentioned, we briefed the subcommittee, the joint subcommittees on factors in PRA and reliability in January regarding our activities of -- our activities to date and our plans to enhance the ROP in response to the direction that we were given by the Commission. And specifically we addressed the approach actually in a fair amount of detail, we talked about that approach.

We talked about components and what the -- the components as we see them with respect to safety culture. We talked about international activities and I should mention that Jay Basinski (phonetic) is on travel today, he's not here in case specific questions. We'll attempt to field them, of course, Jay is not here today. And in addition, we talked about the major remaining activities and plans that we have with respect to going forward on this initiative. And then, of course at that time, the subcommittee has asked that we come back and brief this month, in April.

The purpose of the briefing, I really think is to touch on the approach, touch on the approach -- you'll find that there are a fair number of slides on the approach but we'll only do that to the extent that you want us to go again over the approach because it was covered in a couple of the previous meetings. But we really want to emphasize, I think, progress since January and our remaining plans. As you're going to hear in the presentation that Jim will make, we think we've made considerable progress. We've nearly completed translating the approach and the detailed procedural changes, those very procedures that you've seen.

We're preparing training. We'll talk about that in a little bit. We've identified some transition issues and how we phase into implementation so that the industry and the staff can fold out this in a smooth manner. We're transferring also leadership to -- from the Office of Enforcement over the NRR. In fact, Gene Cobey was here in the previous presentation. Gene is back in his job and the reason Jim Andersen is here, NRR is really the program office. NRR is taking back leadership for this activity.

And the bottom line is, I think we're on track to implement going forward in July. I should mention the one procedure that you have not seen, it's 95-003. We plan to make it available on the 3rd of April. The safety culture portion of that procedure is ready to go. As I was going through the final words in that procedure late last week, we discovered that while we had done a good job, I think with Safety Culture, we had inadvertently changed some parts of the procedure that were -- that we didn't need to change. We've done 95-003 inspections in accordance with the procedure all along. Our intent was to fix up the safety culture piece, not touch the other stuff and so we're going back to make sure that we didn't inadvertently make those kinds of changes. We hope to have that procedure available ready tomorrow, unfortunately, not in time for your review today.

From an implementation perspective, I think with respect to 95-003, we're okay with respect to going forward and what I mean by that is we -- first of all, I should tell you, while we were working all of these things in parallel due to the time constraints that we had, we saved 95-003 till the end because we recognize we only have one or so of these. We budget for one of these a year.

Oh, by the way, we don't have any outstanding 95-003 inspections that we plan on doing and so we have some time before we would need to exercise this procedure. Also 95-003 is a big deal. It's going to be the first time we go out and do an independent evaluation on safety culture and so we did not want to rush to get it out and then have, as a result that we've rushed on that, either go out with the wrong kind of a procedure or do it badly, let me just leave it at that. And so we've taken the time to do it in a deliberative manner. We think we still have time. We've talked with the industry. They understand that it's going to be coming any day now.

They're going to be able to give us comments on that. We've got time to factor those comments in and again, get to implementation in the time frame.

So again, I'll stop there with respect to lead in. I think we've -- as you will remember, we were given some fairly specific guidance by the Commission in terms of how we approach that. I think in essence we've met that guidance. Hopefully, you'll agree. Jim?

MR. ANDERSEN: Like Mike mentioned, my name is James Andersen. I'm in the Performance Assessment Branch in NRR. It's one of two branches that support the ROP implementation in NRR. So I'm happy to be here to discuss the safety culture with you. I'm going to start on Slide 4 of mine.

Basically, like Mike said, the purpose of today's presentation is to provide a short overview of the approach regarding the treatment of safety culture within the ROP. Like Mike mentioned, we have discussed some of -- the definition of safety culture, how we went about and selected safety culture components and also discussed in some detail, the proposed approach. My plan is to go over that proposed approach again and also then get into basically the current status of staff activities.

I will, you know, go at your speed. If you want to stop me, please do. Hopefully, I've left a lot of time for question and answer.

MEMBER POWERS: It seems to me that one of the concerns that arose is not just how you get into this implementation of this but once the licensee is castigated for having a bad safety culture, how in the world does he get out of the situation? Are you going to cover that area?

MR. ANDERSEN: It wasn't in the slide package, but I can when we get into --

MEMBER POWERS: I think we would be extremely interested in that.

MR. ANDERSEN: Okay.

MEMBER BONACA: Now, if I understand as part of that procedure, 95-003 that they have not completed yet. We haven't had the opportunity to review, but that's a very important issue because, I mean, it's interesting how you look at the 75, whatever the identification and resolution, the problem typically is the solution or the required actions are pointed in a certain area. Once you go in and you have an 95-003, it means everything is being questioned, whether or not you have any findings in some of the areas. And so it's a big deal how you get in. It's a big deal how you get out.

MR. ANDERSEN: Okay, maybe as I go through, I can address that. I think the answer is different depending on what the procedure. When we're in the problem identification and resolution procedures, 71-152, that will be a different criteria on how to get out than if we're in 95-003.

MEMBER BONACA: Yeah, it's a resolution of a specific issue, it's easier to understand than to -- what is consistent with the normal inspection process, find the problem and ask for resolution.

MR. ANDERSEN: I have a slide on 71-152 and also on 95-003, so when we get to that point, if I haven't answered the question, please.

A little background, back about a year and a half ago the staff prepared a Commission paper on several options related to safety culture. In response to that paper, the Commission issued an SRM that put boundaries on what the staff could and couldn't do and that was important as far as the safety culture working group was concerned because there were certain areas they wanted us to go in and certain areas they didn't. So I tried to capture some of those on the slide here.

First, they asked us to enhance the ROP

treatment of cross-cutting issues to more fully address safety culture and we did that through some modifications we made to the cross-cutting area of manual chapter 03-05 which is our assessment process. The proposed to develop a process to determine the need for conducting a safety culture evaluation at plants with a degraded cornerstone.

We did through our work on 95-002, which is the inspection when plants get into the degraded cornerstone of the action matrix. We'll talk about that in a little bit. And they also told us to develop a safety culture evaluation process and that's what we've done now in 95-003 and which we get into in Column 4 of the action matrix, the multiple repetitive graded cornerstone column.

They asked us to insure that inspectors are properly trained in safety culture and I have a small couple slides on training and what we're doing in that area to address that. And they also asked us to involve stakeholders in making changes to the ROP. As Mike briefed during that last meeting and Gene Cobey, we had a number of interactions prior to that subcommittee meeting and we've had a couple more since then and external stakeholders have also given us some comments on the procedures which have been made public on with respect to 95-003.

MEMBER POWERS: Do you -- I'm sorry, go ahead, George.

MEMBER APOSTOLAKIS: There is this emphasis on the reactor oversight process. We also have other programs, right, like flow accelerator corrosion and all that, in-service inspection and all that. Is it possible that issues of safety culture may be raised in the context of those problems or is it just in the ROP?

MR. ANDERSEN: You're talking about the inspection procedures for in-service inspection?

MEMBER APOSTOLAKIS: Yeah. It's unclear to me what role those would play.

MR. ANDERSEN: I would say whenever the staff is out doing inspections, we're always looking for issues regarding safety culture and that's part of the training that we'll do, it's just to make the inspectors aware of the safety culture components, where they're documented in our inspection guidance. And then if we want to further explore that area, if there's a specific performance deficiency or finding that we're addressing in say the in-service inspection program, we can utilize portions of inspection procedure 71-152, what do we need to do to go ahead and inspect that. So -- yes.

MEMBER APOSTOLAKIS: So it's not then just the ROP.

MR. ANDERSEN: Well, the inspection procedures for, say, in-service inspections, our part is the ROP. They're all part of the baseline inspection program. We do it all the time.

MEMBER APOSTOLAKIS: Oh, okay.

MR. JOHNSON: All of those procedures, all of those inspections across programs are covered by the ROP and so where, for example, as a result of a specific inspection, ISI or whatever, where there is a part of the cause, I mean, has its root in the safety culture area, we would flag that and look to see what's going on with this.

MEMBER APOSTOLAKIS: As I was telling you earlier, Mike, maybe you can help me here. How many inspection procedures do I have to read to get a global picture of the inspections? I mean, what is -- it's an ocean of --

MR. ANDERSEN: There's a number of inspection procedures which we do as part of the baseline inspection program every year. The number, I want to say would be on the order of, I don't know, 30 to 40, somewhere in that range. There's also a number of inspection procedures we have on the shelf in case we need them on a specific basis. And then there's also supplemental procedures if we talk about 93-001, 2 and 3, which we do if we detect performance at the plant declining. And then there's also event procedures that if a --

MEMBER APOSTOLAKIS: So what is the -- maybe the baseline procedure is the place to start. What is the number there for the procedure?

MR. ANDERSEN: I'm guessing 30 to 40.

MEMBER APOSTOLAKIS: No, no, no, the number of the inspection.

MR. ANDERSEN: Oh, the actual listing of all of them is in manual chapter 25-15.

MEMBER APOSTOLAKIS: Okay.

MR. ANDERSEN: That contains an appendix which lists the baseline inspection procedures we use and then you can go into each one specifically to find out --

MEMBER APOSTOLAKIS: Thank you.

MEMBER BONACA: If any one of these inspections finds a deficiency and then it will come through the ROP. And then in case of cross-cutting specs, it will come down under some elements of human performance or production program, everything will come through that, right? I mean, anything which is the --

MR. ANDERSEN: Whenever we do an inspection and find a performance deficiency, all of those issues go through a process we use to first determine if it's greater than minor. So there is a threshold that, you know, below which we let the licensee correct it, above which, you know, we want them to enter into an action program and we track it a little bit more. Then it goes through -- once we determine it's a finding and it's greater than minor, then we get into whether it has a cross-cutting aspect to it. Whether it involves traditional enforcement or, you know, we use a STP, a process to evaluate the risk.

MEMBER BONACA: One last question I have on that issue is, this greater than minor is a very important point in these procedures. When you get into 95-003, and the guy now is there being examined for everything under safety culture, do you still use a greater than minor concept for capturing issues or do you use anything that you find? I mean, what's the threshold?

MR. ANDERSEN: For specific performance deficiency, yes, it's still greater than minor we use for 95-003. 95-003 also gives us the latitude to look at programmatic areas and put some assessments to those programmatic areas as well.

MEMBER BONACA: So what you're telling me that if I have two different independent organizations as I have, for assessment, and they did it separately, they would come up with similar results or conclusions? I'm trying to understand how objective this 95-003 is going to be, I guess.

MR. ANDERSEN: I'm not sure I followed the question. If you hired two different people to do 95-003?

MEMBER BONACA: Yeah.

Mr. JOHNSON: While Jim is thinking, I think it would be -- first of all remember, we've not changed a major portion of 95-003 where we already inspect that a licensee will go off and do an independent look at root cause. So one major aspect of 95-003 is going to be to continue that and then as a separate piece of that, we're going to be adding in this look at to what extent do you consider the various components of safety culture, to what extent did that have a bearing on this performance decline.

Now, the threshold, as Jim indicated, on finding new performance deficiencies as a result of that 95-003 inspection is exactly the same, greater than minor threshold, but beyond that, we're going to be passing judgment on whether the licensee in fact, in their look that they did, found all of the things that we think they should have found in terms of addressing the issue, whether we think there are other things that they need to address in terms of addressing the issue. That's captured, I think, fairly well, even today in terms of 95-003.

MEMBER BONACA: You understand that at some point we need to discuss this issue of how do you get an objective evaluation that will allow for the evaluation to be objective independently on who does it.

MEMBER ARMIJO: Well, it seems to me though that didn't -- in cases like this you really have to rethink the definition of objectivity. I mean, you would like them to reach essentially the same conclusions but again, what does essentially mean?

MEMBER BONACA: No, all I'm trying to say is that if you allow for somebody to nitpick on anything that exists and then piling up, you're going to find that you never get out of it because everything that looks like something that is not exactly up to snuff is thrown into the bucket by other processes. This is not allowed. Only more than minor things are possible. So I'm trying to understand how that concept is conveyed and brought into 95-003.

MEMBER POWERS: That's tomorrow, right?

MR. JOHNSON: Well, I don't think we're going to talk to you tomorrow on that.

MEMBER BONACA: The timing is --

MR. JOHNSON: We'll issue it, yes. The threshold -- again, the threshold -- remember in 95-003 we've already got issues, significant issues, and so the real focus of 95-003 is to try to understand what the licensee did, first of all, in terms of looking at that issue and what caused it and do they understand what caused it and have they taken -- do they have the appropriate actions planned to address it, so on and so forth.

And then the second part of 95-003 is we want to do sort of -- independently, we want to arrive at the same conclusions. We're not -- again, if I were looking at issues and I happen to stumble across another issue, a separate issue, unrelated, those same thresholds for whether it's minor, more than minor or less than minor apply. So I'm not just adding in everything that I see based on this 95-003 inspection.

There is some restraint as to how I approach that.

The other thing I would add, George, in response to your question on the baseline inspection, remember the baseline samples, all of the cornerstones, right? We sample also on the baseline PI&R, the cross-cutting issues and we -- again, once we apply that threshold for findings that are greater than minor, then we document them for those things that are greater than minor. The licensee puts them in the corrective action program and addressed them. We do supplemental inspection, perhaps, if they -- some missing, that's sort of the way the ROP is structured.

MR. ANDERSEN: I think we're going to hit some of these points again in the slides so we can discuss them. Do we have another question? Slide 6, please.

So taking a look at the basic safety culture initiative approach here, we believe that the approach uses the existing framework. That was important that we not disturb the framework of the ROP and that we believe that the Commission basically told us not to. That framework includes a number of things which I'm going to discuss on the next two slides here. Basically, we get information from a number of sources. We document that information, inspection reports and then we assess all that information during the mid-cycle and then the cycle assessments and other times during the year. So I'm going to touch upon each of those three on the next slides.

That framework has been enhanced through the Safety Culture Initiative to better help the staff recognize safety culture weaknesses and take appropriate action before they result in a degraded cornerstone. So that's kind of the general approach. Now, so the question always comes up with we're talking about you know, what's changed and what's not changed. So the following two slides kind of --

MEMBER POWERS: Let me come back to this. Framework has been enhanced to better recognize safety cultural weaknesses. By that you mean inspectors recognizing safety culture weaknesses. And then take appropriate action before they, presumably the weaknesses, result in a degraded cornerstone. What kind of actions are you thinking about there?

MR. ANDERSEN: The primary -- before it goes into the degraded cornerstone, the primary action is to -- is in the baseline procedures, the PI&R inspection. Basically, we're looking at a number of assessments the plant does or some corrective action issues they've addressed and we're looking to see how they conducted their root cause analysis, did they consider all the appropriate attributes or contributors and if some of those contributors they missed related to safety culture or due to safety culture, then we would look further, probe into that area. So it's basically, you know, we're using our general baseline inspection program to look into different areas of the licensee's performance, corrective action program, how they utilize operating experience, how they --

MEMBER POWERS: I think what you're telling me -- let me feed back to you and you can tell me whether I've understood or not.

MR. ANDERSEN: Okay.

MEMBER POWERS: You've told me that, you know, okay, we sensitize our inspectors and he's recognized what he attributes to be a safety cultural weakness and so he starts doing additional -- he starts looking at things that maybe before he would not have looked at as part of the baseline inspection. And he may find things that are findings and in fact, they may be greater than green findings in the course of doing so.

But you're not forcing the plant to do a safety culture inspection at this point, evaluation. Okay, now I just don't want you to be running afoul of the explicit language in the SRNs that says --

MR. ANDERSEN: No, and I think it gets to, you know, this may be simplistic, but in the past you might go and you look at a performance problem and it's, you know, the operator didn't follow the procedure. Now, with the safety culture in mind, you might now take the next step in saying why didn't that operator follow --

MEMBER POWERS: But without the --

MR. ANDERSEN: You might ask that question.

MEMBER POWERS: The -- without the safety culture in mind, he still might have asked why.

MR. ANDERSEN: Very true.

MEMBER APOSTOLAKIS: How accurate is the language before they result in a degraded cornerstone? Can you actually be in a degraded cornerstone and you look deeper and you find safety culture problems?

MR. ANDERSEN: Yeah, I think the intent of that language is to say, "Let's try to do it earlier".

MEMBER APOSTOLAKIS: Yeah, but I mean --

MR. ANDERSEN: But, in fact, you may have a plant that's in a degraded cornerstone and you find a --

MEMBER APOSTOLAKIS: That's right, you have repetitive failures and so on, so it's not quite accurate, right? Before it becomes worse, that's what you're saying.

MR. ANDERSEN: That's where we're going.

MEMBER APOSTOLAKIS: You want to find the causes and arrest whatever evolution is in progress there before it becomes worse, but it's not necessary that you are in a situation before a degraded cornerstone. You may already be in a degraded cornerstone.

MEMBER POWERS: But it also seems to me that it's important to recognize that all this incremental activity on the part of the inspector could have happened without any safety culture training. I mean, an inspector are individuals and they could have gone out here now in the course -- if he'd done it without any safety culture training, in fact, it could have resulted in getting into a degraded cornerstone just because --

MR. JOHNSON: That's true, and I'm sorry, Jim, I was just going to say, that is certainly true and we've found some inspectors who have great insights even without this stuff. Some of this is intuitive, they'll know and go there. I think maybe the best way to get this to the entire inspection force though is to do what we were trying to do which is to capture it, put it in the process or the procedure and --

MEMBER POWERS: It is as though for some reason, you've identified an inspector which particular keen insights and you said, "Gee, I will transmit these keen insights to the rest of my inspection force and they'll get the benefit of it".

MR. JOHNSON: And in fact, some of those insights that we've got on safety culture come from international experience and what our international partners are doing. It comes from the industry. The industry has done a lot of thinking about safety culture and we're trying to --

MEMBER POWERS: But it is, in fact, different than if you'd found an inspector that had particularly keen insights on fire protection and you wanted everybody to know about these because they were so useful.

