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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

RELIABILITY AND PRA SUBCOMMITTEE

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THE INDUSTRY TRENDS PROGRAM AND PERFORMANCE INDICATORS

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WEDNESDAY, MAY 7, 2003

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ROCKVILLE, MARYLAND

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The Subcommittees met at 2:00 p.m. in Room T2B3, 11545 Rockville Pike, Rockville, Maryland, William J. Shack, Acting Subcommittee Chair, presiding.

PRESENT:

WILLIAM J. SHACK	Acting Subcommittee Chair
MARIO V. BONACA	ACRS Member
F. PETER FORD	ACRS Member
THOMAS S. KRESS	ACRS Member
GRAHAM M. LEITCH	ACRS Member
JOHN D. SIEBER	ACRS Member
GRAHAM B. WALLIS	ACRS Member

NRC STAFF PRESENT:

MAGGALEAN WESTON	Cognizant Staff Engineer
TOM BOYCE	NRR
DALE RASMUSON	RES
PAT BARANOWSKI	RES/DRAA
MARK SATORIUS	NRR

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

2:01 p.m.

CHAIRMAN SHACK: The meeting will now come to order. This is a meeting of the Reliability and PRA Subcommittee. I am William Shack, acting chair, of the Reliability and PRA Subcommittee. ACRS members in attendance are: Tom Kress, Graham Leitch, Jack Sieber, Graham Wallis and, I believe, Mario Bonaca and Peter Ford will be joining us.

The purpose of this meeting is to discuss the Industry Trends Program and the Integrated Industry Initiating Events Indicator. The subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions as appropriate for deliberation by the full committee. Mag Weston is the cognizant ACRS staff engineer for this meeting.

The rules for participation in today's meeting have been announced as a part of the notice for this meeting, published in the Federal Register on April 4, 2003. A transcript of the meeting is being kept and will be made available, as stated in the Federal Register notice. It is requested that speakers use one of the microphones available, identify themselves and speak with sufficient clarity

and volume, so they may be readily heard.

We have received no written comments from members or the public regarding today's meeting. We will now proceed with the meeting, which I think is sort of a Bayesian update of a previous discussion we have had of this, which really it's not based on a non informative prior. I thought we learned something from the last meeting. But I think Mr. Boyce will start us off.

MR. BOYCE: Yes, thank you. I also agree that it should be an informative prior or I hope that it is. I'm Tom Boyce. I'm a senior project manager in the Inspection Program Branch of NRR. With me is Dale Rasmuson, senior technical reviewer, in the Operating Experience and Risk Assessment Branch in the Office of Research. My section chief is here with me, Mark Satorius, in the Inspection Program Branch, and the branch chief for the Operating Experience Branch, Patrick Baranowski is also here with us.

This is an update of the Industry Trends Program and another briefing of an Integrated Industry Indicator for Initiating Events, and the acronym that we're using right now is the IIEPI, and I can say that because I've actually practiced it. We are, in fact, looking for a snappier acronym and I put out a

request. We're going to have a naming contest, but right now IIEPI is what we're using.

There's an outline of the presentation. We'll be going over the current status of the Industry Trends Program and an overview of the Industry Trends Program and the development schedule. I'll be covering some of the previous ACRS comments on the IIEPI. We'll be providing some draft responses, and we're going to tell you where we're going in the future.

Right now, just as background, we briefed the Industry Trends Program in May and November of 2002 to the, I think it was, subcommittee in November and it was the full committee in May 2002. Subcommittee and full committee in May 2002. We briefed the IIEPI.

MR. WALLIS: IIIEI is the same thing, isn't it?

MR. BOYCE: Yes. What you got in your draft report was the IIIEPI, and what you're seeing is the reflection of the struggle we're having trying to come up with something that's easy. But you did hear about the IIEPI or IIIEPI. In November, we went through the transcripts and we called out as many comments as we could from individual members, tried to

find group consensus, looked for protest problems, etcetera, and we're coming back to talk to you about those today.

I'm going to actually open up with an overview of the Industry Trends Program to remind you of the Industry Trends Program process. But it's easy to get side tracked in the programatics, but what I would ask is that we try and focus on the IIEPI today, and we'll be back to dialogue with the ACRS on both of these topics at a future meeting.

Having said that, what we're targeting is, and I'm getting ahead of myself a little bit, we would like to come back in the fall to the full committee, and would probably ask for a letter at that time. The purpose of this meeting is just continuing dialogue and verbal feedback, at this point. Okay.

CHAIRMAN SHACK: I think you're back on this later.

MR. BOYCE: I'm going to come back to this bullet right here, the third bullet down. We briefed the Industry Trends Program and the IIEPI to industry, and the way we've done that is we hold periodic meetings on the Reactor Oversight Process with various representatives from industry, including NEI, and we have probably briefed this concept four or five times,

and I would characterize the feedback as no show stoppers.

In general, because it's at the industry level, no individual plant specifically feels like they are being regulated, and so they've been quite amenable to the concept and supportive of the fact that we're moving in a risk-informed direction. We issued our third annual Industry Trends Program Commission paper in April 2003. The number there is SECY 03-0057. I believe you were given a draft copy of that report.

MS. WESTON: We have the final copy.

MR. BOYCE: You have the final copy? Okay. There was only minor editorial changes from the draft to the final, so you don't have to reread the entire thing. Just to tell you what the intent of the Industry Trends Program is is it's designed to take a 50,000 foot look at the oversight that is provided for each plant by the Reactor Oversight Process. In other words, we are looking for the forest here, rather than the trees.

Just to set your mind as to the difference, one of the key differences is the Industry Trends Program indicators do not use colors. We're not into white, green, red, yellow. At the moment,

many of our indicators are unthresholded. We're just monitoring for trends. We are, in fact, working on thresholds.

I will cover the last bullet as part of the next slide.

CHAIRMAN SHACK: I'm having trouble with these integrated overviews, you know. We always focus on the worst case. It's Davis-Besse and it doesn't matter how well the Boric Acid Corrosion Program is doing in every other plant. As long as there is one, there's a problem.

MR. BOYCE: Any time you have a significant event like a Davis-Besse, it does call into question all your monitoring programs, Reactor Oversight Process, and you all have questioned that, and the Industry Trends Program. At least as far as the Industry Trends Program, what Davis-Besse did was remind us that while we have nice indicators and we're developing additional indicators, there are limitations to what the indicators can tell us. And so we're continuing to develop a more comprehensive set of indicators, and hopefully some that are more focused on the most risk-significant aspects of performance. Having said that, in hindsight it's a lot easier to detect a Davis-Besse than to proactively

monitor for that sort of thing.

Now, at the last ACRS presentation, we tried to talk through the process using words and text, and one of the comments was it wasn't obvious how the process worked, and what the definitions were for adverse trends, and so we went back and we developed a flowchart. So we've really made progress since the last meeting.

What this is intended to do is actually put on one page what used to be several pages of text and bullets. And in general, you start here at the lower left. We collect data and formulate indicators. I've listed the indicators here. We're currently using this set of eight for reporting to Congress. We're developing additional indicators based on the plant-specific indicators for the ROP, and you're going to hear more about the IIEPI today.

This 2 means there is two indicators, one for BWRs and one for PWRs. So we collect data. Then we look for issues in that data. We've been chartered to report to Congress against the performance measure of "no statistically significant adverse industry trends in safety performance," and so we look for long-term adverse trends and performance. But we're mindful that you don't want to wait for a long-term

trend to develop, which might take several years, you want to look for short-term issues and preclude them from becoming long-term adverse trends.

And so what we've done is draw up separate blocks. We follow the same process, whether we have a long-term adverse trend or whether we identify short-term issues, and you might hear more about that later. Once we identify what we think is an issue, we take a look and we analyze the issue. There's several things that are in this block, which I'm not going to cover at the moment. Based on the safety significance of what we've seen, we then take the appropriate agency response. Again, there's a menu of things that are possible here that are listed.

Senior management reviews the ACRS Program and the results annually. We just completed the agency action review meeting where the program and results were briefed and senior management confirmed that we were doing the right thing, and that no further actions were required. We communicate the results of the industry trends meeting. We publicize graphs of the indicators on our website. We provide an annual report to Congress. We publish the indicators in the Info Digest, and they've also been used at industry conferences, such as the closing

remarks for the Regulatory Information Conference last month.

I have already alluded to reports to Congress, and, in addition, the chairman has historically provided these indicators as part of his annual reports to our oversight committees.

MR. LEITCH: Tom, a question before you leave. In the paper that was distributed it lists three main objectives of the Industry Trends Program, and one of those says collect and monitor industry-wide data, so that it can be used in a number of things, but it also says to provide feedback for the ROP. Is there a feedback to the ROP that's not shown on this chart or am I misinterpreting what I'm reading here? I don't quite understand how that feedback to the ROP occurs.

MR. BOYCE: Now, you're correct. One of the purposes to provide feedback to the ROP, it's not shown on this process, this process is actually focused on what do we do if we have an adverse trend. You could say that if we take the appropriate agency response, we would be -- that agency response typically comes in the form of additional inspections. And so you could say that that was feedback to the ROP.

I guess that's only half of it. The other half, which is not shown, is we're developing lower, and you'll hear more about this, additional indicators, say at the component level, where we're trying to say "Give news you can use to individual inspectors," that they might be able to compare how their plant is doing against an industry average. That is a future type development effort. I think we discussed it a little bit in the paper, but we're also doing it in response to Davis-Besse Lessons Learned Task Force recommendations to improve our handling of operating experience.

So I guess the short answer is only have of what we're doing for feedback for the ROP is illustrated in this flowchart. Is that --

MR. LEITCH: Yes, that's helpful.

