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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

503rd MEETING

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THURSDAY, JUNE 12, 2003

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ROCKVILLE, MARYLAND

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The ACRS met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, at 8:30 a.m., Mario V. Bonaca, Chairman, presiding.

COMMITTEE MEMBERS:

MARIO V. BONACA, Chairman
GRAHAM B. WALLIS, Vice Chairman
GEORGE E. APOSTOLAKIS, Member
F. PETER FORD, Member
THOMAS S. KRESS, Member
GRAHAM M. LEITCH, Member
DANA A. POWERS, Member
VICTOR H. RANSOM, Member
WILLIAM J. SHACK, Member
JOHN D. SIEBER, Member
STEPHEN L. ROSEN, Member-At-Large

ACRS STAFF PRESENT:

SHER BAHADUR, Associate Director - ACRS/ACNW

RALPH CARUSO, ACRS Staff

MEDHAT EL-ZEFTAWY, ACRS Staff

MAGGALEAN W. WESTON, Staff Engineer

PANEL MEMBERS:

DAVID COLLINS, Engineering Analyst

CHARLES DUGGER, Nuclear Energy Institute

GEORGE FELGATE, Nuclear Energy Institute/ Nuclear Power Operations

CLARE GOODMAN, NRC/NRR

JACK GROBE, NRC/0350 Panel

SONJA HABER, Human Performance Analysis Corp.

WILLIAM N. KEISLER, Nuclear Maintenance Int.

LEW MEYERS, FENOC

THOMAS MURLEY, Safety Consultant

WILLIAM O'CONNOR, Fermi 2

ALAN PRICE, Millstone/Dominion

ASHOK THADANI, NRC/RES

D. TRIMBLE, NRC/NRR

HOWARD WHITCOMB, III, ESQ.

GEOFF WRIGHT

AGENCY EMPLOYEES ALSO PRESENT:

ZENA ABDULLAHI, NRR/SPXB

J. BONGARRA, NRR/DIPM/IEHB

AGENCY EMPLOYEES ALSO PRESENT: (cont.)

J. CAI, NRC/NRR/DIPM
C. CARPENTER, NRR/DIPM
J.F. COSTELLO, NRC/RES/DET
R. ECKERODE, NRR/DIPM
FAROUK ELTAWILA, NRC/RES/DSARE
S. TINA GHOSH, ACNW
JON HOPKINS, NRR/DLPM
LISAMARIE L. JARRIEL, NRR/OD
J. KARA, NRC/RES/REHHFB
MINDY LANDAN, NRC/OEDO
DANEIRA MELENDEZ, NRC RIII/DRP
TANYA MENSCH, NRC/PMAS
JOCELYN MITCHELLE, NRC/RES/DSARE
B. MUSICO, NRR/EPHP
HO NIEH, NRC/ OEDO
JAKE PERSENSKY, RES
T. QUAY, NRR/DIPM
ISABELLE SCHOENFELD, NRC/DEDO
D. SKOEN, NRR/DRIP
DEIRDRE SPAULDING, NRR/DLPM
MARVIN SYKES, NRR/SPSB
HANRY A. WAGAGE, NRR/SPLB
GEOFFREY C. WRIGHT, NRC RIII/DRP

ALSO PRESENT:

ROBERT C. EVANS, NEI

GEORGE FELGATE, INPO

BRIAN HAAGENSEN, PSHA, Inc.

RICK JANATI, PADEP/BRP

CHARLIE JONES, TECHNIDIGM.ORG

STEPHEN KOFF, Cleveland Plain Dealer

DONA MEINDERTZMAN, Winston & Strawn

THOMAS MURLEY, Safety Consultant

NORM PETERSON, Detroit Edison Co.

BROOKE POOLE, Winston & Strawn

SUSAN G. STERRETT, Duke University

ALI TABATABAI, Link Technologies

SPYROS TRAIFOROS, Link Technologies

GREGORY TWACHTMAN, McGraw-Hill

ANDY VOMASTELI, Dominion

MIKE WOODS, Pittsburgh Post Gazette

C-O-N-T-E-N-T-S

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

(8:31 a.m.)

CHAIRMAN BONACA: Good morning. The meeting will now come to order. This is the first day of the 503rd meeting of the Advisory Committee on Reactor Safeguards.

During today's meeting the committee will conduct a workshop on safety culture.

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

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

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

Before I turn the meeting over to Dr. Apostolakis, who is the chairman of the safety culture workshop, I would like to simply point out for those of you not familiar with the conduct of ACRS meetings that typically the most time we assign to any given topic in a day is maybe two hours.

And today we have assigned a whole day to one topic, which tells you the interest of the ACRS on this topic and the importance to the members here of your views. We are looking for insights, and we have I think a well-structured agenda to move us through that.

I simply want to point out we have 12 speakers today, and then we have a lot of questions, I'm sure, from members. So hopefully you'll help our chairman today of this workshop to make sure everybody has a chance to give their point of view.

With that, I will turn it over to Dr. Apostolakis.

MEMBER APOSTOLAKIS: Thank you, Mr. Chairman.

While the issue of safety culture is of great interest to this committee and other federal officials, especially since the incident at Davis-Besse, there has been a lot that has been written about safety culture. There is a vast literature out there on safety culture.

I missed the boat. I still don't know what a good safety culture is or a bad safety culture is, and I suspect that many of my colleagues on the committee feel the same way.

So this unusual workshop, as the chairman said, is intended to give us a better understanding of what safety culture means, the words "safety culture" mean.

So we have two panels, as you know. In the morning we will hear various views on what safety culture is, hopefully what the good culture is, and in the afternoon we will hear about what are good attributes of safety culture, which is a subject of particular interest to us, because we are not here only to try to understand what culture is, we are looking at it from the regulator's point of view.

In other words, maybe the licensees may want to do certain things on their own to improve their culture, but we are looking at it from the point of view of, what can the regulator do to perhaps help the licensees, or monitor certain things, and so on.

As the chairman said, we have a crowded agenda, so I will ask the speakers first to give us a few words about themselves, why are you here, and stick to the schedule, please. All of you have half an hour. I will ask that you speak for about 20 minutes, so we'll have about 10 minutes for questions of clarification.

And then, as you know, at the end of each session we have one hour where we can discuss in a roundtable kind of mode more general issues.

And now I will walk into dangerous territory and ask my colleagues to try to refrain from asking questions --

(Laughter.)

-- during the 20 minutes. I'm willing to be chastised for that.

MEMBER SHACK: Well, I think it's -- I mean, it's just an unreasonable request.

(Laughter.)

It's not done, we don't traditionally do it, and you're asking us to remember to try not to --

MEMBER APOSTOLAKIS: I'm just asking. I'm not directing anybody to do anything.

So with that, we'll start with Mr. Thadani, the Director of the Office of Research of this agency. Ashok?

MR. THADANI: Well, George, I'm here because I guess I was invited to participate in this panel. And I thought probably the best I could do would be to give you a sense of where research has been in the past, and where are we today.

And I'll try to be fairly brief in terms of some of the things that have happened over the last several years, but I do want to sort of capture a sense of what's been happening, not just in this country but around the world. So if I may go to the first chart, the next one.

Today you'll be hearing from three groups from the agency. Certainly, you'll hear from NRR later on about specifics of Davis-Besse. So I will not be going through any details of any of the specific issues.

But let me go back a little bit. It was after Chernobyl that the International Nuclear Safety Advisory Group coined the term "safety culture." And it's documented in INSAG-3, 1988 book, and they call "safety culture" the following. Let me read you a part of it anyway. "Personal dedication and accountability of all individuals engaged in any activity which has a bearing on the safety of nuclear powerplants."

In 1989, the Commission issued a policy statement, and they stated the following, and I'm going to read to you again part of the statement. "Management has the duty and obligation to foster the development of a safety culture at each facility and to provide a professional working environment in the control room and throughout the facility that assures safe operations."

The Commission also later on issued a statement in terms of a safety-conscious work environment, which I believe is a subset of safety culture. But I won't say any more about that, except to note that the Commission again recently asked the staff to continue to monitor what's happening in this area.

Next chart, please.

Soon after INSAG-3 -- when INSAG-3 came out with its definition, or at least the characterization of safety culture, there were a whole range of comments that were received on that. And subsequently in 1991, INSAG-4 was issued, which characterized safety culture as you see -- the definition as you see on the chart.

And, of course, over the years some further refinements have been made and some better focus has been brought to bear on this issue, and these are documented in subsequent INSAG reports.