MR. JOHNSON: Absolutely.

MEMBER APOSTOLAKIS: But you are -- I'm sorry, go ahead, Jim.

MR. ANDERSEN: Let me -- I mean, the way

I view this is the problem identification resolution inspection procedure is a very important procedure in our baseline inspection and the licensee's corrective action program is a very important tool that they use. In doing the PI&R inspection, that inspection allows us to look at the corrective action program and give observations of that program. So in that way, you know, if we see some problems developing, they may not be performance deficiencies, you know, have elevated to that level, we're at least able to say, "We see some potential problems coming down the line that you might want -- you know, it's important that you get your hands around". I think what we're trying to say in this last bullet is, you know, we've now included some safety culture language into that procedure that if we see some safety culture stuff along that line, we may be able to feed that back to the licensee at this point instead of waiting for something worse to develop. I hope I've helped.

MEMBER BONACA: I believe also, that 71-152 the problem identification and resolution is probably the most significant procedure from the perspective of early detection of cultural degradation before something happens. I mean, if that is the objective, because that really -- and you know, the question I had some point, if you want to comment, you still have maintained that no more than 30 minutes a day looking at what goes into the regulation program. First of all, there is another step that doesn't go into corrective action program. Does it look at those things too? And second, it's really important that we spend the time, especially now with the new framing, look at what goes in and what these other kind of things are. So that procedure is very important.

MEMBER APOSTOLAKIS: Mike, you mentioned earlier international experience. My understanding is the major difference between the European approach and ours is that we are as performance based as we can. Is that correct?

MR. JOHNSON: I think that's true. I can't say enough about the influence of PI&R, the Problem Identification and Resolution Procedure. Licensees are responsible for safety. They have programs. They specifically go out to find issues. We rely on them but we don't follow up on things that are minor because they have corrective action programs and we know they'll put them in the corrective action programs. We don't cite violations. We issue non-cited violations based on licensees putting those things into the corrective action program and addressing them. So we place a lot of stock, if you will, on licensees' PI&R programs.

MR. ANDERSEN: All right, I'm going to move to Slide 7. Again, the three areas I wanted to quickly discuss and what's changed and what hasn't are information sources, documentation and assessment. Under information sources, plant status activities aren't changed and what we mean there is we have a manual chapter that we use that basically let's -- tells the inspector to be aware of what's going on in the plant.

It discusses plant tours. It discusses control room observations. It discusses going to plant meetings and such. So that process has remained basically unchanged. We've already talked about the baseline inspection procedure, the 30 or 40, it was my guess at the number. Those procedures haven't been changed except for 72-152, the identification and resolution of problems. I have a slide coming up on that and we talked about that a little bit already.

We've also enhanced the supplemental inspection procedures, 95-001, 2 and 3 as we've referred to in the past and I'll cover those in a little bit more detail down the line here. We've enhanced the special inspection procedures, i.e., the event follow-up procedures. I have a slide on that to talk about what we did there.

And lastly, the NRC inspection and investigation of allegations, that process has basically remained unchanged. We did not look at that. I should go back and say, you know, the Safety Culture Team went back and looked at what were the key inspection procedures and inspection manual chapters that we needed to address first and obviously, after we implement this, we'll, you know, continue to look at it and if we need to add or change some of the other inspection procedures or manual chapters, we'll do that and make continual -- we'll get a lot of feedback as we implement this. So it's not a done deal in July 1st. The ROP is a continually upgraded or improved area and we continue to look at it and make improvements.

Documentation, we -- have minimally impacted. We will document inspection findings the same way. Where it's changed a little bit is in the PI&R because we are looking at Inspection Procedure 71-152 because we are looking at operating experience a little bit more. We've put a little bit more focus on that and also plant assessments and audits, we've put a little bit more focus on that in the PI&R

inspection procedures. So that documentation will change just a little bit.

Moving on to Slide 8 on the assessment process, the framework for the assessment process which is called out in Manual Chapter 0305 remains largely the same but within that assessment process, we have made a number of changes in initiating the safety culture initiative here. The second bullet, we're adjusting the cross-cutting issues to more closely align with important partner safety culture. I think Mike and Gene talked about that last time where we changed the components under each cross-cutting issue and I have a slide that kind of captures all of that one or two back here, and that was specifically to address the SRM the Commission gave us, you know, they wanted us to use the cross-cutting issues as a vehicle.

We're including outputs now from the allegation in traditional enforcement processes as inputs to the assessment process and this is really going to the safety conscious work environment area. In the guidance, current guidance, as far as cross-cutting issues is concerned, we didn't really have a lot of specific guidance in the safety conscious work environment area. And now with this new initiative, we've added some additional guidance and information in that areas, so we'll talk about that a little bit when we get to that slide.

And then for those safety culture components that are not closely aligned with cross-cutting areas, if you recall, there's a couple that didn't align well with the cross-cutting issues. We evaluate those only in the supplemental inspection procedures.

MEMBER APOSTOLAKIS: Do you have an example of that?

MR. ANDERSEN: An example, I'd have to look them up. There's four of them. One of them is accountability, management declines, defines the line of authority and responsibility for nuclear safety, continuous learning environment. The licensee insures that a learning environment exists. Organizational change management, management uses a systematic process that there are planning safety policies in place. So those are the four that really didn't align well with the cross-cutting issues, but as we look at a licensee's root cause evaluation, if one of those looks like it was the primary contributor to a finding, we would look at that.

Slide 9. Before I get into the -- I keep putting off a number of issues, but before we get into those slides, I think it's important, the next two slides I tried to define some terminology because we throw around cross-cutting issues, cross-cutting components, cross-cutting aspects, cross-cutting themes and substantive cross-cutting issues. It's important to understand the hierarchy of that when we're discussing changes because I think it will help.

Stepping back, a substantive cross-cutting issue, that's the terminology we use when we tell a licensee that he has a problem in one of the cross-cutting areas. We've gone through the criteria, you have to have a number of findings, you have to have a common theme throughout them and we have to -- and the NRC has to have some concern that the licensee is not addressing them in a timely manner or appropriately and if we come to all those three conclusions, we would label that as a substantive cross-cutting issue in human performance and that's what we would write and tell the licensee in a letter. So that's called a substantive cross-cutting issue.

MEMBER APOSTOLAKIS: I'm trying to understand the significance of these numbers, three current inspection findings. Why three?

MR. ANDERSEN: It's --

MEMBER APOSTOLAKIS: No, I mean, you could reach a conclusion with one, couldn't you?

MR. ANDERSEN: What we're looking at is, you know, we tried to be -- one of the goals of the ROP is to be objective, predictable, so to be predictable, we needed to have some sort of criterion number. And when we looked at the number of findings in a plant, and, you know, evaluated you know, what plants had problems and which ones didn't and the numbers, you know, we came up with three. It wasn't anything based on risk or anything like that. It was basically looking at the data, we came up with a number.

MEMBER APOSTOLAKIS: What if we take decision making?

MR. ANDERSEN: I'm sorry?

MEMBER APOSTOLAKIS: Decision making is a component, couldn't I reach a conclusion that the decision making process is flawed from one event? Why do I have to wait for three?

MEMBER SIEBER: You could make the conclusion that it was flawed for that even. The question is, is it a flawed in multiple --

MEMBER POWERS: Your question is a bit unfair, because you can always arrive at a conclusion.

It's whether I will concur in your conclusion that's the problem.

MEMBER APOSTOLAKIS: Sure.

MR. ANDERSEN: For the higher significant events, when you have a -- when we get to the risk significant events, we're already into the supplemental inspection procedures where we're taking a much closer look. For most of these -- most of the findings we have at plants are in the green level or very low safety significance is how we classify those. So we're not talking about very risk significant events. They're very low safety significance.

MEMBER APOSTOLAKIS: So we could clarify it a little bit, then?

MR. JOHNSON: It is. For the sake of the conversation, we've sort of abbreviated it but it's -- and Jim was going to tell you this; we may have a thousand of these across the nation, these low level events that are green findings, essentially. So a plant may have 10 or 20 low significant events.

MEMBER APOSTOLAKIS: You are talking about greens.

MR. JOHNSON: Green findings, that's right.

MEMBER SIEBER: You could also have a

significant event in the plant that has a number of findings associated with that event in different areas. And I think that would count toward the three that would trigger additional inspection work.

MR. JOHNSON: That's correct.

MEMBER APOSTOLAKIS: Well, I think a lot of these things are really a matter of judgment.

MR. JOHNSON: Yes, they are.

MEMBER APOSTOLAKIS: And that's why you don't have only one guy do it. You have a group, you know, evaluating these things.

MEMBER SIEBER: It's not --

MEMBER APOSTOLAKIS: If I take it on its face, I mean, it doesn't really --

MEMBER SIEBER: It's not an exact science.

MR. ANDERSEN: No, and an important point there is because it's not an exact science, the last criterion in determining if there is a substantial cross-cutting issue at a plant is that the staff has a concern with the licensee's approach or the time limits.

MEMBER APOSTOLAKIS: Right.

MR. ANDERSEN: So there is that subjective, you know, review based on not only those findings but on, you know, the multitude of inspections we've done, the plant visits management's done to talk to them, the presentations they've given us. A lot of information goes into that last criteria and the NRC's evaluation of that last criteria.

MEMBER MAYNARD: The fact that something is not a cross cutting issue doesn't mean that the NRC can't take action. If there's a single significant item, the enforcement procedures and policies still provide the NRC to take whatever actions. Just because it doesn't fall into a category of cross-cutting issue doesn't mean the licensee gets away with it.

MEMBER APOSTOLAKIS: Yeah, but in the new era now, would they be sensitive to the issues of safety culture when these things happen, that's the point. They're enhancing all their procedures.

MEMBER MAYNARD: Well, it's kind of difficult to have a safety culture issue if it's just one isolated event. You may have a case of a bad decision, a bad mistake being made but if you're talking a culture issue, you're going to have multiple items --

MEMBER APOSTOLAKIS: I understand.

MEMBER MAYNARD: -- for it to be a culture issue.

MEMBER APOSTOLAKIS: I'm a little lost now, so I would have to wait --

MEMBER BONACA: You have multiple events where you have some corrective actions which are not property thought out and not addressing the root cause and so if your maintenance department is doing some maintenance and really is not learning a lesson, that's where you would see a trend.

MEMBER APOSTOLAKIS: I think the assumptions we're making are different. You're all making the assumption that these are minor findings.

MEMBER BONACA: More than minor.

MEMBER APOSTOLAKIS: But what --

MR. JOHNSON: Jim actually has slides where he's going to touch on what we do for significant findings and I think it will clear up the questions.

MEMBER APOSTOLAKIS: Okay.

MR. ANDERSEN: Page 9 at the bottom, the cross-cutting areas, I think you're familiar with those. Those are the three areas; human performance, problem identification, resolution and safety conscious work environment. So those are the three --

MEMBER APOSTOLAKIS: It's really only one, human performance, right, if you really think of it.

It's human --

MR. ANDERSEN: Well, you can tie human performance to everything, that's true.

MEMBER APOSTOLAKIS: As long as we define human appropriately, it's everything.

MR. ANDERSEN: Okay, and on Slide 10, I apologize but I kind of went out of order on these next two, after the cross-cutting issues, if you think about the three on the top, the cross cutting area components are basically like sub-elements of those, so each cross-cutting area, for instance, human performance, will have three or four sub-elements below those. I believe decision-making is underneath human performance and we'll have a slide that spells them all out.

MEMBER BONACA: I brought up this issue before and I guess I'm stubborn because I bring it up once more. You know, you went through identification of the components first. Then you repeated them under specific and you made it a point of not duplicating components. But when you do the inspection, you don't start that way. When you do the inspection, you look at for example, PI&R, that's the procedure. You know, when I looked at PI&R, I think also that human performance, I mean --

MEMBER APOSTOLAKIS: Decision making.

MEMBER BONACA: -- decision making resources are important elements of performance there. You know, the backlog depends on resources. The time to completion of activities and all that kind of stuff, the threshold.

MR. ANDERSEN: Right.

MEMBER BONACA: Now, if you look at the plants and you look at them and you find that the threshold for accepting corrective action goes very high and, you know, that was tied also to the resources in part. So the point I'm making is that why didn't you consider the possibility of having, yes, you want performance, we'll still have decision making and resources, but you could use those two also under PI&R.

MR. ANDERSEN: I think one of them was not -- one of the reasons was not to have a lot of sub-categories under each one, just because it would be hard then to classify them. I think the key here is what we're trying to do is determine if there -- given the 10, 15 findings we have at a plant each year, is there a number of findings that have a common theme that we think the licensee isn't addressing and they need to. So no matter where we, you know, bin them in these different groups, as long as we do it consistently, and then so the common theme is brought out.

MEMBER BONACA: Look at your procedures, PI&R it doesn't say that. It says, go in and you look at the attributes below that and you know, it doesn't say open up your eyes and look at it. When you get to do 95-003, yes, then you're covering everything there, or course, but when you do the -- again, the PI&R, you're not doing that. I'm just concerned that you're putting blinders around the eyes of the resident inspector. He's just looking at, you know, the three that goes under that, which is corrective action, operating experience and self-independent assessments.

MR. ANDERSEN: Right, and I think the key is probably in the next definition, the cross-cutting aspects, but underneath each of those components we list, you know, some more discussions, the specific definitions that could fit under that. So I think we've captured that.

MEMBER BONACA: I have one more question. Did you consider the possibility of doing that or did you just assume that he didn't want to do it, so you just moved on, because I'm not saying it cannot be done the way you're doing it. I'm only saying I would like to know if you considered the possibility.

MR. ANDERSEN: I wasn't involved in that, so I'm going to have to --

MEMBER BONACA: There are two ways of doing it.

MR. JOHNSON: Well, we actually did consider where we put the components under each of the cross-cutting areas and we had dialogue on a number of them, whether work control or work practices were even the right titles, whether work control or work practices went somewhere else. And so -- and I don't -- actually, I was looking around of Andrew. I don't recall all of the dialogue on this but I think Jim, in essence, is right. We focus in on the component level and so even if I were to argue that maybe I've got the component lined up under the wrong area, as long as I'm touching those in terms of PI&R I think I'm okay.

And I guess the other point I want to make is, remember that most of the findings that come to us don't come through NI&R. Most of the findings that come to us come through the individual baseline inspections were we find individual performance issues because we're out looking at how well the plants are doing their ISA, or how well they're doing their adverse weather preparations and when we find a performance issue in that area, then we ask ourself when did that performance issue occur and then try to link it to one of the components. That's what Jim's going through now. So, I mean, I think in essence what we're looking at, was there a cause and what's that closest cause, I think we still get there even if we didn't get it exactly right with respect to putting a component under the right area.

MEMBER SIEBER: I presume that you can find issues in one area, cross-cutting area, that have the cause come from another one. For example, failures of the PI&R sometimes are caused by a lack of human resources that causes things to be dropped, backlogs to build, the threshold for action in the problem identification and repair listing to be raised so that small issues never get dealt with and but I see the resources and organization factors in another -- is in another area. And it seems to me that a good inspector may be able to make that link.

MR. ANDERSEN: I think in most cases, we could probably put them in multiple areas. I think the focus is we want the inspectors to try to pick the best area, the most significant contributor to the root cause and there are going to be some instances and we hope they're rare, that we bin them multiply into two different areas.

MEMBER SIEBER: On the other hand, you've got to put the stuff someplace, otherwise you have no structure.

MEMBER BONACA: It wasn't that it's better one way or the other. I'm saying, you're at a stage where you're really forming this and you're doing it under a lot of pressure to do it in a fast time. Give yourself time to consider if there is a benefit to expanding the definition to three cross-cutting issues or to leave them this way. I mean, as a minimum, I would think that in the process of implementing this, you would get lessons learned and see whether you should do it one way or the other.

MR. JOHNSON: That's actually a very good point. In fact one of the things Jim is going to say, perhaps, is that at the end of this, at the end of the initial implementation period we actually do plan as a part of the routine thing that the program does, to go back and look at the changes and to identify improvements and that would be one that you would think to top off, if there is something with respect to that.

MEMBER APOSTOLAKIS: It seems to me that really if you look -- you have everything on Slide 12.

MR. JOHNSON: Right.

MEMBER APOSTOLAKIS: Everything you have under human performance, belongs also under problem identification and resolution. All the whole component also belongs there. And it's also separate because you may have problems with human performance that are not related to problem identification. So, you know, maybe some note someplace that says that, that's why I said earlier half in jest, everything is ultimately human performance. But really if you look at it strictly, how can you have a problem with problem identification and resolution that does not involve human performance. Come on.

So you know, if you make a note -- huh?

MEMBER SIEBER: If the reverse --

MEMBER APOSTOLAKIS: No, I mean even in a limited sense, because it will probably have something to do with resources or work practices or decision making. So as long as you point that out, I think you are okay. You don't have to repeat it if you don't want to crowd the column, but it comes naturally, it seems to me.

MEMBER SIEBER: Well, like I said before, you've got to put it someplace.

MEMBER APOSTOLAKIS: Yeah, just make a

note that, you know -- so we're managing to spend 20 minutes per slide.

MR. ANDERSEN: I just like --

MEMBER SIEBER: You only have 17.

MEMBER APOSTOLAKIS: Yes.

MEMBER SIEBER: We'll finish tomorrow afternoon.

MR. ANDERSEN: I going to just quickly summarize Slide 10, because it's important that the cross-cutting issues are on top. Then we break them down into components. Then we further break them down into cross-cutting aspects. That's an important hierarchy there that it's important to understand as we walk through the next two tables. And then the bottom one, the theme, again, we're trying to -- the real main objective of this whole process is to, again, look at all the findings at a plant for a 12-month period and see if there's a common theme throughout a number of them, you know, and greater than three or four or more is the criteria we use just to -- just to ask ourselves the question, is there a problem in this area and do we need to you know, make that licensee aware of it and have them address it. And that's kind of the main objective of the cross-cutting area.