MR. BOYCE: Yes, if you picked that up, you're the first one to pick up on that. Okay. That was the overview of the Industry Trends Program. And what I'm going to provide is an overview of the IIEPI, and I thought we would start perhaps too simplistically, but that way I could at least get a head start on it, before I turn it over to Dale.

What we're trying to do is take a look at the most risk-significant initiating events. Now,

we're trying to risk-weight them for their contribution to core damage frequency, and we're trying to combine all those into a single indicator to give us a roll up indicator of how we're doing in the initiating events cornerstone. To do that we're using two sources of information. We're using PRA information primarily from our SPAR models, the Rev 3 models that are developed in our Office of Research, and they are combining it with the operating experience information, which we picked up from several sources, and I'll get into that in just a second.

So there's only two key elements for this, and that plays into my next slide. This equation is written for an individual plant, but this is a Birnbaum importance measure. This is derived from the SPAR models. It's the relative risk-weighting for each initiating event. Lambda here is the frequency of individual initiating events, and so when you multiply those, you get the relative contribution to core damage frequency for a given initiating event.

An example might be LOCAs, steam generator tube ruptures, loss of offsite powers. You sum up all those initiating events and you'll come up with -- now, we've dropped down to a single I hear trying to

move in a more simple direction, but you come up with your IIEPI at that point. And for PWRs we have 10 of these terms, so we go from 1 to 10. For BWRs we go 1 to 9. The difference being steam generator tube ruptures.

MR. WALLIS: So it's a measure of the risks associated with these events?

MR. BOYCE: Correct, correct. And the units for IIEPI is core damage frequency or delta core damage frequency.

MR. WALLIS: What order of magnitude is it when you do the sum?

MR. BOYCE: For PWRs, I think, we came out about 5E^-5, 4E^-5, I think. For BWRs we're at 1E^-5. Now, that's very preliminary and the only reason we did that was for illustrative purposes, but the information was derived from several sources, which I hope Dale can elaborate on later.

CHAIRMAN SHACK: Could you pick the initiating events because they comprise, you know, X percentile of the risk in the average CDF or they were the initiating events you had data on?

MR. BOYCE: Actually, it's a combination of both, but there was some early work done for initiating events, NUREG 5750, looked at initiating

events from '88 to '95 and that NUREG was published five years ago. The research at our request updated that information and brought it current. In addition, there was a risk-based PI report, which the ACRS reviewed a couple of years ago, and in the risk-based PI report, they took a look at all of the initiating events and said we will focus on those initiating events that contribute greater than 1 percent to core damage frequency and that have occurred once during the '87 to 1995 time frame. So it's a combination of those two. Okay.

This is a more detailed explanation of the previous chart, and it tells you how we go from a plant-specific equation to an industry equation starting with the Birnbaum importance measure, which is our risk-weighting factor. What you'll see is to get to the industry calculation, we're going for an average industry Birnbaum. We're calculating the individual Birnbaums for each of the 103 reactors, and we're just getting an arithmetic average there.

CHAIRMAN SHACK: See, now I like equation 4 better than equation 5. Was that the ones that they're both identical?

MR. BOYCE: Yes, they're both identical.

CHAIRMAN SHACK: All right.

MR. BOYCE: Who picked up on that one?

CHAIRMAN SHACK: It's a question of whether you think in terms of the industry average Birnbaum or the average initiating frequency, but you end up at the same place.

MR. BOYCE: Right. Over here to calculate the Lambda or the frequency of occurrence of these initiating events, we just look at event counts and we look at operating times. Now, we break this up separately, which we'll get into later, because the choice of operating times determines how sensitive this indicator is. If you pick a very short time interval, a single initiating event will cause the indicator to give you more of a response than if you adopt what we call like a moving average.

In this case, I think we've picked three years for a lot of the work that was done in the draft study that you're looking at, and that gives you a more smoothed response. It's similar to the approach that we did for the ROP PIs where we had few occurrences. Scrams or loss of normal heat removal is the example. We would count a scram or loss of normal heat removal over a period of three years as a moving average.

MR. WALLIS: Is there some reason you draw

it this way? I mean, I think it would be more normal to simply sum over each plant, and you get the average of the product rather than the product of the averages. It would perhaps be more reasonable summing up the risk. It's probably just average difference, but is there some reason why you do it this way?

MR. BOYCE: I'm going to defer that one to Dale in just a second if I could.

MR. WALLIS: Okay.

MR. RASMUSON: We'll answer the question for you as we go along.

MR. WALLIS: Okay.

MR. RASMUSON: We've got some material that will address that.

MR. BOYCE: Are there any questions on the approach that we took here? Okay.

MR. KRESS: The operating times, you said you use a three years running average.

MR. BOYCE: Right.

MR. KRESS: So all you do is subtract out of that the down time, out of those three years?

MR. BOYCE: Right.

MR. KRESS: And that's some time.

MR. BOYCE: Right. Yes, this is only for at-power --

MR. KRESS: At-power, okay.

MR. BOYCE: -- events. We don't consider shut down events in the IIEPI or external events. Yes, external events are also excluded. This tells you some of the data sources that we get to determine the number of counts. We take a look at licensee event reports that we get. We take a look at monthly operating reports submitted by all utilities. This is the Lambda portion again, and I've already covered the Birnbaum importance measure.

MR. WALLIS: I just wanted to ask you about Birnbaum again. Are there some plants that don't have a good enough PRA for you to get a Birnbaum from their PRA?

MR. RASMUSON: No, we have models for all the plants.

MR. WALLIS: You got a Birnbaum for every plant?

MR. RASMUSON: Right.

MR. WALLIS: From your SPAR monitor?

MR. RASMUSON: From our SPAR monitor, right.

MR. WALLIS: But the industry might not be able to?

MR. RASMUSON: They may not, I don't know

on that.

MR. BOYCE: Yes.

MR. RASMUSON: But I think they probably can also.

MR. BOYCE: Right, and jumping ahead into one of the developmental issues, we've seen from our experience with the MSPI the plant-specific mitigating systems performance indicator that there is when we go to compare the SPAR models to licensees PRAs, there is a delta and we do need to work through that. And so one of the developmental efforts is we're taking the SPAR Rev 3(I) models, for those who follow this, 3(I) stands for 3 interim, and we're doing onsite verifications to the extent that we can, and as we reach agreement on certain points, we will move from 3 interim to SPAR Rev 3 final.

Those are closer to agreement with licensees PRAs, but they are not perfect. We also don't think we need perfection to move this concept forward. This one gets a little bit back to the question you asked, Graham, is to how do we get news you can use to inspectors. Right now, we're targeting right here. This is a hierarchy of indicators is what this chart is designed to illustrate. We're at the IIEPI. We've integrated 10 different initiating event

terms into a single indicator.

And if you look, in general, there's a downward curve if you go back to the mid '80s. There's a downward curve there. But let's assume that there was a slight up-tick. If we follow our Industry Trends Program process, we would need to analyze why there was that up-tick. At that point, we would go down to each of the 10 initiating events and start tracking them individually and looking for what was driving the overall indicator up. Again, this is illustrated in the draft report. We've got all the individual indicators shown in that report. So that report shows you these two levels.

Finally, let's assume steam generator tube ruptures were driving the overall indicator up. Well, just because you had an up-tick in steam generator tube ruptures, you still don't have enough information to do something about it, so, at that point, you get down to the plant level and you say I've got five plants that had steam generator tube ruptures and you start analyzing the causes, looking for commonalities, and at that point you can start giving the appropriate feedback to the ROP that will make a difference. Okay. So this indicates how we start here at the industry level, but we can monitor down to the plant

level.

Okay. Here's the development schedule that we are operating to. The draft IIIEPI report you have a copy of. It has been sent over for internal review from research to NRR. We're taking a look at it. We expect to have comments later this month. Research is part of its normal process for getting feedback for draft reports. We'll be sending it out for public comment and review, and that will include people like UCS, NEI, NPO, etcetera.

We expect that feedback to come back 60 days from the date that it is made publicly available, which will be maybe in a week or two. We hope to have a public workshop on the IIEPI concept in about the July time frame. Based on the feedback that we get, we would like to do additional studies, beyond what you see in the draft report, to try and flesh out the concept. You know, find what the weak spots are, explore sensitivities, perhaps look at a different time frame other than three years, look at different equations, that sort of thing depending on the feedback.

We hope to have a final report in about the September time frame, come back to the ACRS full committee, and then go to the Commission early next

year. Okay. Now, the remainder of the presentation is devoted to trying to address the comments that we got out of the transcripts from the previous ACRS meetings. Dale went through and organized those comments into six general areas. I'm going to address the first area, and then Dale will pick up the remainder of the presentation.

MR. LEITCH: Just before you get into that, Tom, does any of this program require industry submitting additional data or with the data you already have from LERs and so forth, do you already have everything you need to implement this program?

MR. BOYCE: A very good question. Right now, we have all the data from existing sources.

MR. LEITCH: Okay.

MR. BOYCE: LERs come in per 50.73, 10 C.F.R. 50.73, monthly operating reports require data submissions and the requirement comes from tech specs. So we have all the data sources that we need right now.

MR. LEITCH: Okay.

MR. BOYCE: Coupled with the SPAR models, we can do it totally independent of any additional submittals. That's different than the ROP PIs which do require voluntary submission of data.

MR. LEITCH: Yes.

MR. BOYCE: And kibitzing a little bit, if we do move forward and get to the point of taking it from industry level down to a plant-specific level, which is a possibility some time in the future, we might then require utilities to come in with more timely submittals than we get from LERs.