I'll share with you what I think are some of the -- probably the most important elements. I don't mean to understate the importance of others, but

I think there are some elements that seem to me are particularly important, and I'll go through those.

First and foremost is the commitment of organizations to safety as the most important element. Second, safety ought not to be compromised for profit. Third, there needs to be a strong questioning attitude towards safety. Fourth, and this philosophy must be communicated in all directions, up, down, sideways. I think these are -- in my mind, these are some of the most important elements.

Next, please.

With this sort of bit of background, in the mid-'80s, NRC Research Office initiated effort in the area of organizational factors, and in the mid-'80s published a document called "Organizational Analysis and Safety for Utilities with Nuclear Powerplants." This was sort of an extensive empirical analysis relating mostly to organizational factors.

Subsequently, with the support of Brookhaven, and Sonja Haber in particular -- I know she's here, is going to speak to the committee later on -- was the principal author, published a report called "Influence of Organizational Factors on Performance Reliability." And this was focused, again, on organizational factors, but on data collection and the analysis aspects.

And I recall some of the discussions, and I know George was part of those discussions, how can one really utilize this information? It was work that was not complete, but where do we go at that point? Tom Murley was actively engaged at the time as well trying to see if some of these parameters could be screened to a place where the agency could use them in its decisionmaking.

In the early days, in those days, we used to have what we called "systematic assessment of licensee performance," where we're trying to understand how best to integrate these concepts. The other part that we thought it needed, and George was engaged in this area, was how to bring in risk-informed thinking also in addressing these characteristics.

This led to Idaho holding a workshop to identify factors and assess the technical basis for modeling influence and how one could convert that into some sort of risk analysis approaches and to be able to assess impact of safety culture on plant safety.

About this time we -- the decision was made that this was a very difficult area for the agency to be engaged in, and that it wasn't clear what research was going to really lead to. And so the research was terminated at this point, and the decision was made that we aren't really going to a mode of monitoring what is happening out there.

I won't really go into any of the -- what the industry has been doing, because I know you will hear from the industry. So let me go on to the next chart.

But I do want to say a little bit of the international effort -- I know Tom has been quite engaged, so I'll be extremely brief on these. But I do want to note that IAEA has really been a leader in this area. They published lots of reports. I talked about INSAG is the forerunner. There are a whole bunch of technical documents that the IAEA folks have written.

And they also play an active role in providing service to various member countries when there are issues of -- potential issues of safety cultures and how one might go about doing self-assessments, and so on.

NEA has issued a number of reports. I won't say any more. I actually brought some copies, and I notice Tom has -- he is one of the authors, I believe, of these reports.

But I do want to point out that within NEA, within the Committee for Safety of Nuclear Installations, there is a group called the Special Experts Group on Human and Organizational Factors. And that group has been tasked to take a look at this issue and to see what practical things could be developed, and that group is currently engaged in this area.

And as you know, the NEA and IAEA have hosted a number of workshops, and so on, and in fact last week there was a workshop, and Bill Travers was there, and the focus of the workshop was to look at specific operating events which had implications in terms of safety culture issues.

Next chart, please.

Besides the international organizations, we have certainly been also keeping a look to see what's happening in various countries. And as I suspect you know that several countries are really at different levels of what I would call engagement in the area of safety culture.

In fact, some of the early work that was done by NRC Research, early work by Sonja Haber, was enhanced further and has been utilized by several countries, starting with Canada early on, Spain, also

Ukraine has utilized these approaches. And, as you know, most recently at Davis-Besse this approach has been utilized.

I will not go through what the specifics or what the countries are doing, but, anyway, just to indicate that in some cases they have very specific requirements, particularly in the case of Finland. In other cases, there is sort of what I would call fairly general considerations of safety culture.

Go to the next chart, please.

I've said this before to the committee in other venues, but it seems to me that there is really nothing more important than paying attention to operating experience.

We at the Office of Research took a look at a selected set of events covering the period of 1992 to 1997. We picked 37 most important events, and these events were based on our accident sequence precursor analysis. And we tried to understand the causes. What were the underlying causes of some of these events? And we found some rather interesting insights.

You see some of the -- on the chart some of the drivers. Obviously, the percentages go well above 100 percent, because we don't -- it's hard to try to distinguish at that level as to what the real root cause is. But it was pretty clear that they were driven by some considerations of human factors, if you will.

An interesting insight was some concerns with corrective action programs, repetitive errors, potentially indicative of a number of root causes one can go through. But, again, it pointed out the importance, and I must say I was more convinced once I realized that the events we were talking about themselves were important to begin with.

So I continue to think this is clearly an operating experience. I think he's saying that this is an important area that does need attention, particularly by the industry. And then, I'll come back and say I think regulators have responsibilities as well.

Next chart.

Going into these -- continuing on into these operating experience issues, I suspect most of you are familiar with some of these better-known international events which have relationship to issues of safety culture. You know, Philippsburg had a couple of situations having to do with boron concentration in the tank as well as the level issues.

There was tendency to ignore these irregularities because these were believed to be -- oh, they're not very important in terms of safety, nevertheless. And there was an investigation, and the root causes were believed to be human factors related issues. And, actually, a number of personnel actions were taken at Philippsburg.

Brunsbuettel is this issue of explosion in the hydrogen piping connected to the primary vessel, and again tendency, in spite of some indications of the operator, to continue to operate the plant at power. And it did lead to an inquiry and follow-on actions by the German government.

TEPCO -- I suspect you know a number of issues relating to aging effects and core internals issues.

Dampierre -- during '99 and 2000, they kept having a whole bunch of events. And once they started to dig into it again, they got down to this issue of underlying -- some of the underlying factors were procedural human-related things that we often talk about.

Paks is certainly the most recent one, where you know they -- there has been some fuel failure, cleanup process that they were engaged in, ballooning, cracking, fragmentation, fuel perhaps. And, again, it seems to indicate -- obviously, this is most recent and we don't know for sure what the root causes are, but it appears that there is a lack of understanding of safety. And some actions certainly were taken which led to the situation that they are in. We'll wait and see what comes out of it.

Next one, please.

Let me -- I will not talk about the specific events at U.S. plants except to really note these events seem to be characterized by procedures and processes, issues of commitment, communications, and use of operating experience.

And my own concern -- let me repeat what I said earlier. I do worry about potential for complacency, perhaps taking things for granted. And the whole issue of inquiring mind or questioning attitude I think is really, really critical in my view.

And let me note when I say that, I don't mean just for the utilities industry. I think it applies to the regulator just as equally to have that kind of a challenging and inquiring attitude about the issues.

And let me add to this, it's important to have sound technical foundation. That understanding, good fundamental understanding of safety I think is very important. And this dedication that says that safety really is number one, and so those are some things that in my mind they're critical.

So the question then we keep asking ourselves, well, can we -- and when I say "we," I don't just mean the regulator or research organization. As a nuclear community, can we develop some sort of measures and means to be able to proactively understand what's going on, and be able to take preventive measures before things get much worse? I think there is also great economic incentive to do that.

Well, let me go on to my next chart. I'm trying to stay very close to George's admonition here.

So in conclusion, let me note that, consistent with Commission guidance, we have been monitoring and really looking to see what's happening out not just in this country but internationally.

As I have indicated, safety culture has been an important certainly influencing factor in what has happened and is happening. And that it is important for us, as nuclear -- I will say again as a nuclear community, to understand early, and particularly persistent, signs of deteriorating performance.

And this points to, again, the need for looking for some mechanism, some sort of performance indicators, or some other guidance that one can develop that would be not only valuable to the industry but would also be valuable to regulators in understanding.

And, finally, we are currently taking a hard look -- "we" meaning both the Office of Research and NRR -- are taking a hard look at this information that I briefly describe to you, along with what you're going to hear later on from the staff to see, where do we go next? And we're just in the assessment mode.

Thank you very much.

MEMBER APOSTOLAKIS: Thank you, Ashok.

Any questions for Mr. Thadani?

MEMBER ROSEN: Yes.

MEMBER APOSTOLAKIS: Okay. Steve?

MEMBER ROSEN: Yes, thank you.

Ashok, you had a slide early on on the operating event analysis. The title is "Operating Event Analysis: NUREG/CR-6753." Can we go back to that?

Can we go back to a slide in Ashok's --

the one entitled "Operating Event Analysis" --

MR. THADANI: It's number 7.