Cross-cutting issues is really the only leading or type thing we do in the -- most of the ROP is reactive, i.e., we're reacting to something we found or the licensee found some condition or some equipment involved. Cross-cutting issues in this area is kind of a leading type thing as we're looking at it, you know, across the cornerstones. Are we seeing some trends that we might want to address early on before they lead themselves to any --

MEMBER SIEBER: You're looking for cultural root cause that would lead to more serious events.

MR. ANDERSEN: Yes.

MEMBER APOSTOLAKIS: But still, why all this emphasis on the greens? I mean, everybody seems to think in terms of greens. And I'm confused by that.

MEMBER SIEBER: That's the minimum.

MR. ANDERSEN: The green, white, yellow and red are all subject to this process.

MEMBER APOSTOLAKIS: But when I read the document I was sent, I didn't get that impression. And here in your slide, you don't make that distinction. You just say four or more. And I have to understand that these are greens. But what if there is something that's yellow.

MR. ANDERSEN: And we say four more findings and a finding can be green, white, yellow or red.

MEMBER APOSTOLAKIS: Well, shouldn't you have another bullet then to tell --

MR. ANDERSEN: Well, we could have.

MEMBER APOSTOLAKIS: -- what to do if you have a yellow or white?

MR. JOHNSON: Let me answer that. We're going to get to a slide that tells you what we do depending on the column of the actual matrix said that a plant is in. If a plant has a yellow finding, that puts them in a column that the action is major and we do a certain supplemental procedure and you'll find that we added specific words about what we do as it relates to the safety cultural components based on that yellow, white, or red finding.

So with respect to the cross-cutting issues where we're just looking at the routine baseline and only finding green findings, this tells you that if you have more than three findings and they have a common causal theme and we've got concern about the scope of the licensee's action to follow up, even if it's only green findings, only in that instance will we say you've got a substantive cross-cutting issue. We want you to do something because otherwise if we just have green findings that aren't linked, those are going to the licensee's corrective action program. The licensee remains in a licensee response bin and we don't have questions or concerns about cross-cutting issues. So it's that nexus of green findings that we're worried about that we pick up because of the potential cross-cutting aspect of those and we document it as a substantive cross-cutting issue if they pass those three tests that we --

MEMBER APOSTOLAKIS: Look, I never doubted that you would do something substantive if you found a yellow or white, but you know, from this stakeholder's point of view, you have a problem with communication because I really had to ask you to tell me that -- to have you tell me that you're talking about greens here. And not everybody understanding that finding really means green.

I mean, you know, you're communicating and it makes sense now that you're saying it but for instance, you do something else. I mean, why --

MR. JOHNSON: I think it's clear in the procedure, George, if we didn't communicate it, appropriately, I'll make a note to go back and look to make sure that it is, but I think -- I think it's clear and it's certainly clear in the supplemental procedures that --

MEMBER APOSTOLAKIS: And also when you present slides like this, maybe you should make it clearer what you're talking about.

MR. ANDERSEN: The next two slides kind of get at the treatment of cross-cutting issues. Slide 11, I'll start with first and that's the current process before we initiated the safety culture effort. And I should state that, you know, if we went back to the early days of the ROP, basically alls you had is the first row in our guidance. Basically we had that there's three cross-cutting issues and that was it. There wasn't any guidance onto how to document them, how to evaluate them, what constitutes them, and what they mean.

So over the course of the last probably three years, we've taken incremental steps in working with, you know, our stakeholders both the inspectors and the industry. We've taken steps to try to define what it means to have a cross-cutting issue and how do we go about looking at a finding and deciding whether it's, you know, in a certain area of human performance. So what I wanted to cover here was, you know, the first row again is the cross-cutting issue. The second row is the cross-cutting component that exists currently and that we have three different bins for human performance and problem identification and then in the safety conscious work environment area we just had some general words. Like I said earlier, we really didn't have much guidance on what constituted a cross-cutting issue in that area.

And then the third row is kind of the criteria we used to make the determination that they had a substantive cross cutting issue at a certain plant. Again, you'll see the more than three findings or four or more, that it had a theme running through it that was consistent and then also we had a concern in the area in -- or the progress in the licensee addressing it. So that's how our current structure is.

And I'll move on to the proposed treatment is very similar except for two big changes. One, we changed out the components and made them more in line with what's important for safety culture and two, we've added significant guidance in the area of safety conscious work environment.

MEMBER BONACA: I have a question. In the material I was given, we raised an issue in January regarding the willingness to raise concerns. Dana and myself both raised that issue and in papers I've seen since, some guidance, I notice it has been changed to environment for raising nuclear safety concerns. Now, I see that you're back to willingness to raise concerns and the issue has never been that employees are not willing to raise concern, it's that they are -- the environment is not --

MR. ANDERSEN: I think what I heard murmured in the back was we had an error on the slide. So I think we were where you are --

MEMBER BONACA: All right.

MR. ANDERSEN: I apologize for that.

MEMBER APOSTOLAKIS: So am I to understand that these little bullets under each major heading are the -- what you call aspects?

MR. ANDERSEN: These are the cross-cutting components, and then we'll have aspects under each of those --

MEMBER APOSTOLAKIS: Okay, you're not going to --

MR. ANDERSEN: -- which defines them a little bit more in detail.

MEMBER APOSTOLAKIS: You will not come back and discuss these today, are you?

MR. ANDERSEN: No.

MEMBER APOSTOLAKIS: No, so I have a couple of questions here.

MR. ANDERSEN: Okay.

CHAIR WALLIS: I spoke up on this at the subcommittee meeting and it's not really just preventing and detecting retaliations. It's responding to concerns. I mean, a manager who does nothing is just as bad as someone who retaliates and you don't say that. I mean, it doesn't have to be overt retaliation. It can just be as if he wasn't there.

MR. ANDERSEN: That's right.

CHAIR WALLIS: That's more likely to happen really because retaliation he can be caught doing but doing nothing it's harder to pin him down.

MR. JOHNSON: And I think our view would be that's exactly what we're capturing in that environment to raise concerns. For example, if you had a plant where individuals raised concerns and nothing happened, that would create in the mind of that employee, sort of a reluctance. You know, why raise concerns if every time I raise them -- and those are the kinds -- that's also a piece of what we are going after with the safety conscious work environment.

MEMBER SIEBER: I think in today's environment that's more likely to be the case than active retaliation.

MR. JOHNSON: Right.

CHAIR WALLIS: But you've put it down as if it was sort of let's say the worker's concern. I think it's up to the management to encourage the raising of concerns and it's up to the management to create the environment in which concerns get raised. It's not the willingness, it's the environment that stimulates this.

MEMBER BONACA: They changed. You know, in the paper we got which is a draft too, but it says, "The environment for raising nuclear safety concerns", which implies responsiveness, encouragement to bring them up.

MR. JOHNSON: That's right.

MEMBER SIEBER: On the other hand, it's very difficult to write a rule or a procedure to make a licensee do that, you know, "We want you to smile every day", you know.

MR. ANDERSEN: Yeah, I was going to read the same bullet.

MR. JOHNSON: Go ahead, Jim.

MR. ANDERSEN: The bullet under environment for raising concerns is, "Behaviors and interactions encourage free flow of information related to raising nuclear safety issues, differing professional opinions and identifying issues in the CAP and through self-assessments", and then it goes on to more --

MR. JOHNSON: In fact, the next sentence says, "Such behaviors include supervisors responding to employees' concerns in an open, honest and non-defensive manner, providing" -- we're reading from words that define this component in inspector manual Chapter 0305 and George, in response to your earlier question, if I would have been smart enough to go to 0305 to read your question, it's very specific about what we're doing with the cross-cutting issues. So go read 0305 and you'll get the right answer in terms of what we intended to say.

MEMBER APOSTOLAKIS: Okay, can I ask my question now?

MEMBER POWERS: I don't know.

CHAIR WALLIS: How much time is it going to take?

MEMBER APOSTOLAKIS: The self-assessment and independent assessment that's under PI&R, in the document that I have here it says the licensee is supposed to communicate the results to effected personnel and so on. How much of the licensee's findings, how many of those are supposed to be communicated to you, if any? You asked them to do a self-assessment and you asked them to do an independent assessment. There is always some conclusions they draw. I think it's a sensitive issue. Do you negotiate it with anybody, how much they would be willing to tell you or how much you would like to know?

MR. JOHNSON: Well, let me answer it a different way. Remember the task -- our task isn't that we're going out to try to evaluate how good or bad the licensee's safety culture is. It is that we're trying to figure out if there was a performance deficiency and that performance deficiency resolved it because, for example, a licensee did a self-assessment, looked at that area, didn't do a sufficiently probative self-assessment, could have found, should have found, didn't find, then that would cast a light on the self-assessment that was done. So we don't have expectations. You know, we don't have expectations about the number of self-assessments.

It is, is there something about that

performance deficiency that had at its root or significant contributing cause some problem with respect to the way they do self-assessments.

MEMBER APOSTOLAKIS: Wait a minute now. The licensee does self-assessments or hires a consulting firm to do an independent assessment and you have no interest in finding out what they found.

MR. JOHNSON: I didn't say that.

MEMBER APOSTOLAKIS: Well, what is it that you learn then from that?

MR. JOHNSON: Well, I mean, we'll look at, we'll sample as a part of this PI&R process self-assessments that were done because we would expect that if a licensee does a self-assessment, finds significant issues, that they translate those into their problem identification and resolution, their corrective action program, that they handle those significant issues. We look to see that that happens but in terms of making an account about whether they're doing enough self-assessments, again, the primary window of the licensee self-assessments is was there something wrong with the self-assessment that contributed to this performance issue that we have.

MEMBER APOSTOLAKIS: But the way you're talking now it's as if you had full access to the self-assessment and its findings.

MR. JOHNSON: We do.

MEMBER APOSTOLAKIS: Why should you? I don't understand that. I mean, aren't you inhibiting in that way the licensee from a true self-assessment. I mean, if they know you're going to see, they may not do a very good job. You know, the moment you said, this is green, as you know, everybody focuses now to get greens.

MR. JOHNSON: We have -- I understand the question and maybe even the concern behind it. We -- you know, and in fact, the industry, IMPO (phonetic), as a result of their evaluations that they do are really industry self-assessment for licensees. We don't make those publicly available. They don't make them publicly available. They'll read them. They make them available to us. We read them to gain insights about the plant. We don't share them with the public because of --

MEMBER APOSTOLAKIS: I understand that.

MR. JOHNSON: -- the fact that we don't want that to impact the scope or the -- you know, how intrusive they've gotten or you know, even some of the findings which are low level findings, but we share those -- they share those with us. We would expect to look at those self-assessments because we want to know what they're finding and whether or not it's significant.

MEMBER APOSTOLAKIS: So okay, so if they don't object, I mean, who am I to object? I would expect the industry to object.

CHAIR WALLIS: Michael, at the speed you're going, we're going to be here over an hour beyond our time.

MR. JOHNSON: Yes, I understand.

MR. ANDERSEN: Okay, I will move onto Slide 13. One other area we changed in our assessment process is that we -- the current process allows us after the licensee has two consecutive assessment cycles, i.e., the mid-cycle assessment and the end of cycle for instance, we have three tools available to us. We can request the licensee provide a response at the next annual public meeting to address that cross-cutting issue. We can ask the licensee to provide a written response or we could say let's have a separate meeting to discuss this issue. So there's three different tools we can use to look at a cross-cutting issue if it's been there two times in a row.

The proposed change to manual Chapter 0305 in our assessment process is to add a third -- another tool and basically that is after three consecutive cross-cutting issues, i.e., you've been in this condition now for you know, three consecutive times or a year and a half, we can basically request them to do an assessment of their safety culture and they've agree to do that. So that's a tool we've added to 0305 and you know, depending on our evaluation of plant performance, we may or may not do that.

MEMBER POWERS: I don't quite understand your expression "and they have agreed to do that".

MR. ANDERSEN: Industry.

MEMBER POWERS: They've said -- I mean, you went to them and just said, "Do you agree to do this", and they said, "Yes, we do".

MR. ANDERSEN: That's the understanding I got from the public meetings we've had with NEI and --

MEMBER APOSTOLAKIS: That comes back to my question. I mean, if they didn't object to your putting this in the action matrix --

MR. ANDERSEN: Yeah.

MEMBER APOSTOLAKIS: -- I thought they would.

MR. JOHNSON: Well, on this issue, the industry -- if there were any aspect of the -- of this change that the industry would have concern with, it would be this. In fact, we got a letter from -- Luis Reyes got a letter from Marv Fertel and it raised issues regarding the treatment of cross-cutting issues and it's actually -- it's the treatment -- overall treatment of cross-cutting issues I think that raises concern. I think Jim is right, they didn't -- I don't think that we picked up from them a specific concern about doing a safety culture assessment on the third or at least I didn't get an overall industry prospective regarding that.

And I know there have been individuals in the industry who have had a concern, but in general, I think it's right, the industry is okay with respect to that -- this aspect of how we're treating cross-cutting issues.

MR. ANDERSEN: If they didn't want to, it's not a violation or anything. If they said, "No, we're not going to do it", it's not a violation but then it would be up to us to say, "Do we want to use some other inspection tool to get at that deficiency we're looking at"?

MEMBER SIEBER: There are other pressures that cause licensees to cooperate under these circumstances. It does not do their financial picture any good to be in -- at the bottom of the list because it's all public and so they will do whatever they feel they need to do to improve their standing.

MEMBER MAYNARD: Well, most, if not all the plants have had some independent assessments done anyway and I think plan to be doing some periodically.

MR. ANDERSEN: That is my understanding as well, that it's part of, you know, INPO and they're periodically looking at safety culture now.

MEMBER MAYNARD: The industry never likes the NRC to tell them to do that, but they are doing for themselves.

MEMBER SIEBER: Astute management and executives will be out ahead of that, be doing it before they're told to do it, I think. That's been my experience.

MR. ANDERSEN: Okay, I'm going to move on now to our inspection area and how we basically respond to declining licensee performance. I'm on Slide 14. Basically to be consistent with one of the principles of the ROP, we tried to incorporate safety culture like we have with -- in a graded performance. So if the licensee -- the first column in our action matrix is the licensee response column where a plant has all green findings and all green performance indicators.

The change for a licensee is, we don't see any change with the initiative. The only change we have in our baseline which we would do would be the 71152 and again that's just, you know, trying to get observations and look at them early in the process. And there's really no regulatory action change as far as that column goes.

As we move into the other columns, our oversight becomes you know, more intrusive and probing into the specific performance deficiency. I think I've covered Slide 15 in some detail already. It's the enhancements we made to 71152. And if there's no questions on that one, I'm going to move to the regulatory response column which is the next level of, you know, when we find a performance deficiency that has a little bit of significance.

MEMBER MAYNARD: Just a quick comment on 71152 in that it is going -- while you say it's no real change to regulatory response or actions, I think this is an area that is going to start raising a number of questions. Some may be good. I think the training and the overall consistency among the agency is going to be important because this is an area that could be easily be used, you know, I'm starting to see a trend develop here or an issue and all of a sudden it starts causing actions that may or may not be appropriate there. So I think I'd be careful how this information is handled and dealt with.

MR. ANDERSEN: Right, I really agree with you because I think training is the key to try to get consistency across the regions and also, you know, I'm viewing that I need to have someone really assigned to this area in the short term, in the foreseeable future, in the next couple of years, to really be the go-to person for questions, so we get consistent answers when people ask the questions. So I would agree with that comment.

The regulatory response column that's our second column in our action matrix, you get there if you have a white finding or a white performance indicator with no more than two whites in a strategic performance area. So you could have you know, three whites, but they'd be in different strategic areas, cornerstones of the ROP. Again, these are low to moderate risk significant findings.

As far as licensee action, we don't see any change. The licensee still conducts the root cause evaluation and enters it into the corrective action program and takes the appropriate corrective action. The intent of our review in 95-001 is to basically review that root cause and selectively challenge aspects of the root cause but not perform an independent assessment of the performance issue. Basically, it's a short inspection, 8 to 40 hours. Basically, we're just looking at the licensee's root cause or we're aware of safety culture components but we're really not -- we're just making sure that they did a good root cause is the bottom line in that inspection.

I think I've in fact, covered both 16 and 17 unless there's questions, I'll move to the --

MEMBER APOSTOLAKIS: So this is something that you expect people to be able to do it routinely.

MR. ANDERSEN: Right.

MEMBER APOSTOLAKIS: I mean, to extend the root cause analysis to include the three components and --

MR. ANDERSEN: Right, and this is the majority of plants throughout a year. Typically, you know, we'll have you know, 80 or so plants in the first column, the licensee response column, we'll probably have 10 or so plants, 10 to 12 plants, 15 plants in the regulatory response column. So you're talking, you know, 90 to 95 percent of the plants will be in these two columns. So for those plants, there's really no impact at all with the safety culture initiative.

Once the plant gets into the degraded cornerstone column and you get here with two or more white findings or a yellow finding in one of the cornerstones or three white findings in the strategic performance area, we take a little bit more action but not in a high degree. Licensee still conducts their root cause evaluation and just like they have been in the past. We perform what's called a 95-002 inspection and the intent of this inspection is not only to review and selectively challenge the aspects of the licensee's root cause evaluation, but also independently assess the extent of condition for the individual and collective risk significant performance issues that warrant a supplemental inspection. Remember that it takes two or more performance deficiencies to get here, so that inspection looks at, you know, are there commonalities between those two inspection findings and is there more of an extent of condition going on than, you know, we did in the first 95-001 inspection.

That inspection has a few more hours attached and it usually is done with more than one individual. We have 40 to 240 man-hours allocated in the procedure and again the enhancement we made here is to let the inspectors be aware of the safety culture components and the key here is we're trying to address -- one of the SRM objective is when a licensee gets in the column three or the degraded cornerstone column, we need to evaluate whether we think they should do an assessment of safety culture. So the way we've done that in this procedure is basically said, okay, let's look at the root cause and assess the extent of condition and did the licensee miss something. And if they missed something that was significant or a significant root cause, significant contributor, and it had to do with one of the safety culture components, then that would be the mechanism where we'd say, "Licensee, you know, we request that you do a safety culture assessment".