All right. The first comment that we called out of the transcripts was we needed to develop more concrete examples of regulatory actions. So we took a liberal interpretation and developed a flowchart of our process, which you saw earlier. We also refined what we are calling a two-tiered process for the Industry Trends Program, and what that means is we had talked about just coming up with a single threshold for each of our indicators, so that if any of the data exceeded a threshold, we would take a predictable agency response.

We've decided to go with a top tier type threshold that we use for reporting to Congress, but a more performance based type of indicator, based on our prediction limit methodology, which would be more sensitive to past performance and would not be tied exclusively to risk. So we developed that concept a bit more. Again, you saw that in the Industry Trends

Program overview where we had two methods for identifying issues in our indicators.

We also developed some example scenarios, which --

MR. RASMUSON: There's the flowchart.

MR. BOYCE: There's my flowchart. Well, we may come back to that.

MR. RASMUSON: I think you've been here.

MR. BOYCE: I guess an elaboration of the two-tiered process for the integrated indicator. What we're thinking of here is if you look at the product, its core damage frequency or you could actually use delta-CDF as your metric, and you could set a risk-based threshold for that. And the question was, you know, what's the current levels and it's about E^-5 up to say 5E^-5. You could arbitrarily set a threshold at 1E^-4, okay, that's one example of setting the threshold.

And I think that's currently where we are. You could then take it down to each of the individual indicators of initiating events, such as steam generator tube ruptures. And because they happen so infrequently, setting a risk threshold for those may not make a whole lot of sense. It would be better to go with a more performance based approach and, at that

point, we would be looking at past data points and using the prediction limit methodology. That's what this bullet is intended to get across.

Was that clear? Perhaps not.

MR. LEITCH: What are the two-tiers?

MR. BOYCE: Well, the two-tiers would be the, I guess, industry level would be one tier with thresholds, and the next level down then, if you remember that hierarchal slide, that would be the next tier down, which talks about individual initiating events with prediction limits. And that's what I mean by two-tiered approach.

MR. RASMUSON: Yes, but the two-tiers are one is the integrated indicator up here with a threshold, which would reflect safety. The next level down would be looking at the trends of the individual initiating events, and there we would use the prediction distributions and come up with prediction limits, and there we are tracking performance in the individual initiating events themselves. And I have some examples of some slides that might explain it.

MR. BOYCE: Okay. Next slide, example scenarios.

CHAIRMAN SHACK: I can understand the prediction. How am I going to do the first one again?

I get an absolute measure of the threshold, the integrated one?

MR. RASMUSON: For setting a threshold, what we plan to do is to have an expert panel and we would provide them with information, such as uncertainties, simulation runs and so forth to show what the sensitivities are and so forth, and then they would pick some value or we would recommend some value to them for their consideration or they would consider other programmatic things along with the safety goal and so forth. But it would be some type of absolute value.

CHAIRMAN SHACK: But then I would still take my model, I would take my updated frequencies and I would go through some sort of predictive model to decide whether my 95 percentile met that threshold limit.

MR. RASMUSON: No.

CHAIRMAN SHACK: I mean, I still would have to use the predictive model, wouldn't I?

MR. RASMUSON: Not on that. For the individual trends, not for the integrated indicator.

CHAIRMAN SHACK: I just take the raw?

MR. RASMUSON: If I could defer, I have some examples that we can talk about that.

MR. BOYCE: That's where we currently are. But you captured what we said correctly. That's our current thinking is thresholds at the integrated level and predictive limits one level down.

All right. I thought it might help if we came up with some example scenarios. In the previous SECY that we issued last year, we actually had two indicators, and I'm not talking from this slide at the moment. We had two indicators that exceeded prediction limits last year. One was scrams and one was collective radiation exposure, and we did follow our process and we investigated what we thought we saw there. We took a look for scrams.

For example, we looked at whether a manual scrams, whether automatic scrams, we looked at whether the scrams occurred during startup, shutdown, full power operations. We looked at the reasons that the scrams occurred, whether it was due to maintenance, whether it was due to testing, whether it was due to just on-line operations, some sort of operator error, and then we tracked and trended all of those factors, and we actually did not see anything that was driving our overall scrams indicator to go up.

Now, mind you the indicator ticked-up from .55 automatic scrams to .57 automatic scrams, so it's

not surprising we didn't see a whole lot, but we did follow our process and investigated it. We didn't think that that clearly illustrated our intent as to what we wanted, so we tried to come up with some better examples here as to what we might do if we had something come up.

So we picked loss of offsite powers. And if we had a large increase in loss of offsite power events in one year, we would try and take a look at it. In this case, we said we found out after looking at that individual indicator, remember we're down one level, that there was an unexpected increase in severe storms on the east coast. Well, as part of feedback to the Industry Trends Program, the first thing we do is provide that information to the inspectors and say okay, here's what we're seeing. Here's why we're seeing it, and then ask the inspectors for the effected plants, now, these storms aren't going to knock out every plant, we ask them to take a look at it.

We could review how good our inspection procedure is for adverse weather to see whether we're picking up all the reasons why the loss of offsite power would or could have occurred, and depending on what we found from those sorts of looks, we might

issue an information notice to all licensees. Okay. And this sort of illustrates the news we can use type of approach that you asked about previously.

Then we picked an increase in general transients. And at this point, what we would be doing is reviewing licensee event reports to see what might be causing the transients. We might be able to issue a temporary instruction to take a look at whatever was found from the licensee event report review. Now, remember there's a lot of reasons for transients, so it was difficult to get more specific there. And once again, we would possibly issue an information notice to all licensees.

And again, this is just for exceeding prediction limits. Presumably, because we would have higher thresholds for long-term adverse trends if we exceeded that higher threshold, we would take more intrusive actions based on the menu of things listed in that process in the flowchart that I showed you earlier.

Are there any questions on these scenarios? Well, then, at this point, I'll turn it over to Dale for the rest of the presentation.

MR. RASMUSON: Our next area, big area, that we are collecting all the comments was I

collected them under trends. From there there was, in summarizing them, lack of a firm definition of trend and statistical, a significant trend. Performance has been basically flat for several years. Use of horizontal line, industry behavior versus plant-specific behavior, there was comments on that.

We have definitions. We did not put them in the report, but we certainly were operating under the definitions of what a trend is, a statistically significant trend and an adverse trend, and we actually did estimate "flat" trends, if you will, in all of our use, you know. So some definitions of trend, if you look in the dictionary, you can find definitions of some trend there. It's a general movement in the course of time corresponding to a statistically detectable change. Also, a statistical curve reflecting such a change is a definition of a trend.

For a statistically significant trend, we are looking at the slope parameter in our particular models, and we're saying it's statistically significant if the p-value of that is less than 5 percent. Do I need to define p-value for you? Okay. And a statistically significant trend is one that where it exceeds the threshold or a prediction limit.

And for the "flat" trends, we actually estimated the base line trends reach initiating event based on at least four years of data.

We developed some rules that we were following here, along with looking at the trends themselves and trying to put some things into perspective, but in the report we have some rules that we laid out there that we were using. For initiating events with few occurrences, the intervals tended to be the whole period that we were looking at, and for some of the others, you know, if you look at the whole trend and sort of the decreasing there and then the flattening out, but it was at least four years.

As an example, here's loss of vital DC Bus. We've had three occurrences in two years. There we're using the whole period. These are the prediction limits. This is the 95th and this is the 99th prediction limits. This is our mean value here. For BWR transients, here you see our decreasing behavior. Here we have the mean value, and from this we obtain a statistical prediction distribution from which we pick off the percentiles. Here is the 95th, which corresponds to 39 events, and the other one here 44, is the 99th percentile.

Let me just put up here at this point here

just an example. This is for loss of offsite power. Using the data in the baseline period, you come up with a negative binomial or a gamma poised on distribution, and this is what it looks like. That's the predictive distribution. And so you can pick the percentiles off of here, and this is the decreasing. This is the cumulative here. You can pick off the percentiles, the number of events that you would see here.

And so we have done this for each of these initiating events that we have. And this, I think, is a very nice tool to use. What you put in this is the number of occurrences, the operating time that you've seen over the period of the interval, and then what you estimate to be the time for the next year or the next period of time. If you want to do this quarterly or whatever, you can do it and you will obtain one of these.

CHAIRMAN SHACK: In your previous graph, you showed us a mean value of 95 percent in the '99. In the paper you've got fitted trends.

MR. RASMUSON: The fitted trend is really the mean value. Well, right, right. The fitted trend is the fitted trend.

CHAIRMAN SHACK: Is the fitted trend.

MR. RASMUSON: And what we would really do is the -- what we're actually using is this mean value over the period.

CHAIRMAN SHACK: This mean value.

MR. RASMUSON: But the fitted trend sort of shows you sometimes it's going up, sometimes it's going down.

CHAIRMAN SHACK: The fitted trends that you have are all statistically insignificant.

MR. RASMUSON: That's exactly right.

CHAIRMAN SHACK: So you've just replaced them --

MR. RASMUSON: Right.

CHAIRMAN SHACK: -- with the mean value.

MR. RASMUSON: I did in this chart, yes.

MR. BOYCE: And you're also seeing some of our thinking of where we are going. That paper talks about our current process, which looks at trends. We have not gotten approval to go forward and go with the thresholds-based approach. This is developmental work right now that we think we're going towards, but we have not yet said we're going to make that our definition of adverse trends yet. That's not in the current paper. When we had sufficient developmental work under our belt, we were going to shift to that

possibly as early as next year.

MR. RASMUSON: The next area I want to talk about is industry versus plant-specific. I know we spent a lot of time last time, you know, people said well, maybe we ought to do plant-specific calculations and then just maybe average those. We can estimate plant-specific frequencies for some initiating events. There's enough data that we do get some variability in that and we do have some variation in that.