MEMBER ROSEN: -- "NUREG/CR-6753." One more, one more, keep going. Oh, go back.

MEMBER APOSTOLAKIS: It was number 7?

MR. THADANI: Yes, number 7.

MEMBER ROSEN: All right. Now, in our handout, you don't have -- it doesn't have the last bullet that's on your slide, and you did not comment on that bullet. Found that the ROP does not identify many of these errors.

MR. THADANI: Yes, this is an issue -- as you know, there is -- and when the cornerstones -- when you get down to it, the whole issue of human errors, and particularly some cross-cutting issues, are a difficult part. It is difficult to see how to capture these. And this is what I was talking about earlier with stepping back, looking to see, what can we do?

Is there some reasonable approach we can come up with which could be used both -- there are two parts. You have the -- industry will do its thing, and I'm sure you'll hear about that from regulators you have. Do you have some mechanism such as indicators that might give you some information?

Second question you have to ask yourself, well, if you don't have indicators, then is there some mechanism such as inspection? Is there something you can do within inspection that will help you uncover some of these problems?

And I'm saying today it's difficult. We're not able to do this, and --

MEMBER ROSEN: At what point on this slide is it the ROP does not now lead us that way?

MR. THADANI: It's not able to capture what I just described to you. That's correct. That is correct.

MEMBER APOSTOLAKIS: On this subject? Because we have Peter, Graham, and I believe, Dana, you wanted to --

CHAIRMAN BONACA: I raised my hand already before.

MEMBER APOSTOLAKIS: Okay. Peter?

MEMBER LEITCH: I had a question on this particular slide, if you want to take me --

MEMBER APOSTOLAKIS: Go ahead.

MEMBER LEITCH: -- while we're there.

Ashok, I was wondering about operating practices. You speak about design practices, maintenance practices, and management and supervisory practices. Are operating practices assumed in some of those other three categories? Or did they fall less than 30 percent?

MR. THADANI: I would ask Jay, just so that -- because I don't know a specific answer to your question. Jake, can you respond to that?

MR. PERSENSKY: Jake Persensky from the Office of Research. This is just a subset of the number of root causes that we did identify in that report. There were some operating events or operating practices that are involved here, but what we were finding in this report was we had like a four-to-one margin for latent errors. Most of those latent errors were in these categories as opposed to the more active errors that you find in the operating experience.

MEMBER LEITCH: Okay. So you're focusing primarily on latent errors here.

MR. PERSENSKY: Well, I did in this particular slide. But it's because the data showed that most of the events, if you go back and look into them and do a detailed analysis, have multiple root causes, multiple human causes or human errors in it. Most of them that we were finding -- like I said, about four-to-one -- were not in the operations but in these other areas.

MEMBER LEITCH: Okay. Thank you. I understand.

MR. THADANI: Graham, you are right. Basically, it is -- it was the latent errors. That was the driver.

MEMBER LEITCH: Thank you.

MEMBER SHACK: Let me ask just a question of clarification here. It says organizational factors contributed, and then it says, okay, here are these work practices and things like that. Is there something I'm missing here? Are these, by definition, organizational factors? Or are we just talking about human errors here?

MR. THADANI: Let me characterize this basically as human errors. I think there is this confusion of language as to what we mean. Let me stick with human errors as the real issue, I think. And there can be certain factors, and they could be organizational, that can drive issues.

MEMBER APOSTOLAKIS: Peter? No?

MEMBER KRESS: I have one on this slide.

MR. THADANI: You have certainly seen the UK license condition number 36, and I think there is a clear connection there.

MEMBER KRESS: I'm glad you are looking at the ASP program, because it's the only place I know who we can measure the importance --

MR. THADANI: Yes.

MEMBER KRESS: -- of safety culture. However, I think what we've done falls short of being quantitative. These are root quantitative, but they're really qualitative.

The question I would have is: this is a view across the board of all the plants, because you're doing it with all of the licensing event reports. And you're looking at significant events in the sense that they have some sort of relationship to core damage frequency.

And my question is: can we quantify that? I'm not really certain that these safety culture events are not well enough controlled by design and the things -- regulations we already have to the extent that they have an acceptable impact on CDF.

And that's the question. Is there some way to take this information and go that next step and say, like in 1.174, how much CDF affect does it really have?

MR. THADANI: I think that's a difficult statement, in my view. Before an event happens, if you ask me to come up with an estimate, I'd say that's a pretty tough call. But after an event happens, I can certainly come up with conditional probability.

MEMBER KRESS: And add them up.

MR. THADANI: Right. And I can come up with conditional probabilities to give me some sense of relative importance. Just the event happened. Whatever happened did happen, so I -- I'm only looking at the conditional part, which is a little easier to quantify.

MEMBER KRESS: Let me give you a followup question, then. Does that now say that if you indeed wanted to have a regulation having to do with safety culture, does that not make it almost impossible to do a regulatory analysis?

MR. THADANI: It would be very difficult to do a regulatory analysis, because if you say a regulatory analysis has to be quantitative, it's tough.

MEMBER KRESS: Well, it does.

MR. THADANI: It is tough.

MEMBER KRESS: That's part of the --

MR. THADANI: Oh, that's an element.

MEMBER KRESS: Yes.

MR. THADANI: But, I mean, it doesn't mean that the agency can't make decisions because it can't quantify certain things. I mean, there are other examples. This happens to be one of those.

MEMBER KRESS: So it may not be possible.

CHAIRMAN BONACA: I have just one question. Your concluding slide, Ashok, twice speaks of the interest of the staff in monitoring, evaluating international activities in developing objective measures that serve as indicators of plant safety concerns.

And then, you also speak about the importance of understanding, and then developing maybe a performance indicator or other regulatory guidance. Have we seen anywhere, you know, in international activities, and so on, some indication of some quantitative measures that are being used?

MR. THADANI: Quantitative measures I have not seen.

CHAIRMAN BONACA: Quantitative, no. No qualitative?

MR. THADANI: Qualitative, yes. But I haven't seen --

CHAIRMAN BONACA: Okay.

MR. THADANI: -- quantitative.

MEMBER APOSTOLAKIS: Any other questions?

MEMBER RANSOM: Just a real quick comment.

It would be interesting to hear the views, but has deregulation in the power industry been a factor in safety culture?

MR. THADANI: I would say that our focus -- there are two parts. Let me address it in two ways. We've been pretty focused on grid reliability issues since deregulation. And we are seeing some -- we are getting some interesting insights. I'll use an example.

We find that the frequency of loss of off-site power has been going down since deregulation. I don't want to give direct connection necessarily either, but observation. And we've also found something else, that because of the -- who is in charge of generation, distribution, and operation aspects, that recovery of off-site power seems to be taking longer, because there are questions of, who is in charge, how long does it take to get the communication issues taken care of?

So I can tell you that we're seeing a few signs, but we're not seeing anything so significant that we ought to be moving quickly. But we're still taking a look at it.

MEMBER APOSTOLAKIS: Okay. Thank you very much, Ashok.

The next speaker is Mr. Dugger of the Nuclear Energy Institute.

MR. DUGGER: Well, thank you very much. And I have some slides coming up, I think.

MEMBER APOSTOLAKIS: Would you tell us a little bit about yourself?

MR. DUGGER: Certainly. I'm currently working at the Nuclear Energy Institute, and I'm on loan as the VP of Operations from Energy Corporation to NEI. And my background is site vice president, general manager, and many manager positions within various plants within Entergy and a few other utilities.

MEMBER APOSTOLAKIS: Okay. Thank you.

MR. DUGGER: I really appreciate the opportunity to come and speak on this particular topic. It's a topic of great import to the industry, and I'm in the unique position to speak not only for NEI but also a little bit for the industry also.

When I was reviewing the panel members here, I think we have a real good opportunity to cover this topic, and we might actually draw some conclusion from it. And with 30 minutes, I think we really have to focus in on what we in particular think is important.

Would you give me the first slide, please? And if you'll click four times, that will -- there we go. There we go.

I'd like to start by making a series of statements that will either -- you'll either agree with or not agree with, but I think it will help structure our walk through our discussion on safety culture here.

The first should be obvious to everyone -- safety culture starts at the very top of an organization. We all follow the leader. If the leader says that safety is important, then it is. If the leader doesn't say that, then it isn't.

Safety culture is a continuous challenge. We can probably all name plants or have been at plants where the culture has slipped. As a site VP, this was a continuous worry. Are we putting enough emphasis on safety culture? Are we just looking at where we have been rather than continuous improvement?