So even -- so to get to that point we need to really have a problem with the licensee's root cause evaluation and typically you know, again, 95-002 inspection, we've probably done, I'm guessing now, 20 times. In most cases, you know, by the time a licensee does their root cause, you know, and we've reviewed it, it's sufficient and we wouldn't be here. There may be one or two examples where the licensee did the root cause and I'm thinking one where the actual pump failed when they were doing the follow-up inspection so, you know, they definitely didn't get the root cause.

It no situations where we say, you know, is there a safety culture aspect to this and we would request a licensee to conduct one. And I think I've covered --

MEMBER APOSTOLAKIS: So just out of curiosity, if this had been in place --

MR. ANDERSEN: If this what?

MEMBER APOSTOLAKIS: If this system had been in place, would you have caught Davis-Besse before?

MR. ANDERSEN: You know, I think that's a very --

MEMBER APOSTOLAKIS: Unfair question.

MR. ANDERSEN: I think Billie Garde in one of our public meetings said this process would not have caught Davis-Besse. I think industry, you know, would have a different position.

MEMBER APOSTOLAKIS: So it's quite known here. I mean the whole thing --

MR. ANDERSEN: I believe it would have given us a better opportunity to catch Davis-Besse because with not only this but all the changes we've made as part of the Davis-Besse lesson learned task force and their recommendations, it has us looking at the corrective action program in much more detail. We're looking at all the corrective action entries every day. We're doing a trend review every six months of the corrective action program to look at things that have been in there for a long time that aren't getting corrected, so things like changing out filters and stuff, they keep popping into the corrective action program, we might see that during those reviews.

So we might -- I think we are in a better place to catch Davis-Besse today than we were -- I can't say for sure.

MEMBER BONACA: That's why I feel that really the significant change is the one of PI&R, I mean, the rest, when you run somewhat degraded, you've always been able to go in and whack the heck out of the licensee.

MEMBER APOSTOLAKIS: You'd have problems.

MEMBER BONACA: The problem is the early detection and I think that that position now has some elements in it and that's why, you know, I'm a little bit concerned about you kept those limits, you know, don't do it for more than 30 minutes a day. I mean, if you really want to sensitize them to safety culture issues, why don't you put a time on trial. Maybe he needs one hour a day to look at the -- the other issue, for example, a potential about corrective action programs. I mean, there are lists of items that don't get into the problem. They inspect for it and look for it. Your procedures don't say anything about that and I think the resident inspector should be sensitized to look at those kinds of things that do not get into the --

MR. ANDERSEN: And one of the things we added after Davis-Besse was for the 71152 inspection, we require a number of samples and we look at things. One of the things we added there was that we'd look at some of these other lists, like the maintenance backlog list. There's a lot of different names and we added a number of different names to the 71152 to look at some of these other lists that are out there, make sure they're not deferring safety significant things.

MEMBER BONACA: I think the point in your statement, it says, there are other ways in which there is work. Some of them aren't even on lists. Some of them are on personal lists, you know, some -- I mean, how do you -- I think that's an important issue because that defines a threshold -- it's the only place where you have early detection.

MR. ANDERSEN: Can I finish responding to that? I'm going to go back and verify. I'm fairly certain in the PI&R procedures that there are words that say not just corrective action program but also in the alternative ways the licensees identify and raise issues. We look there also to make sure that if they're finding -- there are things that are put there.

MEMBER BONACA: I didn't see --

MR. JOHNSON: Let me pull the string.

MR. ANDERSEN: Yeah, it's on page 3 of that procedure and basically we're looking at corrective action program and we're talking about other documentation such as training reports or performance indicators, major equipment problem list, repetitive or rework maintenance list, departmental problem challenge lists, issues that challenge operators in performing duties including work-arounds, system health reports, quality assurance audits, self-surveillance reports, self-assessment reports, maintenance rule assessments or corrective action backlog. So those are the type of things we want --

MEMBER APOSTOLAKIS: Those are the

examples, okay.

MR. ANDERSEN: If there are no other questions, I'm going to move to Slide 21 and the multiple repetitive degraded cornerstone. This is where we become the most probing or intrusive into the licensee's performance and again, you have -- to get into this column you have to have a multiple degraded cornerstone. You need two cornerstones with a -- in the degraded column or a number of whites that have lingered for more than five quarters, multiple yellow findings or one red finding. There's a number of different ways you could end up in this column.

Licensee performance improvement plan, basically, when the licensee gets into this column, they look at themself and they come up with a performance improvement plan. So they'll continue to do that with the enhancement we're doing for safety culture. The licensee will also be -- part of this process will be to do an assessment of their safety culture. So we'll expect them to do an independent assessment of their safety culture, and they end up in column 4.

NRC baseline, we've -- 95-003 is the inspection we use. We wait until the licensee has looked at that, looked at their -- you know, come up with their improvement plan, and then we go in with the 95-003 inspection. The intent of that is to determine the breadth and depth of safety, organizational and programmatic issues. This supplemental inspection is more diagnostic than indicative. It includes reviews of programs and processes not inspected as part of the baseline inspection program. So that's words out of our 95-003 basis document on what the intent of that inspection procedure is for.

We talked about enhancements. Basically, you know, we're going to evaluate the licensee's safety culture assessment. That will be part of that. We're looking -- and you know, by doing that, we're looking at areas that we can focus on as part of our sampling of the safety culture components and then we'll independently assess those area as well as all the other aspects of 95-003 that we do today. I mean, we tailor 95-003 for the specific situation, i.e., if -- the reason why they ended up in the multiple repetitive degraded cornerstone column was emergency preparedness, a majority of the inspection will be focused in that area and we might do cursory reviews of the other areas. So we tailor 95-003 depending on the situation and each 95-003 kind of has a plan in place that gets run through the program office before we go out and implement it.

So that's kind of just a general background of that area. And like Mike said, we should be able to get the 95-003 out here in the next few days. Yes, Slide 23 just talks about the event follow-up procedures. Basically we just, you know, again, made the inspectors aware of safety culture components and those procedures were generally right there in the beginning. The root cause hasn't been done so it's more of a transferring of information to the follow-up team that's going to be looking at the root cause.

Slide 24 and 25 kind of summarize the approach. Basically, we believe that it's in the framework of the ROP. The definitions reflect what's important to safety culture. And we believe that the new processes improve the predictability and consistency of the identification of cross-cutting aspects and common themes. We think it meets, Slide 25, the objectives of the SRM and the staff's objectives going into it. It allows us to give is better opportunities to recognize safety culture weaknesses. And these are improvements we've made to 95-002 and 95-003 to look at the safety culture assessment.

Next I wanted to discuss kind of the stakeholder interactions. I think Mike and Gene when they were here in January discussed the multiple meetings we had prior to that date. In those meetings, in looking at Bullet 2 on page 6, it kind of defines safety culture components and we identified a proposed approach. After the January 18th meeting we had which was right before your meeting, the staff made the decision in discussing with the EDO that we move forward into the implementation phase and that's the majority of what I wanted to talk about, stakeholder interaction since your subcommittee meeting.

And Slide 27, in early February we made the inspection procedures and manual chapters available for public comment with the notable exception of 95-003. We discussed those procedures and manual chapters in a telephone conference, public telephone conference on February 2nd. Then we held a public meeting on February 14th to discuss those procedures and get some comments from the industry. Subsequent to that, the industry and external -- other external stakeholders submitted comments to us and those were received in the late February time frame.

And then we evaluated those and most of the comments were incorporated. A lot of the comments were terminology type things. There was some confusion on the terminology which I talked about earlier today, so we tried to make the terminology consistent throughout the procedures. They had questions like what does this mean, what does more than minor mean? What does this mean? So we tried to -- in the guidance document, we tried to amplify that. So we believe we've addressed a great majority of the comments we received.

There were some comments such as we need to do a pilot program which we discussed and we decided not to participate -- not to do because it would be very difficult to run two programs in parallel in the inspection phase, which inspection procedure. You know, you'd have to have two teams, almost to do it that way. So it would be very difficult. So we decided not to do that. There was also some --

MEMBER SIEBER: That's especially when one process is more rigorous than another.

MR. ANDERSEN: Right.

MEMBER SIEBER: I would rather have the less rigorous process.

MR. ANDERSEN: And if one process discovers something but it's in the pilot phase, can we -- we won't be in a position to go look at that further and that puts us in a big bind, so but publically and internally. And I can get into more comments if you really want to but the next step in the process was that we took the revised procedures after you incorporated the external comments and we put them in a package and sent them to the regions because they're the primary users. We wanted to make sure that they would be able to interpret and understand what we were trying to say in these procedures because it's easy to do it here but when you actually try to implement it, we wanted to make sure they were doing it correctly.

So that's an important step in the process is that we get them out to the regions and get their comments. And that phase is currently -- is ongoing right now. They were supposed to respond to us by the end of this week and then we'll be looking at those comments and any significant ones we will be discussing with them and members of the regions. And then hopefully coming to some conclusions and issuing all the documents except for 95-003 probably in that time frame.

I've kind of skipped ahead a couple of slides to 29 in discussing that but the -- like I said, those are -- all the procedures except 95-003 should be in late April. Regarding 95-003, our current time line it will be out shortly. We're going to give the external stakeholders two weeks, I believe to look at it. We'll evaluate those and we're going to use the same process then, to send that procedure out to the regions for a good review. We'll look at those comments, incorporate them and then hopefully in the May/June time frame, we'll put out the final version in 95-003.

Like Mike said, that document we typically only use that on the average of maybe once a year. There's no eminent 95-003 inspection that's coming up, so I think we have a little bit more time with regard to that procedure. And then if it does come up, you know, we will get -- you know, we won't implement it by June anyway, even if we found an issue today because the licensee has to go through their process first and then we come in and do the inspection.

And that will give us some time to do some just in time training where we can bring the whole team in and discuss, you know, how we want to proceed because it's important and we won't have time to get the training out. So that's 95-003. I kind of skipped that little bit of training but on Slide 30 I discuss training and that's an important element of what we're trying to do here. Hopefully next week, we're going to be rolling out a computer based training which is kind of our initial step at doing this. Basically, it's a tutorial you kind of go through and it kind of introduces you to safety culture and why safety culture is important. Some historical events, Chernobyl, the space shuttle, why it's important to have a good safety culture, a probing attitude for the inspectors, and then it gets into the --

MEMBER APOSTOLAKIS: What will you learn from the space shuttle?

MR. ANDERSEN: The space shuttle is actually a very good -- a very good study for us on a questioning attitude and the importance of --

MEMBER APOSTOLAKIS: We're really not questioning --

MR. ANDERSEN: We actually did a whole training evolution just on the space shuttle and presented that at the regions at one of the meetings. It was very useful.

CHAIR WALLIS: I understand there was a

questioning attitude but management was not receptive.

MR. ANDERSEN: Right.

CHAIR WALLIS: That was the problem.

MEMBER MAYNARD: I think that's an outstanding example for --

MEMBER SIEBER: Is this on a disk?

MR. ANDERSEN: It's actually on our website. You can -- on our internal website, I'm not sure if that's accessible or not.

MEMBER SIEBER: Only with great complications.

MR. ANDERSEN: But I think we can get it to you. I think we've shared it with NASA and other people, so I'm sure we can share it with you.

MEMBER SIEBER: Would you send me one?

MR. ANDERSEN: Sure.

MEMBER SIEBER: Thank you.

MR. ANDERSEN: Like I said, the computer-based training and then we got into some of the changes we're making to the procedures because now when we're talking to the inspectors and training them, we really want to get to what do I need to know as an inspector and how is my life changing because of all this? So that's the first step to do that. We have a little tutorial they run through. It's about an hour or two that they go through.

That's kind of to set up the next phase of the training which we'll do at the counterparts meetings in May and June. We're actually going to go through in a little bit more detail those same concepts and what the procedures changes, but really the bulk of the training in the -- at the counterparts meeting is to run through some case studies, case findings and show, you know, how the new process works, how it works into, you know, identifying a performance deficiency, to documenting that performance deficiency and inspection report and to carrying all those findings and stuff into the assessment meeting, how we would run the assessment meeting.

So that's a very important training session we'll do at the counterparts meetings for all the --

MEMBER APOSTOLAKIS: I would like to ask a question of my colleagues who have run plants. How often did you get concerns, unsolicited concerns, from your staff, safety concerns, and there is, I suspect always an element of uncertainty in those concerns and you make a decision and it turns out it was wrong. Can you be accused later that you didn't pay attention? I mean it's easy to sit in a room and say, management didn't pay attention, but there is always uncertainty in these things and you have to make a decision.

MEMBER SIEBER: We had a process for encouraging employees to submit their concerns but I think any site vice president occasionally gets one. I take it if an employee feels he's otherwise in jeopardy, he will put one in to protect himself. And I used to handle those personally, because those I wanted to make sure were done correctly. And so I would walk them through the PI&R system and to make sure that that the concern was answered in a professional kind of a way. In our case, it was very rare that -- we didn't have allegations but we did have a lot of people coming up and saying, "I see this and it ought to be fixed". That kept our corrective action system running pretty much all the time.

Other sites had different situations, different cultures.

MEMBER MAYNARD: First of all, I got concerned if I didn't get any as I did if I got a lot of safety concerns, because with a professional staff, you should get some questions raised, so it didn't bother me. As I said, I bothered me as much if I didn't get any as if I got too many.

And yeah, you always come to a point where a decision is to be made and probably not everybody is going to be happy with that. We would encourage the individual -- first of all, we'd get an independent look at it if we did not come to resolution with the individual. You find that a lot of times when everybody gets the right information, usually it deals with incomplete or not having all the information. Typically, get all the information, people can understand the decision that's made then.

If not, encourage them to -- there's other avenues. And in fact, we would encourage them, if they still didn't agree with it, go to the NRC. Now, we'd typically go to the -- talk to the NRC ourselves and tell them what the issue was, what the concern was and how we resolved it and then if the individual wanted to go to them and that would happen occasionally but you still have the responsibility to manage the plant, make the decisions the best that you can and if that doesn't satisfy everyone, well, there's a process for that to be taken.

CHAIR WALLIS: You're talking about --

MEMBER BONACA: What I have seen is that you have some specialist that you have, engineers, that are probably the most insightful. They come up with a lot of things and the way you treat them, the way you just reward them, you just encourage them, is a message to everybody else, because you know, some people, other plants thing that, you know, those guy is a pain, every time he comes around he finds a new problem. Well, is it a problem or is it not?

It is a clear problem, you know, and so but the way you treat people is a message to everybody else, you know, in how you accept them, and then, that's a protection to you as an individual in management that if you make a wrong call, it's not an unusual wrong call. I mean, you make the call with a fundamental good justification and reason.

MEMBER APOSTOLAKIS: So it's not the decision itself and the possible adverse outcome later that matters. What matters is the process through which you reach the decision.

MEMBER BONACA: That's right.

MEMBER SIEBER: In the documentation and occasionally you get a really good one where someone had an insight that solves a significant plant problem, we would write those up in our plant magazine as a good thing for people to do.

CHAIR WALLIS: You're speaking about

individuals raising an issue and George mentioned Davis-Besse. I would think there were enough symptoms at Davis-Besse there's be an army of people raising concerns and that's the surprising thing about Davis-Besse.

MEMBER SIEBER: That's the culture.

MEMBER APOSTOLAKIS: The answer we got from Jim and Mike really wasn't -- even though ultimately it was a safety culture issue, the changes the NRC has made are not only in the area of safety culture but also how do you evaluate performance, right, because you mentioned Jim, everything else that the task force recommended. Really those things have to do more with observations and reacting to those rather than culture itself.

MR. ANDERSEN: Right.

MEMBER APOSTOLAKIS: Even though ultimately culture would -- so it was really an unfair question, unfair or -- it was a question, but you know, would this have caught it. It's the totality of the things that we did that probably would have put us in a better position.

MR. ANDERSEN: Exactly. Just quickly on the other training issues, we also plan to discuss with regional management a couple times prior to July

1st, safety culture and the importance of it in the new process. And then going forward, you know, long range after implementation, we're looking to incorporate some of the safety culture into the training the inspectors go through as they qualify and also as they recertify themselves periodically, they have to do training, try to incorporate, you know, some aspects of safety culture into that training as well.

We're also going to use the counterparts meetings in the fall to discuss lessons learned in the first quarter to get some feedback and then I'm probably getting ahead of myself, but down the road we've committed to in a year and a half from implementation to step back and take a look at it and see if it was effective or any changes we need to make.

On Slide 31, I just wanted to mention transition issues. There are some transition issues and questions and answers we're going to have to address, you know, when -- you know, 95-003 inspection was conducted in, you know, January of 2006, do we go back and revisit it type of questions. So we're trying to address those and we're working with our stakeholders internally and externally to come up with those questions and answers and then document them prior to implementation, so everyone understands you know, under what situations what's going to happen when we implement this on July 1st.

Slide 32 just kind of captures some of the communications we're going to be doing. The Commission paper in mid-May will cover a lot of the approach and document that. We plan to conduct a Commission technical assistant briefing as well in early June. We will complete a regulatory information summary or RIS on the safety culture initiative and in that regulatory document, we will list all the transition issues just so all the licensees and stakeholders are aware of what the transitions are.

There are some external workshops being discussed by the industry and that we might participate in. That's not finalized yet. And like I mentioned, we'll have an implementation period of 18 months where we'll evaluate in our assessment, our annual ROP assessment in April of 2008. And at this point, if there's no questions for me, I'm going to turn it back over to Mike for --

MEMBER POWERS: Well, you did promise that you would discuss the extrication issue.

MR. ANDERSEN: Okay, okay.

MEMBER POWERS: I've waited patiently. And there are really two extrication issues, the two modes of extrication that I'm interested in. One is that you, in fact, have a degraded cornerstone and for some reason you think that this is indicative of a poor safety culture and you've asked the licensee to do a safety culture assessment. That's the more extreme of the two possibilities.