For others, you really don't have very much variability, and really its an industry average. Like for the rare events, such as loss of offsite power, loss of DC Bus, small-break LOCA, those are really industry averages that you're going to use on the plant-specific basis, you know, and basically for those where I do have enough data for this, really those are like the general transients where they really do not make, you know, a very great contribution to the overall core damage frequency, you know.

So I think in this case, let me just show you an example here. Here is the distribution of the Birnbaum importance measures for loss of offsite power for PWRs. Here is the distribution if I were going to

do plant-specific frequencies, can you see it all right? Basically, I wouldn't use plant-specific, but I did take and do a three year update, you know, just to say there was one or two plants that had a couple of occurrences. Okay. The values increased. Not very many, but I really wouldn't do it.

But now, what's my core damage frequency look like for this contribution? It's like this. It follows this distribution. And so the variability that I see is the variability in the Birnbaum importance measure, not in the frequency itself. And so really, for our purposes at the industry level, we're better off going with the industry approach that we're proposing.

CHAIRMAN SHACK: Well, in equation 4, you used the industry average frequencies and the plant-specific Birnbaum. It's perfectly understandable.

MR. RASMUSON: Right. But it turns out to be equivalent.

CHAIRMAN SHACK: It turns out to be equivalent.

MR. RASMUSON: Right, right, you know, and so equations. There was some comment on the equations, you know, on summations or different things like that and we have tried to -- confusion with the

four equations and industry versus plant-specific, you know, and so we've tried to make our presentation clear. Like Tom showed you at the beginning, you know, having a much simpler equation using some charts, some additional charts to explain the calculations and so forth. So hopefully, that will be clarified.

MR. WALLIS: The equations are the sum of the two variables? How can you make them simpler?

MR. RASMUSON: Well, you make the presentation simpler, but I agree in that sense. And then we've talked about the industry versus plant-specific results there and so forth, you know, so those are the types of things that we've --

CHAIRMAN SHACK: I mean, the bigger question comes as to whether you sort of keep the Birnbaum variations and sort of show those all the time, so you realize just how big they can be or, you know, you smear it down to the single average representative plant.

MR. RASMUSON: Right.

CHAIRMAN SHACK: And you know, when you look back at some of those ones at the back, you know, you really want to ask questions about that guy that's out there.

MR. BOYCE: Yeah, I would just comment on that. I mean, if you want to ask the questions, I mean, part of the developmental work that we are going to do is to take a look at those outliers and find out if it's a problem with the SPAR models. Like it might be a plant-specific issue that has not been incorporated into the SPAR models yet. And we want to rule that out first and make sure it's not a model issue.

CHAIRMAN SHACK: And it certainly requires investigation, at any rate.

MR. BOYCE: Right, right.

MR. RASMUSON: Well, this is a demonstration, at this point, you know, and we're operating on the data that we have. And we know that there are certain things, and we know that some of the things that we've already seen are going to change, you know, and so forth, but as we go along we have actually found that the models have changed in one case and they are going to change some of those outliers. Others they may be real and so forth in that sense.

The next area was dealing with uncertainty and sensitivity analyses. The time we talked to you in November, we had not run uncertainties per se. We

had done some work, but we hadn't really looked at it in detail, and certainly sensitivity analyses and we have certainly done a lot of that, as you can see in the report that we have done various things in that regard.

Here's a chart here that we have just recently put together. This chart shows the average Birnbaum, the baseline frequency, the baseline CDF contribution. The mean of the percent or the percent of the mean, you can see what it is, and then the next one is the N_{Mean} is the number of events or partial events that contributes to the mean. And the last one there is sort of a sensitivity study where we say all right if we take for the uncertainty distribution in the baseline core damage frequency, take the 95th percentile of that. How many events does it take in the small LOCAs to give me that? And you can see it's like 21.3. For transients it's 167 events.

What you find is that for those events that are not very risk-significant that have the low Birnbaums, you know, it really takes a lot of events to go up there. Where in some of the others where they are smaller, you don't have that particular situation.

MR. LEITCH: I'm having trouble

understanding what the VAC is. Is that loss of vacuum or what is that?

MR. RASMUSON: Loss of vital --

MR. BOYCE: Vital power, loss of Vital AC power.

MR. RASMUSON: Vital AC power.

MR. LEITCH: Vital AC power?

MR. RASMUSON: Yes.

MR. LEITCH: Now, why?

MR. RASMUSON: Well, in this case --

MR. LEITCH: What does that mean? The average importance is --

MR. RASMUSON: Well, that really has not been included in the models. We thought it was, but it is not. That is why it's zero.

MR. LEITCH: Okay.

MR. RASMUSON: Okay?

MR. LEITCH: Yes.

MR. RASMUSON: But it is in the list of the risk-significant initiating events that was identified in the Risk-Based Performance Indicator Program, PWR, similar types of calculations.

MR. WALLIS: That's a funny way to write zero. You could write it as 0E^-6. Yes, it would look like the other one.

MR. RASMUSON: Yes. Okay. Here is the integrated indicator. We have updated it to include the year 2000 now. Before, we only had through 2001. You can see that we have actually dropped a little bit. For the PWR, we actually dropped quite a bit.

MR. LEITCH: I guess the thing that always bothers me about this is industry-wide versus plant-specific, and I think what I hear you saying is, you know, suppose there is not a statistically significant adverse trends industry-wide, but one plant could be terrible on that particular category, and I guess it's not really -- is it correct then, what we're saying is it's not really a function of this program to identify that terrible performance at one particular plant. Rather, that comes out of the ROP.

MR. RASMUSON: ROP.

MR. LEITCH: Is that a correct understanding?

MR. RASMUSON: Let me answer your question in a couple of ways.

MR. LEITCH: Okay.

MR. RASMUSON: The initiating events that contribute most to risk don't occur very often, such as loss of offsite power, steam generator tube rupture and so forth. When those events occur, they really do

get quite a bit of attention already from the agency. For the general transients where we get a lot of them, most of those are covered right now under the ROP scrams.

MR. LEITCH: Yes.

MR. RASMUSON: And so if you have a plant that is going to get a lot of them, you know, they are going to probably be picked up, at that particular point, in that sense. What we're looking at, what this program will tend to do for you in looking at them is suppose that I have an increase where each plant picks up a scram for some reason, you know, they are not going to be tripped in the ROP or anything, but if that did happen, you would really see a spike in our trends for that, because our average right now for general transients, for the Ps is about .75. You know, and so if you got that, you know, you would see quite an increase there.

MR. SIEBER: And the agency response would be different.

MR. RASMUSON: And the agency response would be different, right.

MR. SIEBER: And you would have some generic communication or engaging industry.

MR. RASMUSON: Exactly.

MR. SIEBER: As opposed to engaging a specific licensee.

MR. RASMUSON: Yes, exactly.

MR. FORD: Could you address how, for instance, materials degradation would come into this particular schema? For instance, is there any metric in your program that shows this spike or an increasing trend, for instance, towards this corrosion or an increasing trend of cracking? I mean, would those physical phenomena enter into this analysis?

MR. BOYCE: Well, right now, it wouldn't only because the existing set of data and indicators that we have were built from -- I'm sorry. The indicators that we have in the program were built from existing data sources. I believe the Office of Research right now is taking a look at that as part of its response to Davis-Besse.

I think they took a look at it as part of the Accident Sequence Precursor Program and are trying to get to that point where they have got enough data that they can get some meaningful type of indicators. But right now, that's not part of our program just because we don't have industry-wide data sources for that.

MR. FORD: But if there were industry data

over the last 10 years, for instance, including abroad, is the program compliant enough in its methodology to take into account or show process?

MR. BOYCE: Well, I would want to say our process would work. Our process seems like it would work for any set of data like that, but I am dealing in hypothetical space right now. I don't know for sure.

MR. RASMUSON: Pat Baranowski wanted to make a comment.

MR. BARANOWSKI: I am Pat Baranowski, branch chief, so both of these activities are going on in my branch. The business of wrapped coolant pressure boundary integrity, if you will, and performance indicators associated with that is pretty difficult to deal with on a plant-specific basis in particular, but it's also difficult on an industry-wide basis, because there is really a sparsity of data in terms of looking at things that mechanistically trigger cracks and being able to track data of sufficient density to see when those triggers are occurring, and then whether or not the cracks are occurring and if the cracks are leading to leaks and so forth.

But we do have, as Tom mentioned, a task

to go back after the Davis-Besse Task Force made its report to go and see what can be done, but it's just a matter of can we come up with sort of a progression model, if you will, that involves materials and fracture mechanics issues? Can we then collect the data and can we track these kinds of things?

MR. FORD: But I get the impression that this is not high on the priority list of things to do.

MR. BARANOWSKI: It's not in this program, and I don't know that it would ever go in there. I think this is one of these issues where an event like Davis-Besse is of such importance to us that we don't need any trends to tell us to go and spend a fair amount of activity looking at all these things, including how we might be able to get performance indicators.

So yes, that kind of performance measurement activity is not the highest on our prioritization, but it's high enough that we have identified resources and some schedule to work on that over the next year to year and a half.

MR. FORD: Okay.

MR. BOYCE: Just to add to that. I mean, any time you try and collect data from industry, there is a cost. I mean, there is a burden on industry and

before we would gather that sort of data, we would have to go through a cost benefit analysis to capture it, but I would call that a secondary issue, honestly, in this case.

MR. FORD: The cost?

MR. BOYCE: Going through that process of establishing cost benefit. The most important thing is is that it's one of those things that we're going to look at in response to Davis-Besse, and if it turns out that looks like something we need, I am sure we would make our best case for it.