Safety culture is at best a slippery thing. To understand where an organization is on safety culture we really have to look at the entire organizational structure and the underpinnings of management. Is there management engagement? Are they spending enough time in the plant? Is there a strong corrective action program?

What are the performance indicators doing? Do the people in the field know the management team? And the questions go on and on.

We may part ways here, but I believe the industry has done a tremendous amount in the area of safety culture. I believe that safety culture has improved. And at the risk of being accused of looking backwards, the industry has come a long way.

Next slide, please.

I believe there is a place for regulation in the broader theme of safety culture, not so much to regulate culture itself but more the components of safety culture. And then, finally, I don't believe there is a place for direct regulation of safety culture, so let us explore these statements further and see if they stand up.

Next slide, please.

Safety must lead all other goals -- is a very easy statement to make. And I doubt that you will find any CEO or CNO or site vice president that would say anything else. Almost every nuclear organization has a vision statement, and a high-level goal that states safety is number one.

So if this is the case, then we'll never have any other problems with our plants. But we know that's not true.

Although the statement is there, it's how the statement is applied that counts. The way senior management behaves will determine how the organization behaves. And it takes more than just a platitude or a value statement to drive an organization. The values must be demonstrated by management.

Next slide, please.

So let's take a look at a few values. Here are some representative values that one might find in a nuclear organization. On the surface, all of these seem reasonable, and we would probably believe easy to apply. But, again, if that's true, then we, again, wouldn't have any more plant problems.

Next slide, please.

So if high-level goals, platitudes, and values won't by themselves do the trick, what will drive a safety culture? To really get a better view of how a safety culture develops and is maintained, we'd have to take a more global look.

These are not all the things we'd look at, but these things that you see up here give a representative view of what we should look at for safety culture. Communications, alignment, and the rest set the stage for potentially a solid safety culture.

Notice there is no magic here. There is nothing but the way people manage an organization and prepare an organization to perform.

Next slide, please.

So let's start with communication. One indicator of safety culture is how accessible management is to the workforce. Does senior management attend the daily meetings and provide input to those meetings? Are there multiple forums for employees to ask questions and get answers from these people that set policy and have a higher view of the organization?

Does management go out in the plant and get a first-hand feedback on the message they have been delivering? Are people aware of the message? And does management keep trying, through multiple forums, to ensure that message is delivered?

This is not an easy task for an organization that has rotating shift work, training cycles, and other things to contend with. One important aspect of developing and maintaining a good safety culture is management's ability to get out and develop a relationship with the workforce.

Trust and integrity are necessary components to good communication and management. Going out to the workforce in the work areas gives management an opportunity to exhibit the standards and expectations they talk about through demonstration. This adds emphasis to the message and credibility to the management team.

Management must be willing to address employee concerns, and not just the ones that deal with safety but all concerns. That way, when a hard concern does come up that deals with safety or some other contentious issue, the relationship is already developed. Communication is practiced, and there is an expectation and confidence that the issue will be addressed and resolved.

Next slide, please.

In every organization there are barriers to communications. These barriers are sometimes at the supervisor level and often times at other levels. All it takes is someone that doesn't believe the message or doesn't communicate well with the group, and that layer is formed.

This can be cultural from years of the same person supervising a group or from promotions within that perpetuate the same communication problems. Clay layers will prevent the organization from achieving the alignment needed to ensure that the organization has the right view of safety culture.

This is important when trying to educate the organization on certain issues, such as reactivity management. Mechanists, chemists, plant service people all affect reactivity management. And if the message is not made clear and doesn't get through that clay layer and alignment on that issue is not achieved, then a vulnerability exists that could affect safety culture.

People have to understand how they can affect the safety of the plant. Management has to verify that that message has been received. The goals and vision of an organization must be understood top to bottom, and this isn't a case of verbatim repeat back. It's a case of understanding.

Next slide, please.

Continuing with the global look, we can tell a lot about an organization by looking at the self-assessing and benchmarking capability that that plant has done or the utility has done. A strong safety culture requires that a plant look outside their organization to see what others are doing.

Being able to measure yourself against the best helps an organization grow. You have the opportunity to bring best practices back to your organization, as well as share the best practices that you know.

An inward approach to plant management can create a stagnant or declining organization. The plant can be left behind as the industry moves forward. A good self-assessment organization at least will appear to have a good safety culture, but it takes a little more. It's not enough to just go look. You have to act on the information that you bring back.

Management, again, has the responsibility to probe the benchmarking effort and find out what's been brought back. Given that it's good material, then management has the responsibility to drive that change. Effective change management will determine how much of a positive or a negative effect that change has on the organization.

Without good change management, you can almost bet the results will be bad. Good change management can be a whole discussion by itself, so we're not going to go forward with that. But change management is an overall good safety culture aspect and part of what we're talking about here today.

Next slide, please.

The next component of a strong safety culture I would like to discuss is human performance. Back during the '80s and early '90s, we were trying to improve plant performance, and for the most part we're successful by addressing the material condition of the plants, fixing problems that had plagued the industry for quite a while, and reducing outage duration.

The improved material condition and problem resolution could only take us so far. The second great step the industry took was to address human performance aspects of plant operation, and I mean the big operation, not the operations group.

We realized with much effort that we were not training people to be aware of human performance issues. Procedures were not structured correctly. There were traps in maintenance and operational activities that set workers up to make errors.

By addressing these issues and giving the workers the tools to identify traps, we were able to reduce the human performance error rate and learn from our experiences as we went. And we shared those experiences through the industry.

Performance in this area is monitored by several methods that collectively give a picture of human performance. Management presence in the field doing -- performing observations, tracking error precursors in the corrective action program, and tracking errors per number of hours worked are a few of the measures used to map human performance.

Overall, by focusing on the results, we get a pretty good picture of human performance and its effect on safety culture.

Next slide, please.

Of all the indicators the industry has used over the course of time, the industrial safety indicator has given us the best look of what's going on in an organization. Industrial safety is an indicator of how the standards of an organization are accepted by the workforce.

Do people wear their safety equipment? Do they help others in their workgroup remember to wear their protective equipment? Are the number of first aid cases seen as a precursor to greater injuries? Although industrial safety is a small component of safety culture of an organization, it speaks volumes about the internal aspects of the organization.

Before human performance became a focus for the industry, industrial safety was the measure of things to come in plant operations.

Next slide, please.

The last component of safety culture I'm going to discuss is training. One of my favorite leaders in the nuclear industry once told me that if I want to see what my organization and plant will look like in five years, go take a look at training today.

Training is the best opportunity we have as an industry to establish the right expectations for performance, to set the right standards for work, to train people on human performance techniques and generally establish the right safety culture within the organization.

Training has to be the cornerstone of performance at the plant. If training falters or is neglected, the culture of the plant suffers. There are many examples of this in the industry. I'm sure you're familiar with all of them.

Safety culture is dependent on a strong training program, and management must, once again, observe training to ensure the right standards and expectations are trained on. Then, management must observe performance in the plant to ensure the lessons are carried forward into the plant.

Without this verification step, management does not have a good feel for the safety culture of the workers or whether there is a declining trend in safety culture issues.

Next slide, please.

We have discussed some of the components of safety culture and find a common thread throughout. The common thread is the management of the organization. Safety culture is, at best, an amorphous concept. Safety culture requires constant pressure from management with a sensitivity of how change affects the organization.

We can train on the right things, do all of the observations, and track all of the performance indicators just to have safety culture undermined by poor management focus and performance. If management fails to communicate, changes the organizational structure without thought to change management, promotes too often from within, changes the relationship with the bargaining unit, or just generally relaxes, safety culture can be affected.

As a site vice president, I am constantly worried about communications going out to the organization, whether we were changing rapidly enough or not changing fast enough. Without good management awareness of the organization, a declining safety culture can be the result.

Next slide, please.

We discussed some of the ways that we measure components of safety culture, and I hope by now you can see that there are a lot of measures that give a piecemeal look at the safety culture of a station. To help round this out, let me discuss several more that individually do not reflect the actual state of safety culture but that collectively give us a better look.

The general plant performance indicators that we all track as an industry, such as capacity factor, forced outage rate, chemistry parameters, contaminated floor space, give us some more insight into the safety culture of a plant.

Corrective action programs can be sliced and diced to show the categories of errors, precursors, failures, potential failures, procedure deficiencies, and the list goes on. And this all gives us a better view of the safety culture of the plant.