The other possibility is there is not degraded cornerstone by the inspection force has convinced itself that there is some weakness in the safety culture and consequently is pursuing all these additional questions. How does a licensee get out of these two situations? What does he have to do to persuade you?

MR. ANDERSEN: I'll ask for some assistance from the safety culture folks to fill in where I'm off. The first one, basically, the licensee performs a safety culture assessment. Since under your scenario, they're doing it under seven degraded cornerstone column, we'd probably follow up with the PI&R inspection, 71152 and that basically gives us -- allows us to sample -- use as one of the samples for that inspection looking at a self-assessment which would be the safety code for self-assessment.

When we did that, we would look at the results of that assessment, see if the results matched the inputs, you know, that they got into it, see if the licensee was taking the proper corrective actions coming out of that safety culture analysis and then make some determination whether they were adequate or not. And if I missed something if someone wanted to add into it. We're just seeing if they used it appropriately.

MEMBER POWERS: And automatically, if somebody asked for a safety culture assessment, they're going to come back and say, "You've got a lousy safety culture". I mean, it's guaranteed.

MEMBER APOSTOLAKIS: Because the standard of a good safety culture does not exist.

MEMBER POWERS: That's right.

MEMBER APOSTOLAKIS: We don't know what is a good safety culture.

MR. JOHNSON: But the issue is, we're not asking them if they have a good safety culture. We're asking them to look to see if safety culture was at a root of the issue that we're talking about, whether it's the substantive cross-cutting issue or whether it's this more significant issue, and so if a licensee does a self-assessment and finds issues that they think they ought to fix, we're going to look to see that they fix those issues.

If we do it and see that there are issues that we think they ought to address, we'll dialogue -- we'll document those, we'll dialogue with the licensee and we'll make a determination about whether the licensee has addressed those. Typically, we, for example, for a plant that is in the degraded cornerstone action, we just copy those -- we issue those in a confirmatory action letter so they're on the docket and we -- you know, we are confirming that you're going to take these actions to address the performance deficiency and so we've got then, in those instances a very clear record about what kinds of things we are expecting that the licensee would do in response to the issue that happened.

With respect to the 71152 (sic) or I guess, the substantive cross-cutting issue and we've had it repeat the third recurrence and we've asked the licensee to do a safety culture evaluation, you know, licensees have continually had an issue about how do I get rid of a substantive cross-cutting issue and we have added there are exit criteria in 75-1152, and essentially you know, we looked at -- again, we continued to look at that rolling 12-month window. If we look and they don't reach the criteria that would cause us to say there's a substantive cross-cutting issue, and if we haven't put in place some specific things that we want them to do based on some specific findings, if they have, based on this most recent window, they don't meet the criteria, then they're done. They -- you know, we exit them. So it's not an issue that's different from today with respect to how do we decide as a regulator that we've seen enough in terms of those things that have caused the licensee's performance to decline.

The only twist is with respect to safety culture, we're looking at this admittedly softer area, if you will but the onus is still on us to be very clear about what we think with respect to what the exit criteria ought to be and we think we've tried to put steps in the procedure to drive that home.

MEMBER POWERS: I guess I don't understand quite what the steps are. Somehow I'm missing -- what is I have to do? I mean, if I do a safety -- you asked me to do safety culture assessment. I guarantee I'm going to go get a contractor and do that for me because I haven't got a clue how to do a safety culture assessment and I'll bet you there's nobody on the staff of any nuclear plant that knows how to do them.

MEMBER MAYNARD: Well, actually, there are some very good industry self-assessments that have been put together by teams that have done some very -- I think very good work in the area of -- the USA have put together consistent teams, go around to a number of different plants and that way it's not just a case-by-case basis. You get a benchmark also. And it's a behavior based safety culture assessment.

MEMBER SIEBER: Not only do you have to do all these individual corrective actions, they have to be effective. I mean --

MR. JOHNSON: It's still performance based. I mean, if he doesn't have findings, he's going to roll out of his window.

MEMBER APOSTOLAKIS: No, no, no, well, the other things you can do, though, if you go through these processes that -- I suspect what's behind it is good operating experience with -- the plants have a good operating experience, right? This is considered good. I mean, let's look at the issue of resources. Suppose you find that the problem was that they didn't have adequate resources. Then you have to decide, after they take action that now they have adequate resources. How do you do that? You probably look at good performance and say, well, you know, experiences people like Otto and Jack and so on, and they tell you, yeah, for this kind of thing, this is adequate. I mean, it has to come down to some sort of judgment.

MEMBER SIEBER: You have to look at what the issues are.

MEMBER APOSTOLAKIS: Yeah, absolutely.

MEMBER SIEBER: For example, we had some departments at our site that were smaller than they were at other sites because the people that were in them were very good. And conversely we had departments that had more people in them than other sites did because that's what we needed to do that work. So it's not a matter of numbers. The issue is getting the work done. And that's what you look at to determine when you're out of the problem.

MEMBER APOSTOLAKIS: How does Mike decide that?

MEMBER SIEBER: He looks at the result.

MR. JOHNSON: That's right. You know, I really do want to re-emphasize a point that's been made. The industry -- if the industry were here, EMPA were here, they would tell you that the industry knows very well how to do a safety culture assessment and to come to findings. We believe that. That's why we expect the licensee to do that initially and we're going to come along and do our own and we'll discuss with the licensee where we differ with respect to the outcomes and we would expect, however, whatever results from our assessment or their assessment that they would address those if there are significant findings based on that. And then the issue is, have we seen enough with respect to what they've done to address those issues that enable us to say this issue was closed and then the window, this performance based window continues on. And so if nothing else happens, they're done.

MEMBER APOSTOLAKIS: The issue will not be closed until you see performance?

MR. JOHNSON: We have today in an ROP the process by which we can hold a performance issue open if we're not satisfied with the actions the licensee has taken to address it. Even on a technical issue, the pump didn't work, you know, it got them a white finding or a yellow finding. If we're not satisfied with respect to how the licensee has addressed that in terms of understanding the cause and addressing the issue, we can hold that issue open. So this is an issue that we deal with every day with respect to making sure that licensees understand and fix the problem.

MEMBER POWERS: Now let me understand in the weaker -- the weak condition, no degraded cornerstone but the inspection force, they know. They're absolutely persuaded there's a weak safety culture here and they are checking everything twice. How does the licensee get out of that?

MR. ANDERSEN: I'm not sure what they're in besides the inspector thinking that -- if they have all green findings and all green performance indicators there is really no direct regulatory action we would take. You know, we would be looking but there is no direct action we would be taking unless the inspection staff really had wanted to do something, we could get a deviation from the ROP and you know, directly look at something.

MEMBER POWERS: So all he has to do, I mean, it's really simple, he just waits till there's a rotation of inspectors, I guess.

MR. JOHNSON: No, no, there is one scenario that could get you there. The plant has all green findings but they've got this collection of findings that cause us to issue a substantive cross-cutting issue and it recurs the third time. We're convinced they've got a problem, they're not convinced. We say go out and do a safety culture assessment because you haven't been able to address this in three cycles.

And the licensee goes out and does that safety assessment, that safety culture assessment. How do they get out of that? Well, again, the next cycle, the question that we ask ourselves is, first of all, did they find -- as a result of that safety culture assessment that they did, did they find something that was wrong that needed to be corrected? If the answer was no, then that tells us something. That maybe they're done and we also look at now this most recent assessment window and then as ourselves are there the same checks. Are there greater than three, do they have a common causal link, are we concerned with their ability to correct the actions, to take actions to address those issues? If the answer to that is no, they're done, they're done.

MEMBER MAYNARD: I do think this is going to be a real significant challenge for the NRC in this area because first of all, with the current ROP cross-cutting issues, there's still a lot of inconsistencies and there will be. And with the current process, it's difficult once you get identified as having a problem to get out of that. And it's part of human nature.

If you take a look at the same events for somebody that doesn't have any degraded cornerstones or any problem areas, you may classify them one way. But when you look at the same events and you know somebody has had a culture problem, it's very difficult to make a totally objective assessment of what falls into that area, and that's where I believe that the NRC is going to have to really provide some oversight training and consistency among themselves or a licensee will never get out of some of these areas.

MEMBER POWERS: I think there's a real potential for a do loop here and, I mean, you've seen this before under the old process. A plant got a reputation and it can't -- it just never goes away. You have to wait till somebody else gets in more trouble.

MR. JOHNSON: That's right. It's a concern. It's a concern that we struggle with all along. It's one that we've got to really watch with respect to training to make sure that we've very clear where there has been a safety culture assessment in this instance that we do clearly identify if we think a licensee needs to do something to address those. And if there is nothing like that again, the clock, the window continues to roll and we do the tasks that are done, they're done.

MEMBER SIEBER: One of the weaknesses of this process is when you have the situation of the licensee who doesn't particularly have a good culture, it also doesn't have a lot of equipment failures and they aren't really looking very hard for issues to solve and so the number of events and the number of findings does not trigger you into looking at the cultural aspects until something like a hole in your reactor vessel head appears and then all these hidden defects start to come to the surface. That's the weakness in the process.

MR. ANDERSEN: Hopeful, some of the changes we've made based on the Davis-Besse lessons learned task force will help address that issue.

MEMBER SIEBER: Right.

CHAIR WALLIS: I presume that you're going to evaluate this whole process anyway, so we'll know more.

MR. ANDERSEN: Oh, yes, oh, yes.

MR. JOHNSON: Three very brief points to wrap up.

CHAIR WALLIS: Yes.

MR. JOHNSON: So the approach, I think, is consistent with what the Commission told us to do. We are on track to implement it on the 1st of July. We'll be getting training with that in mind and as we pointed out, a number of times and you've just recently just a few minutes ago asked, we are going to continually monitor the process for things like exit criteria, for things like are we implementing this process as we think we should, do we have all of the components lined up under the right cross-cutting area for example. We're going to monitor that. We'll do an evaluation as a part of our normal process and we'll make changes as appropriate.

MEMBER APOSTOLAKIS: Mike, you said you think that what you have developed is consistent with the Compressor M (phonetic). Does the Commission think so?

MR. JOHNSON: Yes, I believe so.

MEMBER APOSTOLAKIS: Oh, you have already talked to them?

MR. JOHNSON: I interface with the Commissioners in my periodics. I've briefed them and others and yeah, I think the Commission is in agreement with what we've done so far.

MEMBER APOSTOLAKIS: Okay.

MR. JOHNSON: We're going to send them an information paper and they'll get a chance to tell us if we've done otherwise.

MEMBER BONACA: Any additional questions for the presenters? Thank you very much for your effort and any questions we'll have to address as a committee is whether we want to see this procedure 95-0003 that we're all anxiously all waiting to look at some time in the next couple of months or so. But with that, I'll turn it over to you, Mr. Chairman.

CHAIR WALLIS: Thank you very much. Any other matters? We will take a break and we will take a break till 10 after and those of you who are waiting to hear about fire protection, we will being at 10 past 3:00.

(A brief recess was taken at 2:56 p.m.)

(On the record at 3:12 p.m.)

CHAIR WALLIS: Please come back into session. We're ready for the next item on the agenda, the draft final Reg Guide Risk Informed Performance Based Fire Protection for Existing Light Water Nuclear Power Plants. I turn to George Apostolakis to lead us through this one and insure that we finish on time.

MEMBER APOSTOLAKIS: Thank you. So today we'll hear from the staff on Regulatory Guide 1.205. We reviewed this issue on fire protection at the subcommittee meeting in May of 2005. Then the full committee reviewed it during its 523rd meeting in June of 2005 and the 526th meeting in October 2005 at which time we wrote a letter to the ADO where we had the number of objections and what was in the regulatory guide and we recommended that it should not be issued and the ADO write aback to us in August of 2005 agreeing with all the recommendations except one which had to do with definitions of certain things.

The staff has made changes to the Regulatory Guide and today we'll hear about the revised version. And with that, I'll turn it over to Mr. Sunil Weerakkody of the Office of Nuclear Reactor Regulation.

MR. WEERAKKODY: Thank you, Dr. Apostolakis. My name is Sunil Weerakkody. I'm the Chief of Fire Protection Branch of the Division of Risk Assessment. We are here today to present to you the changes to the Reg Guide 1.205. The objective of the meeting; the objective is to receive ACRS endorsement to issue the Regulatory Guide 1.205, Risk Informed Performance Based Fire Protection for Existing Light Water Nuclear Power Plants. Next, please.

The outline; I'm going to take a few minutes to go over the background pretty much complete some of the things what George said from our perspective and then Bob Radinski here, he's' going to give you a presentation not on everything, but his presentation is going to focus on the changes we made to the Reg Guide since you saw them and I thought this is the third time. I missed the one on the subcommittee, so this is the fourth time we are coming to ACRS, including subcommittee.

MEMBER APOSTOLAKIS: Well, when you hit 21, you win.

MR. WEERAKKODY: I'm not going to hit 21. Then what we want to do is have Paul Lain here, he's the Project Manager for 805, give you a brief summary of where we are with 805 implementation. We have -- we kicked off 805 last year, August. We had a couple of observation visits and I'm very pleased to see we have two members from our pilot facilities, from Duke Power and from Progress Energy. Jeff Ertman is here and Dennis Henneke and did I say your name wrong again? Okay.

MEMBER APOSTOLAKIS: No, you didn't say it at all.

MR. WEERAKKODY: I usually point to him and say Duncan, his boss. And obviously the District Guide so we have Alex Marion and his prodigy or mentee

Brandon here. And with respect to the questions, you know, if you have a lot of questions on PRA stuff, we have Steve Dinsmore and Ray Gallucci to help out. Next page, please.

With respect to the background, we did publish the rule in June 2004. We published the draft regulatory guide in October 2004. It seems like a long time ago, yeah, it is one and a half years ago. And 36 units sent letters of intent to adopt 805 by December 31st, 2005. Next slide, please.

The staff presented the draft Regulatory Guide 1.139 to the ACRS full committee on June 14th, 2005 and subsequently, the ACRS recommended that this draft not be issued providing six major recommendations and then finally, if I summarize, your major concern was that the weak emphasis on the PRAs. We corrected that, then we came to you and then presented you the revised draft Reg Guide 1.139 in October but at that time we specifically did not ask your endorsement because we were still addressing some additional comments from CRGR which primarily went towards the coherency of 805 with the other risk informed stuff that we do which is why you are seeing -- one of the reasons why you are seeing Steve Dinsmore here.

Then we revised, over the last several months, you know, since October, we have been going back and forth having a number of internal discussions among us and sometimes with industry to address the additional comments from the CRGR.

CHAIR WALLIS: So to just clarify, this DG 1.39 became Reg Guide 1.205.

MR. WEERAKKODY: Yes.

CHAIR WALLIS: It's the same thing.

MR. WEERAKKODY: Yes, sir, yeah. We get a number, then it gives me a final.

Then to re-emphasize, the objective before I hand it to Bob Radlinski, we will brief you about the changes we made in 1.205 and we are here to request your endorsement with this Reg Guide for licensee's use. Thank you very much.

MR. RADLINSKI: Okay, as Sunil said, my name is Bob Radlinski. I'm a Fire Protection Engineer in Sunil's group and the objective, my objective is to describe the changes that we made to the Reg Guide since the last time we met in October. As a point of clarification, the version of the Industry Guidance Document, NAI 0402 that the Reg Guide is endorsing is Revision 1. That's the same version that you saw back in October. It hasn't changed. The changes that I'm discussing, describing today were all made in the Reg Guide and those changes don't require any changes to 0402. You're going to have to go back and read that again. Next slide.

There have been two significant changes to the Reg Guide since we last met in October. The first is that we've added additional guidance for review and approval of the plant change risk impact as applicable to changes identified during the transition to 805 and also following the completion of the transition. The second additional requirement -- second additional changes that we've added requirements for the licensee's fire PSA to the Reg Guide. Next slide.

The revised Reg Guide includes a requirement that the total risk change associated with the transition must be reported in the LAR. So a risk change will be based on the measured fire risk for the fire protection program as transitioned versus a hypothetical risk for a plant that is in full compliance. Now, a total risk change is to include all fire protection program non-compliances based on current NRC regulations and current positions as well as all fire protection program changes that have been made or are planned to be made as part of the transition to 805.

The current NRC positions, regulations referred to include those for multiple spurious actuations, which includes a Risk 2005-30. Also there's a draft letter on the issue of one at a time with respect to those fire circuit analysis as well as operator manual actions which will be -- which were partially addressed in the Risk 2005-30 and will be addressed in more detail in a new Risk that's being issued shortly which is scheduled to be issued in June of this year.

MEMBER APOSTOLAKIS: Are you -- you're not coming back to the operator manual actions later, are you?

MR. RADLINSKI: Am I coming back to it?

MEMBER APOSTOLAKIS: Yes, in your presentation.

MR. RADLINSKI: No, I hadn't planned to come back to it.

MEMBER APOSTOLAKIS: I have a question then. There is fairly extensive discussion in NEI 0402 regarding these manual actions where they really focus on the time that it takes for the operators to complete a certain task under fire conditions. And I'm wondering how you're going to evaluate a licensee's amendment request that includes a model like that when the NRC models don't do that.

Both ATHEANA and SPAR-H treat this time as one of the performance shaping factors but they don't focus on that time. So I mean, on the one hand we have the industry saying this time is important and you really have to find the probability it would take them to do it and then compare it with the time that is actually available, but at the same time, we don't have a model to do that here.

MR. RADLINSKI: That's why Ray is sitting here.

MEMBER APOSTOLAKIS: You have to hit that button. Is it red, orange?

MR. RADLINSKI: It's on.

MEMBER APOSTOLAKIS: Okay.

MR. GALLUCCI: Ray Gallucci, Fire PSA. Well, probably regardless of which method they use, we'll probably look at it based on the method itself. We won't necessarily look at it in ATHEANA's space or SPAR-H space. If they choose to do a model along those lines, we would look at it along those lines, the SPAR-H type but if they choose to go through the THERP method or one of the other methods, we would just review it relative to that because we will have -- we have the expertise either in-house or through contractors to handle any one of those HRA methods.