MR. FORD: It's just that if anything has got a trend, it is materials degradation, and I thought it was going to be --

MR. BOYCE: Okay.

MR. FORD: -- you know, an obvious input to your model.

MR. BOYCE: Well, I won't disagree with you. I will just add to my previous answer that it's harder in material space to get a risk-informed type of indicator. So the indicator would be a purely deterministic type of thing, so just a refined answer.

MR. FORD: So we do need a time dependent PRA?

CHAIRMAN SHACK: Well, but if you look at

things like Figure C-7 with steam generator tube rupture, you find out that with all the degradation that you have ongoing in steam generators, at least in the sense that it leads to initiating events, it's flat as a pancake.

MR. FORD: But is the metric, therefore, CDF, delta-CDF?

CHAIRMAN SHACK: If in risk-informed space, yes.

MR. FORD: I mean, is that an appropriate metric?

CHAIRMAN SHACK: Well, that's a different question, but certainly in Birnbaum importance, it certainly is. It's the metric he's going to be looking at.

MR. FORD: Well, has anyone thought of a different metric? I mean, for instance, we have heard arguments until rather recently that delta-CDF for material failure cracking in Pressure Bus, PWR Pressure Bus, is fairly small and yet, it has huge impact. Therefore, the question is is delta-CDF a sufficient metric in this approach? I recognize your comment, Bill, but you are just really following your tail. The central question is is it a sufficient metric?

MR. BOYCE: Well, at this point, I would go back to what Pat said and we'll follow the lead efforts in response to Davis-Besse, as opposed to forging new ground in this program. That is just the practicality of it.

MR. RASMUSON: Our next two slides just convert the individual prediction limits to CDF and then just blots their contribution. What I did was just take each one of them, one at a time, kept all the variables at their mean values, and then plugged in the predictive distribute, the predictive limit for the 95th and for the 99th, you know, just one at a time, and this just shows what happened to the CDF value here.

This shows you a loss of offsite power is very important, loss of DC Bus. These others are not quite as important. Others are not as sensitive. Just a sensitivity here and just to show some of the things here for the DC Bus, small-break LOCA, the two big ones, the effect for the PWRs. We ran Monte Carlos in the baseline, using the baseline on certainty distributions for each of the initiated --

CHAIRMAN SHACK: Just back to that graph for a second.

MR. RASMUSON: Okay.

CHAIRMAN SHACK: I think I'm getting confused there. Aren't you sort of skewering things a little bit here by using that baseline value, because if I use the contribution from each of those terms at the mean value limit, I would sort of see the same sort of stacking, I mean.

MR. RASMUSON: Well, this is the mean value.

CHAIRMAN SHACK: But that's the total sum.

MR. RASMUSON: That's the total, right.

CHAIRMAN SHACK: When I looked at the contribution from each initiating event --

MR. RASMUSON: Right, but the contribution from each of them --

CHAIRMAN SHACK: On their mean levels would give me again --

MR. RASMUSON: If I were to do that, I would see some of these coming in.

CHAIRMAN SHACK: I would see spiking, right.

MR. RASMUSON: Right, right.

CHAIRMAN SHACK: I mean, they contribute to the mean, as well as on the 95th.

MR. RASMUSON: Right, and they also -- but I do get different ones sometimes for the variants,

you know.

CHAIRMAN SHACK: Yes, but it would be more illustrative to plot them in terms of mean or median 95th and 99th, rather than that overall baseline.

MR. RASMUSON: Okay. Well, we can investigate some of that, how to show some of these things, you know, but what we are trying to do is just to depict that there are sensitivities, things that we need to look at, especially if we're going to be setting a threshold, you know, an overall threshold value, we need to understand what some of these things are and how they contribute in this regard.

Here is the uncertainty in the mean of the baseline distribution. Here, each of the initiating events has an uncertainty distribution with it, and as we propagate that through, this is what it looks like. When we do our Monte Carlos on the actual indicator, we use the predictive distribution, because that is really what it is designed to do is to predict what it's going to look like, and this tends to spread it out.

This is usually in a 3-year Bayes estimate. Maybe we can put it on here. You can sort of see that it's a little broader in that sense. If we did a one year estimate, you know, with the

predictive, it would be even broader yet. The 3 years tends to bring it down, you know, narrow the uncertainty. We can do the same type of thing with Monte Carlo or with the maximum likelihood estimates, not Bayesian updates. Other types of another --

CHAIRMAN SHACK: Should I be bothered that my maximum likelihood estimate or my Bayesian estimate seem to differ as much as they do?

MR. RASMUSON: No, I think that, you know, by using prior distribution in there, it tends to smooth things out.

CHAIRMAN SHACK: Now, when you do all your calculations for your -- I keep thinking AEOD, but that's all maximum likelihood.

MR. RASMUSON: No.

CHAIRMAN SHACK: No? Isn't it?

MR. RASMUSON: No.

CHAIRMAN SHACK: I thought all those were reported and I always remember MLE, MLE all over the place.

MR. RASMUSON: Well, we do a lot, but we do a lot of empirical Bayes analysis and other types of things in our work.

CHAIRMAN SHACK: I was just of wondering whether, you know, this indicates that you should be

using Bayesian consistently.

MR. RASMUSON: Well, I think we tend to. We do use a lot. We do use a lot of Bayesian updating in that.

MR. BARANOWSKI: I think we're actually using it consistently.

MR. RASMUSON: I think.

MR. BARANOWSKI: I don't think we use any MLE that I know of anymore.

CHAIRMAN SHACK: Anymore?

MR. BARANOWSKI: For years. Just about everything has been empirical Bayes where we can do it.

CHAIRMAN SHACK: Okay. I will have to go back and look at some of those frequency reports. No, really, all those uncertainty distributions are just uncertainties on the initiating events. You didn't put any uncertainties on the Birnbaums?

MR. RASMUSON: No, no, we did not.

CHAIRMAN SHACK: And that would really --

MR. RASMUSON: That would -- there is a section in the report.

CHAIRMAN SHACK: Yes.

MR. RASMUSON: I don't recall the details, but it was not as much as within the initiating events

themselves, but that can certainly be done and looked at. But we did not feel, at this point, you know, it was worth the effort to go through it, at that time, you know, because it just did not look like their uncertainties were --

CHAIRMAN SHACK: Well, it wasn't clear to me, you know, if you're looking at the impact of the initiating events.

MR. RASMUSON: Yes.

CHAIRMAN SHACK: That was so important.

MR. RASMUSON: Right. Yes, yes.

CHAIRMAN SHACK: If you're dealing with thresholds and you actually have specific numbers, then it becomes -- then it may be more important.

MR. RASMUSON: Right. So another item that the ACRS asked us to do was to look at what was the impact of the plant-specific calculations. This is actually taking the plant-specific Birnbaums and calculating and plugging in the industry average in here, and this sort of shows you the types of behavior that we got there.

I will skip the next two slides. They are similar for the PWR on the -- here is sort of the -- I think the plant-specific one here is a little, you know, just to show that there is quite a bit. There

is sort of an outlying area out here on some things, but those are the types of things that we have pursued and looked at.

We have done a lot of this type of thing and so forth. We can certainly do some more in this area, but it is important to understand if we're going to set a threshold, we need to understand what its behavior is going to be and so forth, and you don't want to set it so low that you're going to be tripped up by an occurrence of one or two items, you know, or a combination of these rare events that you are always going to trip it.

But you do want to set it at such a level that you can be, you know, that you don't want it so ridiculously out of the way, you know, you will never hit it.

CHAIRMAN SHACK: Because you can't trip it, no.

MR. RASMUSON: Yes, I think those were the types of things that --

CHAIRMAN SHACK: There were some peculiarities here in some of your uncertainty studies that were sort of interesting. You did a Birnbaum on certainty at a specific plant for steam generator tube rupture, and you came up with an air factor of 2.59

just with the parameter uncertainty.

MR. RASMUSON: That was actually going to the SPAR model.

CHAIRMAN SHACK: Right.

MR. RASMUSON: And this is what you're talking about, of actually incorporating that into the Monte Carlos.

CHAIRMAN SHACK: But when you did the Birnbaum variability for the whole 60 plants that you have SPAR models for, you only got a .6 error factor. Somehow, it is --

MR. RASMUSON: On?

CHAIRMAN SHACK: In the SPAR models.

MR. RASMUSON: On one particular one?

CHAIRMAN SHACK: Yes, if you look at Table 7 and Table 8.

MR. RASMUSON: Yes, in the report.

CHAIRMAN SHACK: Yes, in the report. It's just very peculiar. One would always sort of expect to find a bigger difference in error factors as I go over the whole range of plants that I would find, presumably, in a parameter uncertainty for a single plant, at least I would think so. But then I saw that you were going to work on steam generator tube rupture models for SPAR.

MR. RASMUSON: I'm just trying to find it.

CHAIRMAN SHACK: Page 18 and 19.

MR. RASMUSON: 18 and 19? Okay. Yes.

CHAIRMAN SHACK: So if you look at Table 7, which is the plant variation.

MR. RASMUSON: Yes.

CHAIRMAN SHACK: It's only .6, but in a single plant, just the parameter uncertainty gives you a 2.6.

MR. RASMUSON: Yes.

CHAIRMAN SHACK: Which seems peculiar.

MR. BARANOWSKI: Well, why don't we look into that?

MR. RASMUSON: Yes.

MR. BARANOWSKI: I mean, any questions you raise here, we're going to take note of and check into that.

MR. RASMUSON: Yes, well, like I said, we're looking at it to show that we could do those types of things when we were doing this, and we'll look at the parameter uncertainty in the Birnbaums a little bit more and pursue that area. Okay.