The human performance indicators and how the organization reacts to those human performance indicators give even more insight, and certainly surveys that reveal to us whether a worker will approach a supervisor with a safety issue or not gives us a little more insight.

And the external looks from assessments, visitors, INPO evaluations, assist visits with INPO, safety review committees, and the NRC, help the picture to develop even further. But nothing takes the place of management in the plant interacting with the workers and verifying that the message of standards and expectations has been heard and is practiced for determining the safety culture of the plant and its management.

Next slide, please.

Regulation already exists that monitors the peripheral aspects of safety culture. Baseline inspections monitor the effectiveness of programs on how the expectations of management are met. The oversight process looks at a variety of performance indicators and the trend of programmatic controls. Though not a direct view of safety culture, it certainly monitors the results of safety culture in the organization.

Every inspection looks at the inputs of the performance indicators to ensure that guidance is followed and that accuracy is maintained. Management visits from the region, a tour of the plant, and discuss with workers and management, give another broad look at safety culture. Even the day-to-day observations of the resident inspectors give insight into the safety culture of the plant.

As a licensee, many times the observations from the inspectors gave us a heads-up insight that caused us to redirect the staff to improve safety culture. What would additional regulation do, and would it be effective?

Next slide, please.

I think that safety culture is, thus, best handled through the interaction of the licensee management staff. Flexibility is needed to change management techniques in keeping with the other cultural aspects of an organization. New employees need to be trained differently than the more seasoned employees. Company changes that can create negative aspects on safety culture are best handled through comprehensive change management programs where one size does not fit all.

The NRC and Commission should focus on results and the indicators that exist today. They should look at the various aspects of the corrective action programs, employee concerns programs, and draw a conclusion about the safety culture of the plant.

Root causes can give some insight into the safety culture without undermining the efforts of management to change an organization. Regulation generally sets the minimum standard for performance. Once regulation could be -- overregulation could be detrimental by leading an organization to that minimum standard.

This is a subjective issue that does not play well in our new, more objective regulations that we're moving towards.

The industry has been effective in managing a very soft issue. Performance has shown the improvements. If the results of this meeting are a recommendation to the Commission, then my input is to tell them that rulemaking in this area of safety culture does not make sense.

Thank you.

MEMBER APOSTOLAKIS: Thank you very much. Dana?

MEMBER POWERS: Yes, I've got a question, and I have to admit that I'm not sure how to formulate the question. Okay?

MR. DUGGER: Sure.

MEMBER POWERS: But you began your talk making two important points, and one is that nearly every institution that I know of, not just nuclear powerplants, will assure me in no uncertain terms upon visiting them that safety is their number one consideration, and that that's a lot. If it were true, they would shut the thing down and never do anything. And who is their number one consideration?

MR. DUGGER: You bet.

MEMBER POWERS: And the question, really, then comes down -- is, how does one balance the considerations of safety against all of the other demands on the organization to produce something, and what not. And what I'd like to pursue just a little bit with you, because of your experience, is something specific, and that specific thing that gets mentioned all the time in connection with safety culture is a questioning attitude.

And the problem that I have with a questioning attitude is that it seems to me that if I am an employee of an organization that aspires to a questioning attitude -- and I am -- that it is simply a trap for me, that if something bad happens to me the bumper sticker can be right, you know? That the management will come back and say, "Well, you didn't have a questioning attitude."

On the other hand, if I stop doing things because I start asking ever and ever deeper questions, the management comes back and slaps me around the head and says, "Well, you're not very productive."

So could you pursue that a little bit? I mean, when does a questioning attitude get in the way? And when is it the right thing to do? Or is it simply something that we can only answer after the fact?

MR. DUGGER: You know, questioning attitude is not a tool that is something that we easily understand. As a young reactor operator or building operator, when I was with the Carolina Power and Light System, it was not something that just came easily to me to question why we did things one way or another or why the material condition existed the way it was.

It was something that I had to be trained in, and it was the training that I got through observation of management that helped me understand what a questioning attitude was. And it was through many training sessions and workshops such as this where we discussed the factors of safety culture and how to generate a good workforce and develop a good workforce where questioning attitude really came to play. And many of those were through the Institute of Nuclear Power Operations.

The fact is, or as I see it, that we have to train our workers on questioning attitude, and we do that by being a senior manager or being a vice president or general manager or superintendent supervisor, sitting in meetings and advising and coaching and helping people understand where they should be asking questions, and training them on that questioning attitude.

Otherwise, you know, I can ask questions all day. You know, I can look at a procedure and say, "Gee, why did we write it this way? Why didn't we change this word?" And certainly mechanisms exist to, you know, through a process to change procedures or change words or change process, but that's not productive, and management does have a role to maintain productivity.

But management also has a role in being able to determine when an issue is something they have to respond to or when they tell the person, "That's good insight. Thank you very much," and we'll write up a procedure change document or we'll write a corrective action report and go address that.

We should never turn off our employees from asking questions. We should encourage them to ask questions, but we also have a job to do. And many of the jobs that we do are time-dependent in the industry. When we're running surveillances or performing maintenance activities, some of those activities require close coordination with other groups.

So to head off a lot of that questioning attitude that could occur, one of the mechanisms that the industry has developed -- and it's not just the nuclear industry -- and certainly we didn't get this just -- we didn't just make this up, but we observed it through the aviation industry and other places -- is the use of very good pre-job briefs that cover all aspects of the job from industrial safety to procedures to questions that people have about the procedures, so we can cover all that and get it out of the way.

And sometimes people believe that those pre-job briefs are too timely and time-consuming and, you know, are way too detailed for the activity that's going to take place. But it helps establish that mentoring of the people, and it helps establish the focus of the organization from a safety culture standpoint.

And it allows that individual to raise that question in a non-combative environment before the activity takes place, so that he has the opportunity to get an answer. Many times corrective action documents are generated out of that, procedure changes are generated out of that, mechanisms of monitoring or looking at that activity or change based on those pre-job briefs, and then the activities performed and all of the questions are answered before we get there.

If there's too many questions, that activity will be postponed. That activity will be stopped, and we'll back up and retrench and take a look at what that employee is talking about. They are our best ears and eyes in the plant, so we try to pay attention to them.

MEMBER APOSTOLAKIS: I have a question.

MR. DUGGER: Sure.

MEMBER APOSTOLAKIS: You made a strong argument that also others have made that senior management is really the key to a good safety culture. And I'm willing to go along.

MR. DUGGER: Okay.

MEMBER APOSTOLAKIS: But then I find myself having problems with that. Your slide 14 with the title "Working on and Improving Safety Culture" says nothing about senior management. I mean, if that's the key, why didn't you say anything here? Why didn't you put something in your bullets?

And then, I'll go one step beyond that. If this agency accepts your argument, then we know what a potential vulnerability is. If senior management at a particular facility does not set the right tone, then things will happen. So we know that.

But at the same time, we know that we have to stay away from it, that we are not supposed to regulate management. So are we finding ourselves, then, in the position where we know of a potential vulnerability but our hands are tied?

MR. DUGGER: I think, first of all, addressing the slide that you got exactly the point that I intended from the slide, and you obviously got the fact that I think management is the key to a good safety culture. I don't think your hands are tied. I think there is many ways to address the management of a station and management of safety culture at a station.

Through my interactions with regional administrators through the various reports that we get through the cross-cutting observations that we get in the reports at individual sites, we see comments about culture, we see comments about human performance. So, obviously, this is being observed at some level.

And they are drawing these conclusions based on doing what we do, which is to take a hard look at the corrective action program, to take a hard look at the root cause analyses that are being performed at a station.

And if they're not particularly comprehensive, or there are activities going on at a utility where they're not being identified and rolled into their corrective action program, or that corrective action program is not being timely in resolving those issues, that shows up in the report also, and we may get some type of finding associated with that.

So I don't think your hands are tied at all. I think that your -- I think you have all the leeway you need today to go forward and regulate the industry and push for better safety culture.

Now, obviously, this has been pretty successful to date, with the exception of a few indicators that the performance of the units has been tremendously improved over the past 10 years.

MEMBER APOSTOLAKIS: By the way, on 15 -- just one last point. On 15, you say that regulation is already there, and one of the bullets says inspector observations.

MR. DUGGER: Yes.

MEMBER APOSTOLAKIS: I believe these are not part of the regulations.