MEMBER APOSTOLAKIS: Well, but that is not a very happy situation though, because that means you will have to review the model that they produce and that's -- I mean, three licensees might submit three different models. Wouldn't it be better to try to do something in-house, not necessarily you but we are spending a lot of money on developing HRA models and we don't seem to be spending them on the right thing.

MR. GALLUCCI: Well, the current plan is that there will be a peer review of all the fire PSAs that are submitted. If the submittal comes in after the industry guidance is developed, which will be subsequent to the fire PSA standard, which is probably -- I believe is going out for public comment in a few weeks if not next week. And NEI was hoping to have a peer review guide out by the end of the year. So expect for the non-pilots, by the time -- or except for the pilot plants, by the time the non-pilot plants come in, HRA review will be part of the normal peer review process and what NRC would do is review the high level findings that come from the industry peer review process.

If the peer review process isn't in place, then NRC may do, similar to what we did with some of the IPEEEs, we'll review what we can in-house but we may need to -- we probably wouldn't go our solely, just solely for HRA but in order to have enough support for reviewing of fire -- to basically do a peer review of a fire PSA ourselves, we probably would involved some of the authors of NUREG CR 6850 that worked with the people in Research, some of the Sandia contractors, et cetera.

MR. RADLINSKI: Okay, next slide.

MEMBER APOSTOLAKIS: Okay, means please continue.

MR. RADLINSKI: Noted. Okay, the revised Reg Guide also states that only risk reductions attributed to changes to the fire protection program -- changes attributed to the fire protection program may be combined with risk increases when calculating net change in risk during the transition. And that the --

VICE CHAIR SHACK: Does the hyphen mean that outside the transition you can do other things?

MR. RADLINSKI: Yes, and I'll get to that. Right now I'm talking about the transition. Okay. And also the Reg Guide states that the total change in risk due to the transition to 805 should be consistent with the acceptance guidelines of Reg Guide 1.175.

MEMBER APOSTOLAKIS: When you say "total risk change", what -- change from what?

MR. RADLINSKI: It's going to be evaluated against the acceptance criteria in 1.174.

MEMBER APOSTOLAKIS: No, but a licensee now presumably complies to some extent with Appendix R.

MR. RADLINSKI: Correct.

MEMBER APOSTOLAKIS: Then they transition to 805.

MR. RADLINSKI: Right.

MEMBER APOSTOLAKIS: I will calculate the delta CDF from what to what?

MR. RADLINSKI: Okay, from a hypothetical fully compliant plant --

MEMBER APOSTOLAKIS: Ah, from a hypothetical plant, okay.

MR. RADLINSKI: -- to a --

MEMBER APOSTOLAKIS: But grandfathering whatever else they have.

MR. RADLINSKI: Not grandfathering. They have to address non-compliances as changes. They have to process them through their plant change process, so they're being addressed, they're being evaluated.

MEMBER APOSTOLAKIS: Okay.

CHAIR WALLIS: So you're looking at the risk of the non-compliance really.

MR. RADLINSKI: Well, and they'll make some changes as part of the transition. There will be some changes that they make in the plan. They'll all be lumped together. Next slide.

Okay, now we're into the post-transition phase. For plant changes after transition if the transition is complete, the Reg Guide includes acceptance criteria for self-approval of plant changes. The Reg Guide notes that the criteria are applicable only if the licensee has an acceptable fire PSA based on an industry or NRC peer review. Prior NRC approval is not required for any fire protection program changes where a decrease in risk occur.

MEMBER APOSTOLAKIS: Let me understand this. You're saying that the acceptance criteria -- what did you say about this sub-bullet here, applicable if the licensee has an acceptable fire PSA?

MR. RADLINSKI: Right, what we have in the Reg Guide is a suggested process for self-approval which include acceptance criteria for risk.

MEMBER APOSTOLAKIS: The Reg Guide, as I remember, recommends to the industry that they should have a fire PSA because it will have more benefits.

I'm missing something here.

MR. GALLUCCI: This is one of the benefits.

MR. RADLINSKI: Right, this is one of the benefits. They cannot do this, they cannot use this process unless they have an approved fire PSA.

MEMBER APOSTOLAKIS: There is a difference.

MR. RADLINSKI: But the rule does not require them to have a fire PSA to transition to 805. We can't change that.

MEMBER APOSTOLAKIS: Right, so what does the Regulatory Guide say?

MR. RADLINSKI: The Regulatory Guide says that they cannot use this self-approval process which was a major -- giving an advantage of transitioning to 805. It's like the generic letter 8610 evaluations only now we're putting numbers to it.

Prior NRC approval is not required for any changes within that decrease in risk for both -- decrease in risk for both CDF and LERF and determination of acceptance shall be in accordance with Reg Guide 1.174 which includes a requirement that all changes must be consistent with the Defense in Depth philosophy and safety margins must be maintained. Next slide.

VICE CHAIR SHACK: Do you have any hints as to how many of the people who intend to transition to 805 intend to do it with the benefit of a peer review PRA?

MR. GALLUCCI: Probably all of them.

MR. RADLINSKI: Yeah, we anticipate that they all will.

MEMBER APOSTOLAKIS: They have said that.

MR. RADLINSKI: Well, the pilot plants are developing a PSA.

MR. GALLUCCI: NEI has come out and recommended that anybody who transitions do a fire PSA. It's really the only right way to do it.

MEMBER APOSTOLAKIS: When did they do this? They're --

MR. GALLUCCI: Fire protection information form.

MEMBER APOSTOLAKIS: Because 0402 doesn't say that.

MR. GALLUCCI: No, but they've stated that.

VICE CHAIR SHACK: And this is a big enough carrot to provide incentive, the self-approval is a very large carrot.

MR. RADLINSKI: Yeah. Okay, the next slide has the criteria, the acceptance criteria based on risk. Changes would increase in CDF less than 20^{-7} per year and LERF less than 180 $^{-8}$ per year may be self-approved. Changes with increases in CDF between 1 E^{-7} per year and 1 E^{-6} per year corresponding numbers for LERF must be summarized in a submittal to the NRC. And we provide guidance in the Reg Guide for what should be in that submittal.

Okay, and in that situation the NRC will take up to 90 days to either object or just to let it go and if we do, if we don't object in a response, a formal response to the licensees, they are free to proceed with the implementation of the change. And changes greater than 1 E^{-6} for CDF will be required to be submitted to the NRC for approval under the LERF process.

Some of the guidelines for calculating the risk, when comparing the risk impact of a change to the acceptance criteria, licensees must use the combined change in risk for all fire protection changes that are either related to the same fire protection program issue or that effect the same fire area or are related to the same fire scenario as appropriate. So they can't break it down into individual changes and you know, say it meets the acceptance criteria.

MEMBER KRESS: You're saying they can't make some non-fire related change to offset the Delta risk?

MR. RADLINSKI: That's next, the next slide.

MR. GALLUCCI: This was addressing the case where let's say you started with an automatic suppression system. You wanted to eventually remove it but you parsed it up into two pieces. You went to manual actuation of the system and then finally to removal and you would measure a delta first from going from automatic to manual water sprinklers and then that delta would be acceptable. Then later on, you would make a delta from manually activated to no system which would also be acceptable but had you measured it from an automatically actuated system to no system it would have been unacceptable. You have to -- no matter what timing you use on those changes, you have to track -- you have to keep track of the total.

MR. RADLINSKI: Okay, the first bullet in the next slide answers your question. Risk reductions for changes unrelated to the fire protection program may be used to offset risk increases attributable to fire protection program related changes but they have to be pre-approved by the NRC.

MEMBER APOSTOLAKIS: Okay, let me come back to what Bob just said. You're saying we have to keep track of all the changes. And we'll have to make sure the delta CDF remains below 10^{-5} or ^{6} forever? I don't think that was the intent of 1.174.

MR. GALLUCCI: I believe that is the intent for a set of related changes such as I was talking about with the suppression system. Unrelated, I mean, the total of all fire protection changes doesn't have to remain -- doesn't have to be summed together, only the changes that are like it said, I think on the previous slide, if they're related to the same issue, so it would be like a specific sprinkler system, it wouldn't be sprinklers in general, effect the same fire area, if you were to make a series of changes in the same fire area over time, you would have to probably stay less than whatever the Reg Guide 1.174 delta is over time or if you're dealing with a specific fire scenario where you might have a very large area where it's impractical to treat that area as a whole but you look at fire scenarios in specific zones within that area itself.

MEMBER APOSTOLAKIS: But what if the changes are separated in time say by five years? I don't see why the total delta CDF has to remain continuously below -- I mean, what's the rationale? I understand if they -- you know, after the transition, they want to make six changes, they're all related to the same fire scenario, yeah, you bundle them. But then if three years down the line they want to change something else, according to Regulatory Guide 1.174, you evaluate the change. You don't have to keep track of the total.

I mean, you keep track but you don't apply that to the criteria.

MR. GALLUCCI: It's only the ones that would be bundled together that have to stay less than 10^{-5}.

MEMBER APOSTOLAKIS: But even that, why is that so? I mean, the guide doesn't say that.

MR. GALLUCCI: I don't believe 1.174 gives a time limit as to when you have to -- when you can basically absorb the changes into a PSA update and forget about them.

MEMBER APOSTOLAKIS: The guide --

MR. GALLUCCI: It's constrained.

MEMBER APOSTOLAKIS: Based on the present situation, no matter how you got there, to calculate delta CDF and delta LERF and if they satisfy the criteria along with defense in depth and the other stuff, it will be approved. Now you're saying, no, no, no, that's not a game we're playing now. If they add it later to the same fire scenario, the delta CDF will be tracked forever and it has to be below the criteria and I think that's a substantive change to the intent of the guide. Steve.

MR. DINSMORE: Yes, good afternoon. My name is Steve Dinsmore. I'm with the staff. I guess this boils down to this fact that each application that we've been doing to date, we've been controlling the total increase in CDF for each application. For AOT extensions. We also look at the total increase over time for risk for ISI, for IST. So in this case, again, as Ray was saying earlier, we prefer to be able to take a single change and deal with it at one point in time. But if the change is broken up over time, we need to look at the combined increase.

And if we have unrelated changes, this process will be the same as with 1.174. You'll ask them well, how many of these unrelated changes have you made. But if you look at this as a single application, this is how we've been dealing with single applications.

MEMBER APOSTOLAKIS: Yeah, but what you're saying, Steve, is the guide says one thing but we've been doing something else in other areas, therefore, it's okay to do it here, too. Well, this guide was really a landmark development in the risk informed regulations, so I don't know why the staff has chosen to do things that are not in the guide.

MEMBER KRESS: That's actually why we kept the absolute values in the guide. That's an automatic tracking.

MEMBER APOSTOLAKIS: Yeah.

MR. DINSMORE: The general Reg Guide doesn't define what a change is. 1.174 doesn't define a change. It just says "a change".

MEMBER APOSTOLAKIS: But I remember explicitly during the long debates we had about it that that was the intent, that you look at the delta CDF. You have a CDF now 10 -- say six 10^{-6} and you do something and the delta CDF now is added to make it seven 10^{-6}, that's your new total CDF that goes to the horizontal axis, right?

MEMBER KRESS: Yeah.

MEMBER APOSTOLAKIS: And that's how you take into account --

MEMBER KRESS: That was the intent as I understood it.

MEMBER APOSTOLAKIS: Yeah, because now I mean, it seems to me this is not the intent of the guide.

MR. RADLINSKI: But one difference in 1.174 is that it assumes that you're submitting the change and the risk increase to the NRC for review and approval. This criteria, risk criteria, is based on a self-approval process. We don't see anything other than the original model that --

MR. DINSMORE: We've had a lot of discussions about this. Your point of view is well-understood and we agree that it is certainly an interpretation that's in the 1.174, but there is also the interpretation that that guide tells you to take -- it doesn't define what a change is. So in the application specific guides, we've been defining what a change is, what you include in a change.

MEMBER APOSTOLAKIS: But I explicitly remember, Mr. Holahan was in charge of the effort then, he said the licensee can come to us as many times as they want. Didn't he say that?

MEMBER KRESS: Yes.

MEMBER APOSTOLAKIS: He said it explicitly and each time we'll look at the delta CDF.

MEMBER BONACA: They're concerned about a series of changes whereby if you did the whole step at once, the Reg Guide would say, no, you can't approve it, the change. And now you're breaking it into a series of steps and each one of them is separate.

MEMBER APOSTOLAKIS: I understand that.

MEMBER KRESS: But that ought to be --

MEMBER APOSTOLAKIS: It's already there.

MEMBER KRESS: It's already in there.

MEMBER APOSTOLAKIS: There is a discussion on bundling.

MEMBER BONACA: I understand that. I'm saying that that's what they're concerned about.

MEMBER APOSTOLAKIS: They're concerned about it only if one of these three bullets is satisfied. I don't understand.

MEMBER KRESS: But that shouldn't be a problem anyway because if you do them one at a time you end up with the came delta as you do if you did them all in a bundle. And one of them -- if it wouldn't be acceptable by the bundle, somewhere along the one-by-one, it won't be acceptable either.

MR. WEERAKKODY: Can I say something, and I can't speak to whether the proposed is exactly consistent with 1.174 provision, so I'm going to stay away from that and leave it to Steve or Ray. But what I can speak to is look at it from the need from maintaining regulatory oversight in light of what we typically encounter in the fire protection program. Ray gave one example which is, you know, outside systems. If you look at the history of licensing business, there are actual cases where a licensee would go from automatic to manual and then 10 years later they might propose from essentially getting rid of the system.

And another example, that's even nearer than that, that you're very cognizant say for example, it's not that ever licensee -- I'm not saying that people would gain system but if you look at the time line of you know, people making design modifications to the plant, I may have 1,000 feet of hemic (phonetic) at a plant and I might say, okay, let me just create five mods, where I'm going to take care of this area this year, the other area next year and the -- so there should be some discipline and oversight, so I can only support what we propose here from the needs of the program.

Now, I can't say and I'm going to totally leave it up to -- because I read 1.174. I remember it, then I forget it. I read it again, then I forget it again, so --

MEMBER APOSTOLAKIS: But I think the original guide has safeguards in it against this kind of thing, splitting up the change into six changes and having each one approved. But at the same time, you know, it does allow for changes that are reasonable, I think, you know, to be looked at as being an individual change.

I mean, that's why you have these additional requirements of maintaining the defense in depth philosophy, the safety margin philosophy and meeting the regulations and all that stuff. The industry did not object to this.

MR. DINSMORE: Could I just say to Dr. Kress for a second, it wouldn't be -- it could easily occur that you could break a series of changes --

MEMBER KRESS: Yeah, I take back what I said. I think you're right.

MEMBER APOSTOLAKIS: Yeah, but I mean, there is a whole section on bundling.

MR. DINSMORE: But it also says you combine changes, related changes.

CHAIR WALLIS: We've had this conversation about five times now. Why do we keep having it? Why can't you get together on this one?

MEMBER APOSTOLAKIS: We have what?

CHAIR WALLIS: We keep having -- we go around about -- yeah, but we go round and round on this one over and over again. Can't we resolve it some day so we --

MEMBER APOSTOLAKIS: Well, I hope so.

MR. LAIN: I just wanted to bring a different aspect -- this is Paul Lain of the staff, is that not that it's not approvable. It's possible it would be approved. It's just a matter of is it self-approved or do they need to send it in for approval. And it's possible that they could send it in and it would be approved per 1.174.

MEMBER APOSTOLAKIS: Is Slide 8 referring to self-approval?

MR. RADLINSKI: No. Are we working on this one or are we working on this one?

MR. GALLUCCI: The assumption with the self-approval is they're so small to begin with that bundling isn't a concern.

MEMBER APOSTOLAKIS: I understand.

MR. RADLINSKI: It does apply to self-approval.

MEMBER APOSTOLAKIS: No.

MR. RADLINSKI: Yes, it does.

MEMBER APOSTOLAKIS: But it also applies to the requests --

MR. RADLINSKI: Yeah, it applies to each of the acceptance criteria.

MEMBER APOSTOLAKIS: To all of them.

MR. RADLINSKI: Right.

MEMBER APOSTOLAKIS: Anyway, let's go on.

MR. RADLINSKI: Where were we? The second bullet, Slide 9.

MEMBER KRESS: Well, let me ask you about the first bullet. Do you have some criteria in mind for pre-approving that offset and risk?

MR. RADLINSKI: I haven't really thought about it.

MEMBER KRESS: If you pre-approve this using changes to offset the risk, changes related are you, according to what your criteria --

MR. DINSMORE: This is Steve Dinsmore again. There is criterion in 1.174 which you would use, which is you don't create significant risk outliers. I hope I'm answering the right question. Yeah, there are criterion in 1.174.

MEMBER KRESS: I wonder if that criterion involves a limit to the increase in the uncertainty in the result because all the changes in risk aren't the same because they have different uncertainty levels associated with them and you don't want to increase the risk too much. You don't want to increase the uncertainty too much. And I haven't seen any criteria that includes uncertainty in it.

MR. GALLUCCI: My understanding is that when 1.174 is developed the fact that they chose to base everything on mean values was inherently trying to account for uncertainty and that's why values such as 10^{-6} for means as opposed to 10^{-5} or 10^{-4} were used because there's -- I think ultimately it was linked to the safety goal 10^{-4} and so the assumption was -- and I think this is in the SECY that was used as the basis for some of the numbers in 1.174, there's an assumption that if you limit the mean increase to 10^{-6} you can be pretty certain that even that you're not going to have something greater than 10^{-4} that type of philosophy based on what the typical distribution is.

CHAIR WALLIS: So the first bullet would enable you to say we're going to put in a new diesel and this is going to enable us to take out some fire protection because the net increase in risk is zero, for instance.

MR. GALLUCCI: Yeah, if pre-approved.