The fifth item was dealing with thresholds, comments on that. The comments were thresholds tell us about safety, trends about

performance, and we certainly agree with that. You have to establish that there has been a change before you can start looking for it, and that is what our process is all about, is trying to determine the change and so our particular response here is is that we do have a two-tier approach that we're trying to use here.

One is the top tier, is the integrated indicator with a threshold, which focuses on safety. And at the second tier, we're looking at the individual indicators and trending those and using the prediction limits to look at performance. The individual trends of the second tier are really designed for in-house use at the agency here as a diagnostic tool to help us understand things and in a way, I think that we can also use them as we go along.

You know, we don't have to wait until the whole year is up. We can look at it on a quarterly basis or so forth, you know, and see how we're doing. And we can use it as a monitoring tool, and so --

CHAIRMAN SHACK: Have you sort of done little experiments where you just started trending something and saw how long it would take you to pick it up?

MR. RASMUSON: Sort of, but not a real

definitive task in that regard, no.

CHAIRMAN SHACK: Somehow, I am suspicious that I would have to actually see a rather substantial sustained increase in some of these before I would ever get -- you know, statistical significance is a two edged sword.

MR. RASMUSON: Right, right, and you can see that. You know, if you're running the long trends like Tom did, you know, on that and where the behavior tends to flatten out, you know, you are going to get tighter and tighter and tighter, and then what is really, to me, is random variability like an increase of just one or two scrams, you know, could get you.

Whereas, you know, you take the flatter trends and so forth, you know, which you have suggested we do, and that is what we have always tried or what we are trying to move forward with, at this point.

MR. BOYCE: Sustaining what you probably already know intuitively, you know, events that happen infrequently, such as steam generator tube ruptures, small-break LOCAs, you know, it's much more difficult to say that is a trend when you go from zero to one, but general transients where you are getting, I think, the number was 150 a year, that is much easier to see

a variation. Unfortunately, the contribution to core damage frequency is much lower. So, you know, it's just the nature of what we're dealing with.

MR. BARANOWSKI: There is another aspect here that goes along with that. Any really risk-significant event is going to have some agency response, and it might even be generic without looking at trends, but there is always this issue that comes up like with steam generator tube ruptures. Well, gee, can't you just fix that problem?

Well, if that means having zero steam generator tube ruptures, we are probably not there. We might be, but I don't know, but we can certainly show whether we are getting better, and that might be an important insight to show that, in fact, the trends on this are declining even though they are still occurring. Now, if the objective is zero, then you don't need to trend anything. Just don't trend anything. Just make it zero. Every failure is the worst thing. Agency goes off on everything. I think that's kind of the strength of what this is about.

MR. RASMUSON: The thing that we have been alluding to all along here is that somewhere along the way, we're going to need to have thresholds for the integrated indicator and a process for setting that.

One of the things you're going to need, certainly, is to understand the behavior of it and we have talked about a lot of the types of information that would go into this type of thing here.

And then we would like to put together an expert panel to propose the threshold and to take into consideration, you know, policy and other issues along with the indicator itself and its variability and things like that. That is where we're starting. As part of our proof of principle concept that we want to have is we want to actually put together a panel and to provide them information and training, you know, in that to actually try to set a --

CHAIRMAN SHACK: And what's the schedule for that?

MR. RASMUSON: That will happen sometime after our workshop, we would think. You know, we would like to have our workshop first and then get any input from our workshop, you know, that people would have for that type of thing, so it will probably be late July or August time frame in that regard, but we certainly want to have that and then document our results, summarize our results in our final report of that, putting forth --

MR. SIEBER: So today, you have no

thresholds for anything, right?

MR. RASMUSON: We do not have a threshold, right, at this point.

MR. SIEBER: And when you establish then with the expert panel would be based mainly on Birnbaum?

MR. BOYCE: Well, some sort of a CDF, right.

MR. RASMUSON: It will be based on the results of things like we have seen here, yes.

MR. BOYCE: Right. At least at the integrated indicator level, it would be a CDF, but, you know, the question is what is the right level, at that point? Would you just go with performance based, if I can call it that.

MR. SIEBER: That would be my next question.

MR. BOYCE: Well, I'm glad I anticipated it.

MR. SIEBER: So you can answer it if you would like.

MR. BOYCE: Or would it be better to go with one oriented towards the Safety Goal Policy Statement in some way? You know, and then you say well, what should we report to Congress versus what

level should we be monitoring consistent with that Policy Goal Statement?

MR. SIEBER: Yes.

MR. BOYCE: And that is the sort of policy issue where you hope to ask the board to look at and then, naturally, we would have some sort of a proposal, but I don't think we're there yet.

MR. SIEBER: Now, you already report to Congress. That has been in effect for years, right?

MR. BOYCE: Correct.

MR. SIEBER: And now, you're basing your report to Congress on individual events and individual plants with some significance, sorted by some significance?

MR. BOYCE: Well, if I understood you right, yes, the current set of indicators that we're using to report to Congress are the old AUD indicators and there are seven on them plus the total ASP events.

MR. SIEBER: Right.

MR. BOYCE: And we are migrating towards using the ROP PIs and this IIEPI for reporting.

MR. SIEBER: Well, it seems to me the setting of the threshold is the key to whether this works or does not work not only for your report to Congress, but your use as part of agency reaction to

industry events. Like I said, I guess, I would be curious as to the criteria that the expert panel would use and examples of threshold determinations that they made.

MR. BOYCE: We are curious, too, actually. We were just kicking this around this morning as to, you know, how to best approach that and we might try several options. One is, and I articulated some, should we be consistent with the policy goal in some hierarchal manner? Should we be using a performance based approach?

MR. SIEBER: Well, you are going to have to tell the expert panel what to do.

MR. BOYCE: Yes.

MR. SIEBER: So you're going to have to have that framework.

MR. BOYCE: Right, right.

MR. SIEBER: And I take it you don't have it quite yet.

MR. RASMUSON: Well, we have some ideas on it, but we have not totally --

MR. SIEBER: You haven't formalized it?

MR. RASMUSON: Totally formalized it, yes, right.

MR. SIEBER: I mean, well, but I think

that would be something you would be interested in, because to me it's the key.

MR. BOYCE: I understand. We're struggling with it. I mean, as you know, it's difficult to do it.

MR. SIEBER: Well, I can appreciate that.

MR. BOYCE: Yes.

MR. SIEBER: I can appreciate that.

MR. BOYCE: Particularly at the industry level. It's almost easier for each plant to pick a number.

MR. SIEBER: Yes, it is.

MR. BOYCE: And it just gets harder.

MR. SIEBER: But if you're doing it for each plant, you can go back to the ROP.

MR. BOYCE: Right.

MR. SIEBER: And accomplish the same end, and I see this as a different kind of a program that has an individual plant benefit to it, but it is more an industry program and more satisfies the requirements of the law as far as reporting to Congress.

MR. BOYCE: Yes, and segueing a second, we were also trying to figure out who the right people would be to ask to join that. An idea we had would be

to ask members of the ACRS perhaps to participate. I don't know if that's possible, but I am offering that idea.

MR. SIEBER: I might be absent that day. I think it's a difficult job.

MR. BOYCE: So you are volunteering, I think is what I heard. All right.

MR. RASMUSON: Then just let me just again articulate, you know, that the top level is the integrated indicator, which addresses safety and would have the threshold with it. At the next tier would be the trends with predictive distributions and those you could --

CHAIRMAN SHACK: But even with a trend, you have to decide when the trend, if you have a trend, when does it concern you?

MR. RASMUSON: And that's why you would have the predictive limits, and one thing you can do is you could --

CHAIRMAN SHACK: Well, no, that helps you tell when you have got a trend.

MR. RASMUSON: Right, but then what you need to do.

CHAIRMAN SHACK: What you need to do about the trend.

MR. RASMUSON: That's right. What do I need to do about it? But the predictive limits tell me when I really have something there, sort of the trigger, in that sense, and they focus on performance.

MR. BOYCE: Again, commenting a little bit further on that point. You're right. You can track and then say you have a trend, but the so what part turns out to be a key part in setting the appropriate threshold like scrams. In 1988, we were averaging about two and a half total scrams per plant per year and now, we're at about .8, .9.

So if we go up, our prediction might limit might say that if we went above 1.1 or 1.2 scrams per plant per year, there was something we needed to do, but the question is what? Preventing scrams is not something you can easily regulate, and we struggled with this.

In the paper, we even told the Commission that we -- although, the Commission asked us to develop these thresholds, we struggled for exactly that reason. We adopted this approach. We had these glorious thresholds all laid out and they were beautiful, and then we got to, say, collective radiation exposure and it went up above a level, and then we were left with the well, okay, what do we

really do now?

And we are going to continue to work it. It may come down to an indicator by indicator thing with the people joining our policy board and then bringing in technical experts and saying well, it's not perfect, but that's where we're going to draw the line. I am digressing, but I am trying to give you a sense as to how difficult it really is.

MR. SIEBER: I think one of the problems that you are going to face is, you know, if you look at the ROP and the cornerstones, some cornerstones reflect themselves in delta-CDF.

MR. BOYCE: Right.

MR. SIEBER: But the majority do not, and you are faced with the same problem here.

MR. BOYCE: Exactly.

MR. SIEBER: So you are going to have a diversity there, and the thresholds for the non CDF type indicators are going to require some additional policy decisions.

MR. BOYCE: Agreed.

MR. RASMUSON: The last area of comment was there is quite a bit of discussion on subset of plants in our last meeting, you know, and how would we handle those? How do we look for them and so forth?