MR. DUGGER: I think that can be true, that we get insight from our resident inspectors that are not regulation-driven, and that we value that input. We highly value that input; let me put it that way. That these are people that are in the plant sometimes more often than management, observing in the control room and observing specific activities in the plant, again sometimes more often than management.

And they provide very good insight. If they see something is changing and they can't understand why it's changing, or they see an expectation that's not being met, and they bring that to management attention, that is real value added to safety culture of a station.

MEMBER APOSTOLAKIS: Steve?

MEMBER ROSEN: Let me agree with you, that I think you have -- the industry has been successful over the years in managing this issue in the main. However, it's not the main that we're worried about. It's the outlier. And it's the outlier that we have -- is the reason why we're here today, one particular outlier.

But I think you need to think about your presentation in that sense. One of the ways to do that is to look at the same slide 14, which is about, how does an organization measure safety culture? And how would we measure it to find the outlier? What data would we get to find the outlier?

We are already getting plant performance indicators. We don't get a very clear -- here at the agency I'm talking about, and particularly I'm talking about ACRS. We don't see a clear portrayal of the corrective action categories, and we have almost no visibility of the human performance indicators. So those are sort of bold assertions of mine.

Can you tell us, just for example, maybe for some of my colleagues' benefit maybe more than mine, because I do see these in some interactions I have with people and organizations in the industry, what human performance indicators you think are important, and that we should maybe monitor in a more direct way than we do now.

MR. DUGGER: The human performance indicators that I think are particularly valuable to me and that I would use at a plant are really the -- we monitor errors per number of worker hours, and we look at those errors in various categories. You know, sometimes they lead to a failure, and they're a significant error.

But more often than not they're an error that is a precursor to something else, and it's being able to take the information that you get from those precursors errors and being able to roll that back into the organization that -- where the benefit lies from that. It's not just the indicator and monitoring the indicator.

It just tells you that, you know, you've got .15 errors per 10,000 hours work. And, you know, although that's of some value, that doesn't really help your organization any at all. It's what has created those errors, and what you do with that information, that counts.

So if you're seeing a lot of errors, particularly in procedure compliance or people are suddenly making valve manipulation errors, or something of that nature that is -- does not create a real plant problem, but is a precursor that could create a plant problem, then that's something worth monitoring and worth measuring.

MEMBER ROSEN: So now in our three-part communication, I've asked you a question, you answered it by saying errors per number of worker hours, is that correct?

MR. DUGGER: Errors per number of worker hours, that's correct.

MEMBER ROSEN: Now, that means that we should see that in some way, or the agency should see it and report to the ACRS when we ask about how a plant is doing, but we don't. I think that's just a useful thing to think about.

MEMBER APOSTOLAKIS: Okay. Any other burning questions? Thank you very much, Mr. Dugger.

MR. DUGGER: Thank you.

MEMBER APOSTOLAKIS: The next speaker is Dr. Murley. Tom, you have a lot of slides. Do you want to go over -- okay.

DR. MURLEY: No. There are far too many slides there, and I'll just go through --

MEMBER APOSTOLAKIS: So what qualifies you to be here?

(Laughter.)

DR. MURLEY: I have lots of free time.

(Laughter.)

MEMBER ROSEN: We question your judgment to spend your free time here.

(Laughter.)

DR. MURLEY: For those who don't know my

background, I retired from the NRC staff in 1994. I was Regional Administrator in Region I from 1983 to 1987, and that's where I formed a lot of my original ideas about -- it wasn't called safety culture then, but that's what it turned out to be.

And then, from 1987 until 1994, I was Director of Nuclear Reactor Regulation, worked closely with Ashok at that time.

I'd like to start with -- I have thought deeply about this issue for many years, and so I'll share my thoughts and how they arrived.

As Ashok Thadani said, the INSAG, the IAEA expert panel, in 1986 mentioned safety culture, but they didn't really define it or talk about it very much. And I was at an IAEA conference in 1988, and Herb Kouts was there. I was in the audience. Herb Kouts was talking, and some Russian members asked Herb, what did you mean by "safety culture"? Because he was on the INSAG at that time.

And Herb said, "I don't know." And then he turned to me and said, "Tom, what do you think?" And I hadn't really put my thoughts together, so that got me to think about and put my thoughts together. And in the next year, 1989, was the first regulatory information conference.

And I led off the conference with a paper titled "Developing a Safety Culture," and that's the first time I know of that anything was written on just, what is safety culture? What does it mean? What are some attributes? And it stemmed, as I said, from my experience as a regional administrator in Region I.

And there's one interesting chart from that talk that I gave that I thought I would mention to you. I call it the Plant A/Plant B comparison, and it became moderately famous among the staff about -- because it illustrated, what do we mean by two different cultures? And at the time, for example, plant-specific simulators weren't required, and some utilities didn't have them.

And there's a lot of attributes on Plant B that we saw every day at plants in that era. And, likewise, we saw attributes of Plant A, and they were very mixed. And the point I made at the conference was most of these plants meet NRC's regulations, still do probably, except for the simulator.

And the point I wanted to make was that they're not equally safe. That's self-evident. We didn't know how to quantify it. We didn't know what to do. But this started the dialogue about how one should look at safety, and particularly the regional inspection staff found this chart to be very interesting. I went to each of the regions and talked about this concept.

Okay. That was 1989. The nuclear industry was not very comfortable with that concept back then. I wish they were as enlightened as Chuck was just now in his discussion, but they weren't. And the Commission, in fact, was not easy with that concept, and at a Commission meeting the staff was told in so many words, "Don't use that concept." In fact, I was told, "Don't even use that language."

So safety culture then went by the wayside. It wasn't in our regulations. We didn't need it. We did -- we looked at many of the attributes that were on these Plant A/Plant B kind of things, but within the context of the current regulations at the time.

The IAEA continued with their effort. They put out a number of booklets on developing safety culture. The Swiss Regulatory Agency, in 1997, put out safety culture in nuclear installations. Whole forests have been developed or lost to writing about safety culture now.

And even INPO has reports that touch on

safety culture. And I was very pleased to see that at the December 2002 INPO CEO conference Chairman Meserve talked about safety culture in an NRC perspective. So at long last, safety culture is back from the graveyard of forbidden lexicon in this country, and oh, be still my heart.

(Laughter.)

I am pleased to hear that.

The way I got back into this topic, George, was that the Nuclear Energy Agency in Paris, OECD, has a committee on nuclear regulatory activities, which I'm sure you know. Sam Collins represents NRC.

But there are senior regulators from all agencies of OECD countries. And in 1998, I was asked to be the facilitator of a report, a task group, and write a report on regulatory approach to safety culture issues. And that's what I'll talk about today.

And you've got the pamphlets in front of you. There's two of them. The first one was the role of the nuclear regulator in promoting and evaluating safety culture, and the second one was, what happens if you don't have a good safety culture?

Steve's point about the outlier, you're

exactly right. If we could go by averages, things would be fine. But it's the outlier that can cause accidents in this country.

The ideas in these booklets are from many people in the task group. They're not only my ideas. I wrote the pamphlets, and I agree with them, but it was approved by the full CNRA and it is, in fact, a Nuclear Energy Agency publication. And I don't speak for NEA or CNRA. The reports speak for themselves.

CNRA members were generally agreed that regulators could not regulate safety culture directly. In other words, that was a premise of writing these reports, what was behind it.

Ashok has mentioned license condition 36 in the UK. I've looked at that. I've talked with people, and it's really just a small, tiny part of safety culture.

Main themes in the reports are, I would say, four. One is that safety culture is essential for safety. Second theme is, how can you promote good safety culture? How can a regulator promote good safety culture? These, by the way, are written for the regulator.

I think anybody can find them useful to read, but they're aimed at the regulators of OECD countries. And in that sense, they're unique. Most of the other reports you find on safety culture are, what are the attributes, and how can you develop those attributes? This is different.

A third theme is, how can a regulator look for signs of a weak safety culture and the signs of declining performance that flow from a weak safety culture? And then, finally, a theme is, what are appropriate regulatory actions to take to intervene before declining safety culture leads to actual safety problems?

So that's the background, then, of these reports.

I'll zip through a few slides, George, and then I'll --

MEMBER APOSTOLAKIS: That's fine.

DR. MURLEY: -- stop and ask questions.

We know now that a good safety culture is essential for overall nuclear safety. I suppose there's still some debate about that, I don't know, but I'm very encouraged to hear my colleagues here at the table talk about the recognition of the importance.