CHAIR WALLIS: You trade one off against the other.

MR. RADLINSKI: Okay? All right, the second bullet; risk reductions for changes related to the fire protection program risk reduction may be used as offsets without pre-approval by the NRC and cumulative fire risk increase associated with all changes made subsequent to 805, the 805 transition does not need to be calculated. Accumulated risk will be reflected by the periodic updates of the fire PSA.

CHAIR WALLIS: So it needs to be calculated some day and it will be calculated when you do this periodic update.

MR. RADLINSKI: Right, it will --

CHAIR WALLIS: It does not need to be calculated as part of --

MR. RADLINSKI: As a separate total.

CHAIR WALLIS: Right.

MR. RADLINSKI: Okay, next slide. All right, now we're getting into the next significant change to the Reg Guide, which is additional guidance for fire PSA. First of all, again, reiterate that 5048C does not require fire PSA to adopt 805. However, the Reg Guide provides implementation methods that do require development of a fire PSA, the most important of which is the self-approval process.

According to the Reg Guide, self-approval of plant changes at increased risk requires an acceptable fire PSA. Now "acceptable" means either peer reviewed for the industry standards or reviewed and approved by the NRC. Also an LAR that proposes --

VICE CHAIR SHACK: Okay, an increased risk, now does this mean that if you had a non-peer reviewed PSA and you computed a decrease in risk, you'd believe it?

MR. GALLUCCI: You would be unlikely to get the license amendment approved if you didn't have a fire PSA.

VICE CHAIR SHACK: It says I can do a self-approval.

MR. GALLUCCI: But self-approval is contingent upon having a peer review and acceptable fire PSA.

MR. HENNEKE: Can I -- my name is Dennis Henneke, Duke Power. I'm the Chairman of the Fire PRA for ANS and head of the Duke Power transition and the fire PRA effort. A couple of things I should correct here in what we agree with. Whether you need a fire PRA or not is still -- the regulation still says you don't. Many or most of the fire PRA or fire changes in the plant are qualitatively assessed and those do not require a fire PRA to be performed.

If you perform a fire -- if you perform a change for one fire area, what is says, you do a fire PRA for that area, for that scenario, for that issue that you're analyzing. That's all that's required. We don't have to have a fire PRA for the entire plant. Now, that said, the issues that are brought forward like circuit analysis and manual actions, are in many areas. And so in essence, we are being forced into doing a fire PRA for the entire plant because of these issues.

Now --

MEMBER APOSTOLAKIS: But then -- I mean, if the requirement is to meet 1.174 criteria, how can you do that if you don't have a fire PRA?

MR. HENNEKE: Well, a lot of analysis are qualitative in nature. They're --

MEMBER APOSTOLAKIS: So you're not going through 1.174, that's what you mean.

MR. HENNEKE: 1.174 allows qualitative analysis.

MEMBER APOSTOLAKIS: Yeah, as a screening thing. I mean, if you --

MR. HENNEKE: That's right, a lot of these are fire protection that don't effect risk.

MEMBER APOSTOLAKIS: But there is an issue here. I mean, I understand what you say and I agree. But reading NEI 0402, and also the Regulatory Guide, I get the impression, which may be wrong, but I get the impression that the licensee might have a fire PRA or the licensee may rely on -- how they put it -- in instances where a plant specific fire PRA is lacking, use of the existing internal events plant PRA model may be the most expeditious approach. And then the staff also refers to the cases where the licensee relies on information in an internal events based PSA model to quantify risk associated with fires.

And I mean, if you quantify the risk associated with fires, then you are doing a fire PRA. And the big difference appears to be that if the licensee says, "I have a fire PRA", we are hitting them with a peer review requirement. If they say, "No, I'm relying on internal events PSA model to do whatever I want with fires", then we don't have that requirement. That is a little confusing to me. Actually, it's a hell of a lot confusing.

MR. GALLUCCI: If you look at the structure of that section, that section is entitled "Fire Probabilistic Safety Analysis/Risk Analysis".

Everything in that section is intended to be under the blanket of fire PSA. So the paragraph later on in that section that requires that the fire PSA be peer reviewed also applies to IPEEEs, enhanced internal events models, essentially everything in the spectrum. The term "fire PSA" as used in that section is a very generic term.

MEMBER APOSTOLAKIS: Yeah, but see now, because in that Section 3.2.3, the staff says explicitly, "For PSA based methodologies we require a peer review". That implies to me that there are other methodologies that are not PSA based.

MR. HENNEKE: The industry does not have any methodology in 0402 that I know of that is not fire PRA based. We don't -- the wording you were talking about, I think was the staff wording by using the internal event. Now, there are --

MEMBER APOSTOLAKIS: NEI 0402 says --

MR. HENNEKE: There are times when you have -- excuse me, there are times when you have analysis that can be shown to be very, very low in risk and we talk about using your internal events model for that. But once you approach the Reg Guide 1.174 criteria and get anywhere near it, the higher the risk the higher the quality of the PRA, we require a full fire PRA for that scenario. That's what we're endorsing.

MEMBER APOSTOLAKIS: So the statement, "In instances where a plant specific fire PRA is lacking, use of the existing internal events plant PRA model may be the most expeditious approach". This is in the context of NFPA 805. What does that mean? How can you be lacking a fire PRA and then rely on something else to do it expeditiously? Why don't you guys say explicitly, to do this you have to have a fire PSA which must be peer reviewed? I mean, that's one sentence.

MR. GALLUCCI: That is what is in Section 4.3.

MEMBER APOSTOLAKIS: No, in 4.3 it's "if you have a fire PSA, you must have a peer review". And then you have this huge excellent document from Sandia that tells you how to review the fire risk analysis. This is really great. I mean, if we do that, that will be great. And so either I'm misunderstanding something or it's not stated well, because judging from your responses to my question, we are in agreement, but when I read it -- maybe we can do it like 1.174, write one thing and do another.

Keep going and I'll find it.

MR. DINSMORE: Okay.

MEMBER APOSTOLAKIS: Oh, here it is, 3.2.3, page 9. It's the requirements that the license amendment request must include, D and E, they start by saying, "For PSA based methodologies". So tell me why that is there? Is there another methodology that is not PSA based?

MR. DINSMORE: This is Steve Dinsmore from the staff. I guess we -- we keep trying to follow 1.174. There could be screening methodologies. Now, it depends on what you mean by PSA based. If they can screen a room out at 10^{-8} for fires --

MEMBER APOSTOLAKIS: That's part of the PSA. The screening process always is part of the fire PSA.

MR. DINSMORE: Then I think maybe the difficulty is that when we said PSA we might be more meaning complicated large modeling as opposed to kind of semi-qualitative screening and we're trying to permit the whole range, although we have to permit the whole range, but we're trying to softly push --

MEMBER APOSTOLAKIS: Judging from what Ray said, what Sunil said and what Denny said, it seems that there is agreement that if you really want to go to 805, you have to have a quality fire PSA. Do we agree on that? Ray says all 36 potential --

MR. WEERAKKODY: There is agreement and after our last meeting with you, we and -- we specifically announced to about 140 member of the industry, don't go to 805 without fire PSA, okay. Now, that's something that we can say, Dr. --

MEMBER APOSTOLAKIS: It's not right.

MR. WEERAKKODY: -- but we cannot -- and you have to recognize that the Reg Guide cannot overpower the rule and in fact, if you look at the second bullet there, I remember, we did make one change there, Dr. Apostolakis, based on coming the last time you mentioned, you know, we basically said, if you're up 1.205, you know, you still may do other things, but the position that the staff is taking now is, we understand that the rule doesn't require a fire PSA. However, if you choose 1.205 as your method of doing an 805, then you need a fire PSA.

But there are certain other situations like I'll -- you know, by looking at all the incoming letters from licensees, there's a couple of cases where for very recent plants, okay, where they have relatively good separation, they could adopt 805 if they want to by doing a focus PRA and in fact, I have wondered for those plants why are they going to spend a million dollars or so to do a fire PRA and then I find that --

MEMBER APOSTOLAKIS: It doesn't cost a million.

MR. WEERAKKODY: To do a fire PRA?

MEMBER APOSTOLAKIS: I really don't think so.

MR. HENNEKE: (Inaudible)

MEMBER APOSTOLAKIS: It has been done for much less.

MR. WEERAKKODY: Okay, but the key thing is, though, if you -- you've got to keep that flexibility there because you've got to recognize that not everyone has to do a million dollars fire PSA.

MEMBER APOSTOLAKIS: I understand that, but you said something that I want to ask you about. You said, we cannot -- how did you put it, we cannot override the rule or --

MR. WEERAKKODY: We cannot use the Reg Guide -- you know this already.

MEMBER APOSTOLAKIS: What does the rule say?

MR. WEERAKKODY: The rule has specific requirements and the rule simply says method should be acceptable to the AJ (phonetic).

MEMBER APOSTOLAKIS: So what's wrong with you saying the method -- a method that's acceptable is the fire PSA?

MR. WEERAKKODY: Yes, we have --

MEMBER APOSTOLAKIS: Or one method is fire PSA. The rule does not preclude that. Unless the rule says that you do not necessarily have to use the fire PSA, then I understand it but the rule is silent.

MR. WEERAKKODY: The rule says methods acceptable to AJ. Okay, now, a hardline position maybe we could check if legal is behind us saying fire PSA is the only method, but what we are saying is, if you apply our Reg Guide, then you need a fire PSA.

MEMBER APOSTOLAKIS: If you apply what?

MR. WEERAKKODY: If you are using our Reg Guide as the method of implementation, then you need a fire PSA. I think -- can I just --

MEMBER APOSTOLAKIS: Sure, sure, sure.

MR. WEERAKKODY: In terms of the I believe internal models and you know, turn it and then modify it, I have two theories on that. One, from a technical standpoint, I would submit that there are situations that can be done and one right and this is based on my personal experience when I was in research because we only had models but we did event analysis using those things and we were pretty accurate with those. But let's put that aside.

What we want to do is keep the oversight authority so that if a licensee is abusing that so to speak, we can go in and say, "Hey, you know, that's not acceptable", and I think there's nothing in the Reg Guide that could prevent us from doing that. And so if we find either through inspections or peer review, if somebody is doing that, we would -- what I don't want to do, Dr. Apostolakis, in the Reg Guide, you know, I want to be clear of what -- what the regulation is but I don't want to put a lot of don't do this, this is not acceptable and that kind of statement. And I think the flexibility should be there.

MEMBER APOSTOLAKIS: So you see anybody coming up with delta CDF and delta LERF without a good quality fire PRA?

MR. WEERAKKODY: No, I don't. I have seen one licensee who committed all of their utilities, saying in their letter of intent for this plant, I have good separation, no fire protection issues but I still want to adopt 805 because, you know, they want to incorporate method consistency. I may decide leave fire PSA.

MEMBER APOSTOLAKIS: In which case, you don't peer review it.

MR. WEERAKKODY: No, we would still peer review it. The only -- we would --

MEMBER APOSTOLAKIS: Where does it say that?

MR. GALLUCCI: Section 403.

MEMBER APOSTOLAKIS: Okay, keep going.

MR. WEERAKKODY: That's all I have. He said, keep going.

CHAIR WALLIS: Did this matter get resolved?

MEMBER APOSTOLAKIS: No.

CHAIR WALLIS: This matter is not resolved. I just inquired about whether the matter got resolved and I guess it did not. So we'll move on.

MEMBER APOSTOLAKIS: Because the language "peer review" is not used in 4.3. It says, "when licensees choose to rely on information internal event PSA, they should review the analysis to insure that the model addresses applicable 805 requirements". Whereas in previous case it was explicit, if you are using PSA you have to have a peer review.

MR. GALLUCCI: In Section 4 it says,

"Plants that do not participate in the pilot program should subject their fire PSA to a peer review to the extent that adequate industry guidance is available in a timely manner to support the transition process. In the event that adequate industry guidance is not available for conducting a fire PSA peer review, the NRC will review the fire PSA for acceptability". I don't read that as optional.

MEMBER APOSTOLAKIS: Ray, the moment you say "fire PSA", the way I read the documents, there is a distinction between the fire PSA and other approaches based on internal events PSA. That's where my problem is. You seem to be much more forgiving if the licensee says, "I'm using an internal events PSA and I'm using selectively some model from the Sandia work to do something". And then you say, the licensee should make sure that his or her analysis is okay. The moment the licensee said, "I've done a fire PSA", you come down harshly and you say, "Peer review".

MR. GALLUCCI: In Section 4.3 you'll see that it opens up by discussing various types of what we consider fire PSAs; IPEEE, enhanced internal events analysis. The peer review requirement is intended to apply to all these lesser substandard fire PSAs. To it may just be -- the terminology for PSA as used in this standard, is not limited to the NUREG CR 6850. It's limited to the things that -- it would be limited back to the Appendix 11 of WASH 1400. That would be a mini-fire PSA on Browns Ferry. That's the intent of the wording in chapter --

MEMBER APOSTOLAKIS: I fully agree with that but the way I read this --

CHAIR WALLIS: Do you think we just need to change the wording --

MEMBER APOSTOLAKIS: Maybe just change the wording.

CHAIR WALLIS: -- and peer reviews are required for all these things. That's all we need to do.

MEMBER APOSTOLAKIS: Yeah, that's very simple.

CHAIR WALLIS: Well, let's do it.

MR. GALLUCCI: The methodology has to be submitted with the LERF so we're going to review it and approve it and if it's not equivalent to say a level --

MEMBER APOSTOLAKIS: Anyway, I think we exhausted the subject.

MR. HENNEKE: But George, one additional thing, on the fire standard where we agree in principle with what the staff is proposing, there's an Appendix B to the draft standard which Ray mentioned is now out for public comment for the next couple months. And it basically says the required analysis for 805 is proportional to the risk, so that if there is a qualitative analysis, there's nothing -- there's no peer review, there's no -- you don't have to meet any category in the standard or if it's a risk decrease. If it's a -- starts to approach the Reg Guide 174 criteria, you go to Category 1 and eventually when you're close to it, within the uncertainty bounds, then you would have to meet Category 2.

MEMBER APOSTOLAKIS: Which may be a little circular, because how do you know you're close to it without doing the fire PSA? I think the intent is -- I mean, Ray said most of the six applications are intended to use a fire PSA; is that correct?

MR. GALLUCCI: Yes.

MEMBER APOSTOLAKIS: So maybe it's a matter of communication. We need to be a bit more explicit so that there's no -- that's all.

MR. HENNEKE: We had hoped that this type of detail about what part has to be peer reviewed and how -- what that means, and all that would have been worked out with the pilot process and I think they put a lot of t his information ahead of that into the Reg Guide and I'm not sure they understand exactly what it means. There were a couple of issues that you had asked whether we found acceptable for example, about the cumulative risk and the bundling of things and the tracking. The industry does not agree with that at all.

We've asked actually the staff to recommend this Reg Guide because that's a substantial change to the Reg Guide and the staff has not sent this back for public comment and what we're saying is that now every change has to be tracked. Now we have to track the risk and that could be a nightmare with regard to accounting in trying to bundle these things and there's also interpretation about what is -- are changes that are -- what was the word, that are combined or whatever, what does that mean?

We also disagree with this new 10^{-6}, 10^{-7}, 90-day approval process or non-approval process or whatever that means and that we send something in. We disagree with that also.

MEMBER APOSTOLAKIS: NEI has some time later. Do you plan to raise those issues, Alex?

MR. HENNEKE: But you asked whether the

industry agreed with that, and we don't.

MEMBER APOSTOLAKIS: I fully appreciate your comment but I don't want to interrupt Ray too much.

MR. GALLUCCI: Since we were pre-notified that this was a concern, we took the liberty -- I took the liberty of drafting a potential footnote to Section 4.3.

MEMBER APOSTOLAKIS: Do we have that here?

MR. GALLUCCI: No, it's just -- I'll read it to you. At the end of that Section that's 4.3, here is a backup slide. I don't know if we need it.

MEMBER APOSTOLAKIS: I would like a copy of that, please.

MR. GALLUCCI: It says, "Note that the requirement to have a fire PSA peer review is -- peer reviewed is intended to apply to quote `limited fire risk assessments was well', for example, fire IPEEEs, enhanced internal events, PSAs or pre-NUREG CR 6850 based fire PSAs. The term fire PSA as used with regard to the peer review requirement, is all-encompassing and general". So that's a footnote that I -- the words are not what we would finally put in but it's intended to capture the idea that when we speak fire PSA with respect to peer review we mean the whole spectrum of --

MEMBER APOSTOLAKIS: Why did you wait half an hour to put that up there? Are you intending to do this?

MR. GALLUCCI: It wasn't my call.

CHAIR WALLIS: It's for dramatic effect.

MEMBER APOSTOLAKIS: I would be very happy to see that. It resolves all my issues.

CHAIR WALLIS: Well, my question is, why didn't you work that all out in the subcommittee?

MR. GALLUCCI: Do you have a substantive question?

MEMBER POWERS: You and Professor Apostolakis attribute some merit to a peer review and yet when I look at peer review in other context, I can find a plethora of complaints about a peer review. Can you tell me what merits you attribute to peer review and why you have such confidence in the method?

MR. GALLUCCI: When you say, "other", you're not talking about the peer reviews that were in the internal events PSAs?

MEMBER POWERS: Not at all. I'm talking about peer reviews of proposals, peer reviews of journal articles. You will recall the recent upset within the medical community about peer reviews.

MR. GALLUCCI: Okay, I was the only full time PSA person at GNAY (phonetic) so under the Westinghouse's owners group, I was required to participate in three of the industry peer reviews for the Westinghouse plants and host the GNAY peer review. And I was quite pleasantly, I'd say, and surprised as I went to each one to see the level of detail that the fellows that consisted of Westinghouse people, three people from other utilities and two consultants. And they were rougher on the various PSAs of their fellow utilities and I would imagine anybody -- probably worse than anything I've seen from RAIs.