And one of the thing we certainly do in this process is is that if we see a trend, you know, if we trip a prediction limit, we would certainly want to go back and see why we did that.

If it was an individual plant, that would probably be picked up in the ROP, but certainly, the ROP is not going to pick up the case where we may have all the CE plants had something that had gone wrong on it, and we would certainly want to go back and look at those types of things and see if there are subsets of plants or that type of thing. And so that is sort of how this would come about in our process or in our analysis of what we're looking at.

So our future efforts, as Tom has said, were receiving comments on the draft report. We are going to hold a public workshop. We're going to develop guidance for setting thresholds for the integrated indicator. We will actually go through that exercise to see how we need to refine it and so forth. We will update the reports with the lessons learned, and we want to come back and brief the subcommittee and the full committee, at that time, and request a letter, at that particular point, and then issue a Commission paper on this and then go into implementation of it.

And so those are basically where we are. We have had this scheduled before, but just to put that up there, that's sort of what we're shooting for in that type of time frame, and we think it's reasonable. We can do it and so forth, but it has been nice coming back to you and sharing with you our thoughts and where we are and what we have done.

CHAIRMAN SHACK: Well, your expert panel is going to have their work cut out for them, the time between the end of the workshop and the final paper.

MR. BOYCE: I agree.

MR. SIEBER: I am curious as to where on that schedule you're going to set forth the criteria that the expert panel will use to set the thresholds.

MR. BOYCE: I think you have hit a weak point for us, and I think we have got a bit of homework to do. We may be challenging our schedule.

MR. RASMUSON: I think that's where we would want to talk about that at the public workshop.

MR. SIEBER: Yes, but some place along, and you are going to have to do it.

MR. RASMUSON: Yes, right.

MR. SIEBER: And the expert panel is going to have to meet and make all these decisions that govern how this program is going to work.

MR. RASMUSON: Yes.

MR. SIEBER: And then after you're done with all that, you are going to come in and tell us about it and so, at this point in time, we have no way to give you any input, and by the time we meet again, it will be too late.

MR. RASMUSON: Okay.

MR. SIEBER: Without going through an exercise like you guys did this and committed yourselves to all kinds of things, and we said well, you didn't do this right and you didn't do that right, and so I sort of get a little bit concerned.

MR. RASMUSON: Okay.

MR. SIEBER: Because that's the most important part.

MR. RASMUSON: Okay.

MR. SIEBER: And that's where there is sort of fuzzy concepts involved in some instances, and maybe there is a way to get around that and there comes a time where it will help, as opposed to at a time when all the work is done. I don't know if our Chairman has any additional thoughts on that. He is the Chairman, but that would be my thought, at this point.

MR. RASMUSON: Well, certainly, as we are

in draft where one thing we could do is certainly as we have a draft document on that, we could certainly ask you for comments, not necessarily meeting, but we could certainly send that out for review and comment.

CHAIRMAN SHACK: Yes.

MR. SIEBER: I think that would be good.

MR. RASMUSON: Okay.

MR. BARANOWSKI: So is that an acceptable way to occasionally work once we have been sort of coming along on this, to send some technical issues to ACRS for information and the staff would figure out how to collect some comments and feed them back or do we need meetings?

MR. SIEBER: Well, I think you need a meeting in order to get an official opinion out of us, because if we don't write it down, it's not official. On the other hand, I think if you would send us documents that explain what it is you intend to do and we all get it by email or some other way through our staff, and somebody has, you know, a great concern about it, then we may ask you at the next meeting or some future meeting to come in, so that we can discuss that before it's cast in concrete. That would be one way to do it, but I'm sure the staff knows better how to do those things than I do.

MS. WESTON: Well, I was going to comment that we could try that, you know, as a comment kind of thing. Usually, what happens is we send stuff out. If they have questions, they can send it back and I can send it to you, and it would depend upon the nature of the questions.

CHAIRMAN SHACK: Okay.

MS. WESTON: How much explanation is required, and we could try that in one round and see how it worked.

CHAIRMAN SHACK: Always with the recognition, of course, that the comments are those of the individual member.

MS. WESTON: Right, right.

CHAIRMAN SHACK: Not of the ACRS.

MS. WESTON: And the fact that, at some point, once we get these questions, we will have to come together as a group to discuss them.

MR. SIEBER: See, I think one of your interests is to keep moving forward without having to wait for us.

MR. RASMUSON: Right.

MS. WESTON: Right.

CHAIRMAN SHACK: Right.

MR. SIEBER: And to not show up here for

another meeting if you don't have to, and so perhaps the staff, our staff, can figure out a way that we can legally make that happen.

CHAIRMAN SHACK: Or not.

MS. WESTON: There is no prohibition to providing comments or input to the staff without a formal meeting. The only prohibition would be if we are about to write a letter.

MR. SIEBER: Yes, we can't write the letter.

MS. WESTON: And then of course, we would have to have the reports. So we can do that.

MR. SIEBER: We have to work something out.

MS. WESTON: We can try that as a means of getting some input for you on a rather quick basis, but recognize that ofttimes some members don't read their email, so you might not have some input.

CHAIRMAN SHACK: Okay.

MR. RASMUSON: See, right now, all the comments that we have been given are -- you know, I have just been going through the transcript and pulling them out, you know, and it would be just the same way that, you know, you made comments, you made comments and go for it.

MS. WESTON: Yes.

MR. RASMUSON: They have just been written down in their public record, you know, but they are not -- nothing has come from the ACRS, except the transcript itself, you know, and Tom has said something, you have said something and I have just pulled it out and, you know, we have tried to address that in that regard.

MR. SIEBER: I think that's a good way to work. On the other hand, our individual comments as they appear in transcripts and testimony are still individual comments.

MR. RASMUSON: That's right.

MR. SIEBER: As opposed to --

MR. RASMUSON: That's right.

MS. WESTON: Yes, until you come together as a body in a full committee.

MR. SIEBER: That's right.

MR. RASMUSON: See, so --

MS. WESTON: Then the comments are not official.

MR. RASMUSON: Right, yes.

MR. BOYCE: The only thing I could add to that is is that I don't think we would be waiting for the expert panel to tell us what the thresholds are.

Our plan would be to work these thresholds and come up with our best shot and say this is what we think. We have explored just like we did, we have explored five equations and we think this is the best after weighing the pros and cons of each one.

What we would be looking for is confirmation from this expert panel, which would have a variety of stakeholder interests represented. We hope that we have done the right thing, and that keeps us on track and that is just philosophy more than anything else.

MS. WESTON: Well, I think one of the good things about doing that and getting comments from the members is you may get a diverse set of comments.

CHAIRMAN SHACK: Right.

MS. WESTON: Which give you a broader view of, and then you can consider which of those you want to use and which of those you do not wish to.

MR. BARANOWSKI: I was wondering if I could follow-up a little on Tom's comment there. The expert panel, I don't believe, is going to be asked what do you think the threshold should be?

MS. WESTON: Right.

MR. BARANOWSKI: It will be more along the lines should we use some 95th percentile parameter?

Should we take into account the fact, when we look at the total safety measure, that this is some limited amount of risk? It doesn't include all external events or fires or something like that, and how should we cut that down?

MS. WESTON: Yes.

MR. SIEBER: Well, I think if you do it that way, which I think is a good idea, and document it well, then you're going to have a good paper trail that can be used in the future to determine exactly what it was you intended when you put together this program. So, you know, that sounds like a pretty good way to do it. Otherwise, if you just say to the expert panel come up with some thresholds, I am not exactly sure what it is you're going to get.

MR. BOYCE: Yes, I agree, I agree.

MR. RASMUSON: No, I agree.

MR. SIEBER: That's why one of the reasons why I'm concerned.

MR. BOYCE: We would not be tossing this problem to them. We would be giving it our best shot.

MR. SIEBER: Well, it depends on who the expert panel is. Some experts are very willing to give their opinion.

MR. BOYCE: We'll welcome yours as part of

the panel.

MR. BONACA: The issue of feedback to the ROP was raised before, and I just was wondering if you are going to have some kind of a check done before, you know, you come up with the final Commission paper regarding the effectiveness of an indicator of this nature in trending such that you would have the ROP that would be successful, and then define these trends before they occur. Some reconciliation there.

One of the reasons is that take, for example, the ROP has a limited number of initiators that you're tracking, although, one of them is a number of scrams, which may occur for different initiators. But here, you have an index that includes multiple initiators. I was trying to understand how you are going to do that kind of reconciliation back to the ROP.

MR. BOYCE: It's a good question, and we weren't thinking of developing indicators of regulatory effectiveness. Most of the -- in fact, all the indicators you just cited correctly are outcome measures, how good is performance of industry, and it's a combination of regulatory effectiveness and industry performance.

What we use for measures of regulatory

effectiveness are typically found in budget space and there, you know, the number of license amendments we put out, the number of public meetings that we have held on time as a result of the -- in regards to the ROP, how we completed a baseline inspection, those sorts of measures of regulatory effectiveness.

And we were not thinking of having an explicit tie like that as part of the Industry Trends Program. We would keep that in budget space, which measures outputs, as opposed to outcomes. Rather, our tie to the ROP would be, you know, in spite of what all our output measures are telling us, you know, that we're completing the baseline, we're holding public meetings, are we really still continuing to achieve an appropriate level of industry performance? So it's more of that macroscopic look. You know, our scrams continually go down.

MR. BONACA: I understand. Although, I mean, if you had that adverse trend taking place, you would want to be able to say that the ROP was, in fact, capable of identifying an adverse trend even if it measures different things.

MR. BOYCE: Well, I guess we could make that claim that we know why, you know, we understand why the trend is continuing to go down for scrams, and

so I guess you could say that that tie is there. I mean, I can go back and think about that some more. I told you where we are today.