The regulator has a role to play in all of this, because the relationship between the regulator and the operator can influence an operator safety culture either positively or negatively. I won't dwell on that. It is discussed in the report. The safety regulator has to have its own safety culture. Imagine that.

NRC has no other job but to be worried about safety, and yet it's nonetheless important that NRC have a good safety culture. And it's not a given. That is, it's not all that matters, if that's the case.

Regulatory body should set a good example in its own performance. Technically competent, high safety standards, good judgment, and deal with operators in a professional manner. If that -- those are essential, it seems to me. If the NRC or any regulator is going to hold an operating company, a utility, to high standards, they've got to exhibit at least these minimum standards themselves.

And here again, we list some attributes of a good safety culture. Other people can speak better about these than I can, I'm sure, but I think they are generally accepted now. Most pamphlets that I read, most reports I read, talk about some combination of these attributes. And Mr. Dugger's slides had many of them in there as well.

But I do agree with you, Mr. Chairman, that it's -- even though you can write the attributes down, it's not easy to go in and look and say yes or no. And that's why I think at the end of the day there was not -- there was no consensus that one can really regulate safety culture, because it's so -- to do it even approximately correctly, a regulatory agency would have to be so intrusive that they would almost take over operation of the plant.

That's my view, I think, and that's why if we could regulate safety culture I would like to do it. But I don't think it's practical.

So a large part of these booklets has to do with -- if you can't do that, what can you do as a regulator? And there are many things. You can look for signs, and there's whole pages in here discussing, what are some signs of possible weaknesses in safety culture?

This is the model that these pamphlets are based on. Namely, that if a weak safety culture exists, then that will lead to declining safety performance, and that, in turn, will lead to safety problems. And that it's not as clean-cut as these boxes indicate, but you can intervene at either stage here.

And it depends, really, on the philosophy of the --

MEMBER APOSTOLAKIS: Which stage is that -- you said "either stage."

DR. MURLEY: You can intervene either here, George, or --

MEMBER APOSTOLAKIS: Oh, okay.

DR. MURLEY: And that means you have to look for signs of safety culture.

MEMBER APOSTOLAKIS: Yes.

DR. MURLEY: Or you can wait until that manifests itself in declining performance. These are easier to recognize.

MEMBER APOSTOLAKIS: Right.

DR. MURLEY: That chart shows regulatory intervention at this latter stage, but it can be done at either stage. And it -- the books discuss how one might go about that.

MEMBER POWERS: Don't we do it the other way around? That when we see either safety problems, an event occurs, or we get some massive information about declining performance, many events occur, small events occur.

DR. MURLEY: Right.

MEMBER POWERS: But then we conclude there must be a weak safety culture?

DR. MURLEY: That's usually how it works, yes. But it doesn't have to work that way. One can look -- again, I don't want to go into all of the details, but you can look and find weak ALARA programs. Postings around the plant aren't very good, sloppiness. You can look for those kinds of things and then try to put them together, and you don't have to wait for events, even small issue events.

Now, I recognize that's tricky. That makes the regulator very intrusive, but you can do it.

MEMBER POWERS: No, I don't think you can. I mean, if I come in and I say, "Find something that I, as an observer, find is weak" --

DR. MURLEY: Yes.

MEMBER POWERS: -- and there's no tech spec or condition of operation I can write up against, I can't say anything about it.

MEMBER SIEBER: No, you can't.

MEMBER POWERS: I have to find something --

DR. MURLEY: Yes.

MEMBER POWERS: -- you could write up against.

DR. MURLEY: Yes.

MEMBER POWERS: And if I can't find anything, there is --

MEMBER APOSTOLAKIS: Evidently, that's not the way it works, Dana. We were told yesterday at -- Tuesday that -- and I think Mr. Dugger confirmed it, that the regional staff can bring up issues that are not necessarily in the regulations, and the utilities are usually very -- always responsive.

MEMBER POWERS: I can bring up anything I want to. I can't write it up.

MEMBER APOSTOLAKIS: And they can write it up.

DR. MURLEY: That's true. Maybe some people in this room might recall my days as a regional administrator, but I didn't feel --

MEMBER APOSTOLAKIS: No.

DR. MURLEY: -- particularly constrained.

MEMBER APOSTOLAKIS: We have letters that they do write it up.

DR. MURLEY: Yes.

MEMBER APOSTOLAKIS: They do write it up.

DR. MURLEY: You can take enforcement action.

MEMBER POWERS: That's the whole thrust of the ROP. All those Level 4 findings are now disappearing.

MEMBER APOSTOLAKIS: There is a lot going on with the first column of the ROP that we were not aware of, a lot, and we --

MEMBER POWERS: We can discuss it later.

MEMBER APOSTOLAKIS: -- we will, yes.

MEMBER POWERS: But how many regions have we been to? How many inspectors have we talked to that say, "I'm curious about this. I'm bothered by this. But I can't write anything up because I can't find a regulation to write it up against, or it doesn't make the ROP"?

MEMBER APOSTOLAKIS: That was not a message we got the other day. Maybe things have changed. I don't know.

MEMBER POWERS: But it's the message we've consistently gotten from now four regions.

MEMBER APOSTOLAKIS: Not from Region I.

MEMBER POWERS: This is a recent visit to Region I. We've been to Region I before, and we got an earful. I taught a class in Region I the other day, and I got more than an earful on this.

MEMBER SIEBER: My experience is more on the line of Dana's otherwise. When things are written up in your report, they're based on a regulatory requirement.

MEMBER APOSTOLAKIS: Yes.

MEMBER SIEBER: On the other hand, briefings can be further afield.

MEMBER APOSTOLAKIS: Is there a regulatory requirement that we could take a correction -- a corrective action now? It has to be effective, and the same thing should not happen a year from now? I don't know that there is a regulation, and yet I have six letters here to the vice presidents that point that out.

So things have changed, it seems to me. People do write up things that -- but I think we're getting away from -- we are interrupting Tom too much.

MEMBER ROSEN: I want to interrupt to ask you a question about this slide, because to me it's -- the way you've portrayed it is simply not good enough. The endeavor we are engaged in here, the safety of -- the public's health and safety, and reasonable assurance thereof, seems to me not adequately served to allow declining safety performance before a regulatory intervention. So that leads me very quickly to the question of detecting weak safety culture.

MEMBER APOSTOLAKIS: I think, Steve --

MEMBER ROSEN: And that declining safety performance is a slippery slope whose slope you don't know. It can be much steeper than you think. And, therefore, I'm over on the left-hand side trying to intervene based on a weak safety culture, before the signs of declining safety performance are evident to everyone.

And I think you said it could be done. It's hard, you said, but some things that are hard are worth doing.

DR. MURLEY: I didn't want to get into it, because it's -- but one can take regulatory actions earlier when you've got change conditions that indicate they may be a weak safety culture. Again, I have to refer you to the pamphlet, because it does acknowledge that, Steve, that there is the possibility of regulatory intervention early. It depends on what the regulator wants to do.

MEMBER APOSTOLAKIS: Your previous slide, Tom, was really very interesting. But I think you need to massage your words a little bit. Let's go back to the previous slide.

DR. MURLEY: Yes.

MEMBER APOSTOLAKIS: For example, in the first box, weak safety culture. I mean, you are not really -- you don't mean the whole culture. You are identifying weak safety culture attributes. I mean, no licensee would be, you know, bad at everything. I mean, that would be an extreme case.

But you can identify, like you said earlier, ALARA and other things that you pointed out. And declining safety performance, yes, is really a red flag for us. I would say if -- I don't know how familiar you are with the action matrix of the revised oversight process. This really you have to be on the left, the licensee response column.

CHAIRMAN BONACA: But this doesn't say declined 70 -- it says declining. So there is an implication of a trend --

MEMBER APOSTOLAKIS: Yes.

CHAIRMAN BONACA: -- and some intervention somewhere in that trend. So, I mean, if you are still at a level where you cannot perceive any decline in safety performance, and you want to intervene, I think it's an impossibility. It means that you don't have enough indication to even see it.

So I think you have to take it -- you know, is not really -- there is a continuum there, the way I see it from --

MEMBER APOSTOLAKIS: And also, we have to understand better what regulatory intervention is --

DR. MURLEY: Keep in mind, I wrote this for an international --

MEMBER APOSTOLAKIS: Yes, I --

DR. MURLEY: -- group.

MEMBER APOSTOLAKIS: -- appreciate that.