So the industry review process is very rigorous and not that forgiving. So I have -- if the fire PRA peer review process is anything like what was done for the internal events, they are going to -- if you have a glitch in your PRA, it will be found. And management at all the utilities took these very seriously and all plants, I mean, the high level FMOs went into the corrective action programs and had timetables for a resolution. So I'd say my personal experience is that the internal events PRA peer review process was very thorough and since the NEI process will be developed, we'll have a fire standard and we'll have the Reg Guide 1-200 as well as NEI 0002 as framework, I would expect similar levels of stringency for the peer reviews and fire PSA.

CHAIR WALLIS: The other things is, this is the only way to evaluate a PRA. I mean, there's no confrontation with reality. There's no comparison with tests. The only way you can evaluate a PRA is by having experts look at it and see if it's good enough. Isn't that the only way to do it? So you're supposed to have a PRA.

MEMBER POWERS: Well, there are other context where people voiced that the peer review if not the only way, the preferred way to do that and people find fault with the methodology. I don't know that there's consensus of fault on it but certainly the NSF has taken it seriously enough to conduct a study and they conclude that peer review inherently is quicksotic (phonetic). That it may be internally consistent, but it's irreproducible. And that bothers them a great deal.

And so I'm wondering -- I mean, from Ray I understand two things. One, that he admires the quality of PRAs that he has seen, that he questions the depth to which the staff interrogates things and thinks it should be more rigorous and is quite happy with this and Ray's comments in the peer review process for the PRAs presumably also for PSAs, he's not the first one to make these statements. What is done by the industry is extraordinarily good and I have no reason to doubt it.

But I'm wondering somewhat off the subject, if NRC needs to look at what peer review can and cannot do for you and think about what the implications are for the people that are faulting at peer review and other context.

MR. GALLUCCI: One other aspect that -- at least with the Westinghouse and I believe that probably held true for the BWRs and PWRs as well is that you have essentially at least the same Westinghouse people on almost all of the peer reviews as well as the group of consultants that participated was fairly small, maybe a group of four or five. So you usually had two people -- you had two consultants on each one, so there was the ability to compare the results from one PSA to another and look for consistency among them. And in fact, I know since I went on three, by the time I got to my third one, there was basically a series of lessons learned.

There was a lessons learned document and there was a series of questions and items that would be covered for all subsequent peer reviews. So a lot of this was carried over and it was a very consistent process, I think, among the industry.

MEMBER APOSTOLAKIS: And we had two of our engineers, I believe, do you remember a few years ago, participate, observe the NEI process and they came back and they were very impressed by the quality of the review, although Dan, I think is raising even bigger issues. But also I would like to come back to the Chairman's comment; this peer review thing is new. We didn't see that before in the Guide. The --

CHAIR WALLIS: My comment was, is there any other way to evaluate --

MEMBER APOSTOLAKIS: No, no, your comment was why wasn't this resolved at the subcommittee meeting because there was no subcommittee meeting where this issue was on the table.

CHAIR WALLIS: Okay, I'm sorry, I thought you were addressing my other question, is there a way to avoid the PRA.

MEMBER APOSTOLAKIS: I address the questions that need to be addressed.

CHAIR WALLIS: Okay, can we move on?

MEMBER POWERS: Well, in that regard, do we need to, perhaps, on our own volition, look and understand how people who do have concerns about peer review as the methodology, are addressing that and see if there are alternatives to --

MEMBER APOSTOLAKIS: And Dana, I think you also have to distinguish between the various kinds of peer review. I participated in -- well, first of all, I edited in January and I know when they review papers, it depends I mean to a large degree on who the reviewer is. But also, reviews that are -- you know, like NRC reviews like WASH 1400 and even after that NUREG 1150, it depends very much on who participates in the review and in my experience, the more senior the people, the less detailed the review. You really have to put workers, who really go down to the details and so on but anyway, have we exhausted this subject, no, I mean, for today?

MEMBER POWERS: Oh, you've covered it to my satisfaction.

MEMBER APOSTOLAKIS: Okay.

CHAIR WALLIS: You're saying okay?

MEMBER APOSTOLAKIS: Okay means please go ahead, it doesn't mean we agree, although what Ray put up there after a lot of discussion is pretty good.

CHAIR WALLIS: Okay, we're on the home stretch, are we? Yes, are we on the home stretch?

MR. RADLINSKI: Yes, we're on Slide 11.

MEMBER APOSTOLAKIS: You don't have to go over every single slide, by the way. You know where we're coming --

MR. RADLINSKI: The first bullet on Slide 11, you've seen all that before. There's the guidance documents for PSA there and the Reg Guide. One point that we haven't talked about is that for the pilot program plants, the staff is not going to require a separate industry peer review because we're involved in the development -- we will be involved in the development of their PSAs that will constitute an appropriate review.

LAR submittal should include documented high level findings from the peer review, including their resolution and any other findings that may be risk significant. Slide 12, additional qualifications that we've included in the Reg Guide that actions required as a result of the peer review may be completed later but the licensee must commit to a schedule for completion in the LAR submittal. Incomplete actions could be non-conservative with respect to the plant change evaluation should be completed before applying the evaluation.

One acceptable means of maintaining PSA quality is by conducting periodic reduced scope peer reviews and PSA guidance will be updated as Reg Guide 1.174, 1.200 are updated with the NS standard is issued and also based on the experience in the pilot program.

So in conclusion, draft Reg Guide provides guidance, review and approval of plant changes that effect the fire protection program both during and after transition to 805 and the Reg Guide provides guidance for using fire PSA --

MEMBER APOSTOLAKIS: Very good. Mr. Lain. How much time are you going to need, Alex?

MR. LAIN: I can to mine in five, four and a half actually.

MEMBER APOSTOLAKIS: Four and a half, okay.

MR. LAIN: My name is Paul Lain, I'm a Program Manager for an NFT 805. A lot has happened in the last six months and we're trying to bring you up to date. Next slide, please. We've had -- I think the last time we talked to you we had two utilities with 12 sites. Now we've got 12 letter of intents in with 36 sites, so a lot of the utilities are joining the NFT 805. Most of the sites have requested 36 months to transition and the Commission has recently extended the enforcement discretion for 36 months.

Most of that additional time was requested to do fire PRA. Four utilities are transferring their entire fleet and they're staggering their transition so they're learning from their initial transitions and then following on with the follow-on transitions.

We've chosen Oconee and Harris as the pilot plants. Next slide, please.

MEMBER APOSTOLAKIS: So the other units will have to wait until the pilot is completed?

MR. LAIN: No, they're also -- we'll cover a little bit about how we are trying to communicate with them and having worked to help them also come along.

MEMBER APOSTOLAKIS: Fine, fine.

MR. LAIN: These are the fleet transitions. Next slide, please. These are the other sites that are transitioning. Constellation is also considering -- they told us they were considering Nine-Mile and Copper Cliffs later this year. I threw this slide up here to show that most of the sites were the older Appendix R sites but we do have about a third of the new post-Appendix R sites that are also transitioning. Next slide, please.

The transition program, here are some of the objectives. The main objective is to evaluate regulatory guidance, the 205 and the 402 being used. We're also working on -- Duke is developing details on the risk screening and the multiple spurious circuit analysis and that's one of the good new processes that are coming out of that and also we're working on a frequently asked question program, similar to what the performance indicators in the maintenance pool has. Next slide, please.

We've had a number of observation visits. We had a kickoff in August and then we had one at Duke Power in November. These observation visits are being combined actually with Progress and Duke working together. They are sharing their efforts and resources, I think to get the most bang out of the buck and so we had -- just recently had another observation visit at Progress Energy and Duke was there also and so we're working these things together.

Our next visit, it looks like it's scheduled for July and then the next on at probably Harris in October. Let's see, we're utilizing the trip reports to document out lessons learned, also transfer information to the other non-pilots. We're also using it mainly to document our parking lot or action item list to work on -- out of our first observation visit we had 17 action items. The NRC had about five items to work on that the other sites were working on, the other 12. And we came back and went over -- the next observation visit went over those and actually resolved quite a few issues. Next slide, please.

Non-pilot, these are some of the items that we're working to make sure that they are coming along in their implementation. NEI, Alex will talk about the task force that he's developing. We're using the NEI fire protection information form. It's going to be in August. We will at least have a day on implementation issues for 805. The trip reports become good lessons learned documents and we're starting to have period public workshops. We had one at headquarters on March 3rd, had about 55 attendees. We plan to have another one, start having them in the regions, either at the sites, the 805 sites or at the regional offices to get more people involved and try to keep everybody up to date.

And finally, the FAQ program, I think is going to be a way of sort of documenting questions coming in and posting those on the web so everybody can see them and follow along. Next, regional training, I didn't want to leave the inspectors out. They are participating with us on the observation visits. They're very helpful with that. Also, they're coming to the public workshops. In addition, we're having semi-annual regional training. We had one at Region 2 in October. Had about 20 people attend and one in Region 4 in February had, 40 inspectors, I think, were there. And we have another one scheduled in June tentatively and then the next one will probably be --

MEMBER APOSTOLAKIS: So the training of the inspectors includes a tutorial on what a fire PRA is?

MR. LAIN: Yes.

MEMBER APOSTOLAKIS: And how about these two volumes EPRI and NRC have developed. I mean, you don't teach people all this --

MR. WEERAKKODY: Dr. Apostolakis, we don't go to the high level of detail on fire PRAs with inspectors. For one thing, they don't need to know that but there is an EPRI research, they have periodic training programs on NUREG CR 6850 and we encourage the regions to send their inspectors for that detailed PRA kind of training.

MEMBER APOSTOLAKIS: So they will understand basically the sequences and the issues and that kind of stuff.

MR. WEERAKKODY: Yes, yes.

MEMBER APOSTOLAKIS: They don't have to understand the program --

MR. WEERAKKODY: Yeah, because --

MEMBER APOSTOLAKIS: No, of course not, I agree. Very good, thank you, Paul. You kept your promise.

MR. LAIN: Any other questions?

MEMBER APOSTOLAKIS: Mr. Marion?

MR. MARION: Good afternoon, my name is Alex Marion, I'm with NEI and I'll try to stay within the five minutes. Let me answer the question that came up initially about NEI encouraging or recommending or mandating utilities develop a fire PRA. We have been making recommendations that if utilities want to optimize the benefit and value of making a transition to a risk informed performance based regulatory framework, you've got to have a PRA. All right, now as we go through the pilot process, we will probably ultimately revise or think about revising any IO 402 to make some more specific guidance if you will, along those lines. But we -- anyway, I'll get to that a little bit later.

As Mr. Henneke indicated, the industry does have some concerns with what was in the proposed

Reg Guide. The Reg Guide that is before you now has new provisions that weren't part of the public review process and we've already asked the NRC to consider releasing it for public comment. However, the Reg Guide is going to be a living document as we understand it because NEI 0402 is going to be a living document as we go through the pilot process and we intend to develop revisions as needed to incorporate lessons learned from the pilot process and this is going to play out over a period of several years with the current set of plants.

We want to make sure that fundamentally we baseline the two pilot plants to demonstrate the efficacy of the transition process for Oconee and Harris, but I envision that we'll probably have at least two, maybe three more revisions of NEI 0402. We already submitted Revision 2 of the document to the NRC. So over time, the Reg Guide is going to change and our hope as we go through that change process, we make adjustments because our basic objective is to have a one-page Reg Guide that says it endorses NEI 0402 with no further elaboration.

I hope that we'll get there. We do have concerns about the change process as Dennis --

MEMBER APOSTOLAKIS: Would that one page

have the footnote I like?

MR. MARION: We'll give you two footnotes. As Mr. Henneke indicated, we do have concerns with the change process. Let me make it very clear that self-approval is allowed now for fire protection programs and the concern that we have stems from the application of risk insights to deal with that kind of a process. And the only thing we're looking for is coherence between what we're doing here in the FAR area and what we're doing in some other areas, specifically with 5046A on the redefinition of large break LOCA and also on some of the things that are being considered for new plants in Part 52.

We don't understand the 90-day approval process that the staff has incorporated into the guidance document. There is an ANS standard that's under development. It was just released this week for comments. We intend to look at that and make sure that it provides the right level of guidance that the industry needs and once that document is finalized, we will make adjustments to what we're doing through the pilot effort so that we're in alignment with that guidance where appropriate.

Our objective overall is to assure flexibility and incorporate lessons learned and I have to compliment the staff based upon my understanding of their interactions with the pilot plants, it's been very positive and constructive and we are doing a lot of out of the box thinking, although occasionally we have to drag someone to get out of the box and that takes a little bit of time, but it's going in the right direction.

We have established the task force, as the NRC had indicated. As a matter of fact, we had a conference call with that group. This is a group of the non-pilot plants, the 36 plants that are -- I'm sorry, 32 plants that aren't represented by the pilot effort. And we are going to have a meeting with them in May. I did make the point today about the value of doing a fire PSA as they go through their planning process.

I do want to make one comment, additional comment about some of the statements that were made and some of the language in the slides. This regulatory guide is not a regulatory requirement. It represents guidance that the staff finds acceptable to meet a voluntary alternative to an existing regulation. So you have to keep that in mind. And it is voluntary. I know that the NRC would like all the utilities to make the transition or 805. We think it makes sense to do so because of the sordid history of fire protection over the last 25, 30 years. We see that there's a light at the end of the tunnel but let me just make it very clear that 805 is not the solution. It's a tool kit that allows you to use risk informed performance based approaches. The solution is the longer term application of those approaches in assuring fire safety. That's fundamentally what it's all about. So we have a lot of work to assure the application before us, but I think we'll get there.

That completes the comments I have. I'll be more than happy to answer any questions.

CHAIR WALLIS: Thank you.

MEMBER APOSTOLAKIS: Any questions for Mr. Marion? Thank you very much.

MR. MARION: You're not allowed to ask any questions.

MR. WEERAKKODY: I was just going to --

MEMBER APOSTOLAKIS: You're going to do what?

MR. WEERAKKODY: No, I wasn't going to refute anything Alex said. I think actually everything he said is correct, including that the staff did a good job in the pilot observation. I'm here to basically, if you have any follow-up questions based on what Alex said that you need to ask because he is correct, that we have to make some adjustments in the Reg Guide that was significant that we thought was necessary.

MEMBER APOSTOLAKIS: Are you planning to issue it for public comment?

MR. WEERAKKODY: Yes, sir, if -- no, no, not public comment.

MEMBER APOSTOLAKIS: But that's what he requested.

MR. WEERAKKODY: That's right.

MEMBER APOSTOLAKIS: And you said no.

MR. WEERAKKODY: We said no, but as you can see, they're still here.

MEMBER APOSTOLAKIS: They're very friendly, yeah. How often do you revise these guides?

MR. WEERAKKODY: He's correct in the sense that we are -- we would revise it if there are significant changes but it's not going to be revised every month but definitely, you know, once we get a lot of lessons learned out of the pilot, we are flexible in revising it.

MEMBER APOSTOLAKIS: A year and a half, two years probably.

MR. WEERAKKODY: Yeah.

MEMBER APOSTOLAKIS: Do you want to say something?

MEMBER MAYNARD: Can I ask why you're not going to send it out for public comment?

MR. WEERAKKODY: Because we didn't see the added value of that. If you look at all of the changes that were made subsequent to when we came here last time, in terms of bringing the coherency, and then look at what we would accomplish by your public comment, as opposed to what we would accomplish by asserting the Reg Guide, for example, you just heard from Paul, there's a lot of people waiting out there, "Okay, I'm going to update 805, tell me one acceptable way", and that's why we want to get the Reg Guide out asap, if possible.

CHAIR WALLIS: Well, it has been out for public comment.

MEMBER APOSTOLAKIS: No, the previous version was.

MR. WEERAKKODY: The previous version, yes.

CHAIR WALLIS: So it hasn't changed all that much in response to those public comments. It's already been around the loop.

MR. WEERAKKODY: Yes, but --

MEMBER MAYNARD: But I get the impression that there were changes that were -- significant changes made that -- and I haven't read them, so I don't know but I get the impression that changes were made that weren't necessarily addressing the comments you got from the public and so it has changed from what the version that was commented upon.

MR. WEERAKKODY: Yes, that's correct.

MEMBER APOSTOLAKIS: Like a peer review, right?

MEMBER MAYNARD: So the changes that were made were not just in response to the comments.

MEMBER APOSTOLAKIS: No, that's true.

MEMBER MAYNARD: It was changing what was sent out.

MEMBER APOSTOLAKIS: That is correct and their judgment is that it's not significant enough --

MR. WEERAKKODY: The industry has a legitimate reason to be upset if anything because we did work on a policy but then the last set of changes were necessary in my view and the agency, was necessary but we kind of made sure that they're not painful to a point where 805 is not viable. And we will be flexible. If we learn through the pilots that or Reg Guide is creating something very undue and unnecessary, we will change them.

MEMBER DENNING: Do we have a commitment to the footnote or not? That was not clear to me?

MR. WEERAKKODY: I don't have any problem.

MEMBER DENNING: So that's yes.

MR. WEERAKKODY: Yes. Like I said, the only thing that's standing behind finalizing the Reg Guide and -- is you. So if -- yes.

MEMBER APOSTOLAKIS: Are there any comments or questions from my colleagues? I want to say, by the way, because I may have given the wrong impression, that I have been extremely pleased with your response to our original letter. You were very responsive and this peer review thing came out of the blue at the end. And we had this discussion until Ray decided to show that slide. So I have no problem with, you know, your approach to this issue and I'm sure that future revisions of the guide will be even more responsive to both the industry's problems and ours.

And on that happy note, back to you, Mr. Chairman at 4:31.

CHAIR WALLIS: 4:32-1/2. You did a very good job, George. You were a little slow on the first lap, but you really caught up later on in the race.

MEMBER APOSTOLAKIS: If I use PSA standards, I'd use a factor of 2 or 3 here.

CHAIR WALLIS: We don't need a transcript any more, thank you for today. We'll see you tomorrow or your colleague.

(Whereupon, at 4:32 p.m. the above-entitled matter concluded.)