MR. BONACA: Sure. No, I understand. I just was --

MR. BOYCE: Let me try and think about whether that's a good argument.

MR. BONACA: Yes.

MR. BOYCE: I was going to also say where we were really headed was trying to get out of this program, news you could use down to the inspector, and that's how we were primarily going towards feedback to the ROP, which was to take all the high-level stuff, disaggregate it down to the plant level, perhaps the component level, and then compare individual plants to an industry average. But let me come -- I mean, I will think about what you said.

MR. BONACA: You realize here, in fact, I am not criticizing this. In fact, I think this is quite comprehensive if I look at the initiating events in trending with this index. It simply has more information that you do have with the ROP that you are monitoring there. And, you know, we are still questioning oftentimes the, we say, adequacy of the ROP. I mean, because still it's being on trial, I

mean, it's being -- you know, it's a pretty recent initiative anyway. So to do that kind of thinking process of this back to the ROP, it could be helpful for the ROP.

MR. BOYCE: I understand your point. I can go back and see if I can draw some connection there. Thank you.

MR. BONACA: Yes.

MR. LEITCH: Close to that same issue, it seems to me there is a window of vulnerability here where say, for example, one particular manufacturer of valves is troublesome. If it's real troublesome across the whole industry, the industry trends would, presumably, show that. But suppose it's not enough or maybe those valves don't exist at enough plants to trigger that particular trend, so the industry trend doesn't pick it up.

The other extreme is if one particular plant has a whole lot of those valves and there are chronic failures at that plant, why then the individual ROP program would pick it up for that particular plant. But I guess I am wondering is there a vulnerability to a situation where you may have a couple of these valves scattered among three or four plants, and they are troublesome at all the plants,

but how do you --

MR. BOYCE: A sticking PORV?

MR. LEITCH: Excuse me?

MR. BOYCE: A sticking PORV? Is that what you're thinking?

MR. LEITCH: Yes, well, yes, exactly, yes.

MR. SIEBER: Solenoid valves. Let me expand your question a little bit, because I have a similar concern. The old way they did that was in an LER, you would identify the component that failed.

MR. LEITCH: Right.

MR. SIEBER: It was some kind of root cause analysis, and the LER, from the licensee's viewpoint, was considered not only an LER, but a Part 21 report. And in addition to that, if the licensee told the manufacturer we think your valve is defective, then the manufacturer is required to do that, too.

Now, I believe that the NRC has a trending program to look at individual component failures that would show up in LERs provided the licensee properly identifies it with some kind of root cause, and maybe you can assure me that that takes place or maybe you can say you don't know, but that's -- I understood that's the way it's supposed to work.

MR. BOYCE: I would say I don't know is the easiest way out of that.

MR. SIEBER: I do know that out of LERs things like a brand name solenoid valve, polyurethane seeps where the scrams were identified, they were in the PWRs. They were in the scram hydraulics for BWRs, and so they would pop out that way and the NRC issued information notices with regard to that.

I am looking at LERs that were coming in, and eventually, Part 21s came out that it's not clear to me that our regulatory system is detailed enough to be able to pick out components that maybe experience some generic failure in general service in more than one plant. And the reason why I say that is I don't know. Maybe you can tell me that the NRC does that.

MR. RASMUSON: Our branch looks at performance of valves, you know, but we don't necessarily go down and look at the manufacturer or the root cause of those things. We classify failures a little higher than that.

MR. SIEBER: Right.

MR. RASMUSON: And I don't know what NRR does. Pat, maybe you know.

MR. BARANOWSKI: Well, first of all, they would probably have to be risk-significant valves.

MR. SIEBER: Like scram discharge valves?

MR. BARANOWSKI: Yes, something that would show up.

MR. SIEBER: Right, it would be significant.

MR. BARANOWSKI: With a high Birnbaum or achievement worth or one of the importance measures. They would either be detected through the Reactor Oversight Program on individual plants just because they are of such risk-importance if they are failing.

In the second place that they should show up would be through the generic studies in which we trend valve performance if they are a risk-significant valve. Not every valve is looked at, but if you just take the risk-significant ones, and it wouldn't take that many actually to make the performance change.

MR. SIEBER: Well, I know that it has happened in the past in certain applications. I just don't know that it's systematic.

MR. BOYCE: I won't tell you right now that I know whether it's systematic or not.

MR. SIEBER: Okay.

MR. BOYCE: I know we have an Events Assessment Section that still generates those sorts of looks at things if they notice them as they are doing

their screening reviews, and right now, the Davis-Besse Lessons Learned Task Force told us that there's a large number of recommendations saying we needed to reassess the way we're looking at operational experience.

The current status of that is is that there were so many recommendations by the task force for Davis-Besse that we formed another task force just to respond to the Lessons Learned, and they are looking at the full gamut of what we're doing with operating experience. I don't know where they are or whether they will address this specific issue.

MS. WESTON: They are going to be here tomorrow.

MR. BOYCE: We may have the opportunity to ask.

MR. SIEBER: Yes, well, their actual plan is very, very big.

MS. WESTON: They are doing a presentation tomorrow.

MR. BOYCE: Okay. Well, I know, I mean, in our program, I mean, I know that we have been growing. We started in 2001 and we have been growing at a little bit at a time. We have been working to get down to the component level, because it's part of

that news you can use to inspectors. You need that level of granularity in order to make a difference.

MR. SIEBER: Right, yes.

MR. BOYCE: And we have asked Research to update some of their operating experience studies, which they have done along these lines in the past.

But let me talk to you about resources just a bit. In NRR, there is 1.5 FTE devoted to this and about $300,000, and that is to process all the LERs as well. So the 1.5 FTE is talking to you right now in NRR, and I haven't been able to get around to that stage yet.

MR. SIEBER: A $300,000 man.

MR. BOYCE: I'm looking for my bonus check. But, I mean, I recognize what you're saying. It's outside the scope of the current program is the easiest answer right now, but I recognize what you're saying. I am trying to get to it, so you can get news you can use to the inspectors.

MR. SIEBER: Okay.

CHAIRMAN SHACK: Any other comments or questions?

MR. SATORIUS: No, sir, I apologize. I had another engagement, but I'm back for the end, I guess.

CHAIRMAN SHACK: I think we're just about ready.

MR. SIEBER: Very timely.

MR. WALLIS: I didn't understand some of these trends in these figures here. I mean, you have a trend, which is going down and then nothing happens and it goes up. It doesn't seem to make any sense. It's full of mathematical details. It just looks very strange.

MR. RASMUSON: Well, that is in fitting the -- that is when you go through and you do the particular statistical technique that we're doing, and you're fitting a median line and you're converting that median line to a mean. That is why you have that little shift.

MR. WALLIS: This one where it actually goes up?

MR. RASMUSON: Yes.

MR. WALLIS: Although, nothing is happening?

MR. RASMUSON: Yes.

MR. WALLIS: It didn't seem to make any sense.

MR. RASMUSON: Yes. Which particular graphs do you have in mind?

MR. WALLIS: Let's look at C-16. There is two events. I tried to follow the math and I couldn't see how any math could make it go up over the years, '95 to 2001, when there are no events.

MS. WESTON: Let's see what he's talking about here.

MR. RASMUSON: We are doing points on regression.

MR. WALLIS: Yes, I tried to follow that, but it still doesn't make any sense.

MR. RASMUSON: Which fits the median line to it, then we are converting that median line into a mean.

MR. BOYCE: Cory, can you help? Cory, can you help?

MR. WALLIS: Well, it started up high when nothing was happening.

MR. BOYCE: Please, step to the mike.

MR. RASMUSON: You have to step to the microphone and identify yourself.

MR. ATWOOD: Cory Atwood, I am contractor for the NRC. That line that is plotted is not the median, which would be expedientially decreasing. The line that is plotted, and maybe we should have just plotted the median, but what is plotted is the mean of

the log normal distribution, which goes up as the variance increases. So that increase you see is a reflection of the fact that out at the end of the plot, we have greater uncertainty than we do in the middle.

MR. WALLIS: So if you went on and on having no events, this line would go up some more?

MR. ATWOOD: I believe that's possible.

MR. BARANOWSKI: No, I don't believe that's possible. If you went on and on and there were no events, it would have to come down.

CHAIRMAN SHACK: If you extrapolate from the data that you do have, the curve is going to --

MR. SIEBER: Yes, that's right.

MR. BARANOWSKI: But if you go on for years with no observations, it will come down.

MR. WALLIS: The curve will change, yes.

MR. BARANOWSKI: I'm sorry. I'm not a statistician, but I know that's the case.

MR. RASMUSON: Yes, yes, if we keep adding that data in.

MR. WALLIS: It still looks weird.

CHAIRMAN SHACK: I know.

MR. WALLIS: Any explanation, it still looks weird. So what is the message in the line then?

MR. RASMUSON: Well, that is why we're maybe -- maybe we should have just plotted a flat line across there instead of this one here to show that there is no trend.

MR. ATWOOD: Or a median.

MR. RASMUSON: So that is one of the things that we are considering, how to best display those things, so that they are not -- so we get a message across, but still, you know, get the right thing. And so in this case, it will probably be just we ought to plot the mean, the overall mean there where we show that it's flat.

MR. WALLIS: Okay.

CHAIRMAN SHACK: Further questions? Anybody else have any other questions? If not, I think I'll thank the gentlemen for a very good performance. I thought it was interesting reading the paper. Now, I go back and stretch my statistical knowledge here considerably. But with that, we'll adjourn.

(Whereupon, the meeting was adjourned at 3:51 p.m.)