DR. MURLEY: And they don't have the same system as NRC does.

MEMBER APOSTOLAKIS: That's right.

DR. MURLEY: By far.

MEMBER APOSTOLAKIS: I know.

DR. MURLEY: And so these are kind of generic terms.

MEMBER APOSTOLAKIS: Yes, yes.

DR. MURLEY: To illustrate the concept.

Well, I'll move on, and briefly the -- it talks about periodic safety assessments that a regulator can do. It talks about early signs of deteriorating performance. Now you ask, what can they be? And there's whole pages in these books that describe specific examples of deteriorating performance in each of these areas that a regulator can look for.

And not only was I a former regulator writing this, but there were many, many very good experienced people on this task force. Sam Collins I mentioned. Roy Zimmerman was on it for a time. And people from the UK, from France, from Sweden, Germany, so it had a lot of good, thoughtful input to it.

MEMBER POWERS: I guess I'm struggling a little bit. I look at that list, and I look at dominant -- risk-dominant accidents, and I don't see much of a relationship between the two.

DR. MURLEY: Well, there are. That is, these have to be pegged to safety and regulatory requirements. I mean, they have to have a legal foundation, and that foundation has to be safety.

On this one chart, I don't have room, Dana, to go into --

MEMBER POWERS: Well, I'm sure of that. But what I'm asking you is suppose my documentation was abysmal, like it typically is on the -- their design basis for fire protection. That doesn't affect -- it's not evident to me that that affects the incidence of fire at a plant.

DR. MURLEY: It may not. And I don't think you would take any single item like that by itself. But you would look at every one of these areas -- the idea is you would -- the inspector would look for a whole sign of attributes in the operations area -- I mean, just to give you -- in the reports, each one of these items has a whole list of specific examples -- valve misalignments, electrical/mechanical system misalignments.

And what an inspector does is look for instances of this, and then they put it all together. I don't know, have any of you ever heard of SALP?

MEMBER POWERS: Yes.

(Laughter.)

But usually with some derogatory adjective right before it.

(Laughter.)

DR. MURLEY: It's a cromagnum concept.

(Laughter.)

MEMBER APOSTOLAKIS: Isn't that, though, an important dimension to this that perhaps we are not emphasizing enough? I mean, we will always find errors in operations or in procedures, or whatever.

DR. MURLEY: Sure.

MEMBER APOSTOLAKIS: I'm really interested in whether these are systematic and they are, in fact, a cause for common failures -- common cause failures. I mean, that really should be the driver here, because --

DR. MURLEY: Yes.

MEMBER APOSTOLAKIS: -- it's the same thing with the list of causes that Ashok put up there. Yes, I mean, I can look at particular human action and find the causes and say it was this and that, and that -- but what really worries me is that if the next one has the same cause, and the next one, I mean, it's really the dependencies that are created by these things that give them importance, not the fact that you have individual lapses in judgment.

And this is not really emphasized enough in the documents that I have seen, not just the NEA, but in general this aspect of potential common cause failures. What is your view on that? Or is it implied by what you are saying?

DR. MURLEY: It is partly implied, George, but I don't think enough careful thought has been given to the particular vulnerabilities to common mode failure that -- to my mind, a poor safety culture is the granddaddy of all common mode problems in a plant, because it cuts across -- I mean, just go back and look at what happened at Chernobyl.

I thought it was very insightful for INSAG to use the term "safety culture," but it -- because that's the thing that caused people to run the test in the first place, to keep running the test or planning the test when they shouldn't have, to shut off ECC systems. What is the common theme to that? And it was the attitude of the people at the plant that allowed them to do that, which was safety culture.

But other than that, I don't know that a lot of regulatory inspection thought has been given to focusing particularly on common mode --

MEMBER APOSTOLAKIS: Ashok, you want to comment on this?

MR. THADANI: Just a brief comment. I think I completely agree with the point you're making. In the end, that's really what you ought to be concerned about. What we were trying to search for, and if we get back into this area -- and I'm speaking for Research now -- was can we -- valve misalignments, or whatever. Pick some examples.

Can we point to the causes? Are they coming from improper maintenance of components, if you will? Can you integrate the information that you are looking at and move it up to say, "Well, perhaps the issue is maintenance training."

MEMBER APOSTOLAKIS: That's right.

MR. THADANI: And that's what you're after in the end. It's not the individual problem. It's the collective impact of those problems on what could go wrong down the road.

MEMBER APOSTOLAKIS: Yes.

MR. THADANI: And that's really -- and I personally think that we have -- "we," again Research -- has not done a very good job of articulating how some objective information could be collected, analyzed, and translated into what could really be important in terms of safety. You can apply that same thing to training of operators, if you go to root causes and move up and integrate that information. And that's really the area that at one point we were interested in pursuing.

MEMBER APOSTOLAKIS: And my point -- I know that you guys believe that, but my point was that in the literature on safety culture, this is not emphasized enough, that you are not really looking for an individual error. You are really trying to see whether there is a systematic problem.

MR. THADANI: Yes.

MEMBER APOSTOLAKIS: Which, of course, is consistent with what Mr. Dugger told us about senior management, and so on, because they set the tone.

Okay, Tom.

DR. MURLEY: I will close, Mr. Chairman, with just these thoughts, then. It's very difficult

-- and, in fact, the conclusion of the CNRA, when they -- when we wrote this report and when they approved it, was that you can -- a regulator cannot regulate safety culture as an entity like that. But that doesn't mean that regulators are helpless.

MEMBER APOSTOLAKIS: Right.

DR. MURLEY: There are many things they can do, and these are some -- what was proposed was a graduated approach. You do -- where you start to get inspection signs, resident inspectors telling you things. You do special surveillances. You meet with plant management.

And here, Dana, you can go beyond the regulations. Regional management frequently -- I think probably always is not inhibited in saying, "You've got a problem in your radiological control program. Do you know that?" And those things happen all the time, you know, and --

MEMBER POWERS: Yes, sure they do.

DR. MURLEY: You meet with top corporate management, sometimes meet with the Board of Directors, and sometimes have to take enforcement action. So there are things that can be done, not enough time to go into all of those, but I think I've given a flavor --

MEMBER APOSTOLAKIS: No, that's fine. That's fine.

Okay. Any questions for Tom? And we'll come back to these issues, I'm sure, at the end of the panel.

Okay, great. Thank you very much. I will thank the first three speakers.

We'll take a break now until 10:30.

(Whereupon, the proceedings in the foregoing matter went off the record at 10:14 a.m. and went back on the record at 10:32 a.m.)

MEMBER APOSTOLAKIS: Back into session.

The next speaker is Mr. Howard Whitcomb?

MR. WHITCOMB: Yes.

MEMBER APOSTOLAKIS: Please say a few words about why you're here, and then proceed.

MR. WHITCOMB: Mr. Chairman, and members of the committee, thank you for the opportunity to share my comments on the understanding of safety culture. I'm a resident of Ottawa County, Ohio, the county of residence of the Davis-Besse facility.

I suspect I'm here today because of my interest in the matters of safety culture. I've asked Mr. William Keisler of the Nuclear Maintenance

Integration Consultants Corporation to share his experiences with the committee this morning. We offer this information in hopes that you find it helpful in framing anything that's necessary towards the future.

Before I suggest the characteristics of an appropriate safety culture, I would like to take a step back and look at where the industry has been. The concept that an appropriate safety culture is a necessary ingredient for the safe operation of a nuclear facility is not new.

Safety culture and its contribution towards the effective material condition management of a nuclear plant has been known for over two decades. It has its origins all the way back to Three Mile Island. The discovery of the seriously corroded reactor vessel head at Davis-Besse in February of 2002 is the most recent reminder of the safety and economic consequence resulting from a lack of genuine commitment to the safe operation of a nuclear reactor.

In this case, the irreparable damage to the reactor vessel head was the result of a deliberate refusal to perform routine inspection and maintenance on a critical reactor pressure vessel component. This is not the first time that the failure to perform requisite maintenance on plant equipment has occurred at the Davis-Besse nuclear plant.

The types of problems recently identified in determining the root cause at the Davis-Besse nuclear plant result from a lack of technical competence and management integrity. A degraded reactor vessel head is only a symptom of the problem.

Subsequent to the loss of the main and auxiliary feedwater event at the Davis-Besse plant in 1985, the Nuclear Regulatory Commission promulgated its findings and conclusions as to why the event occurred in NUREG-1154.

Specifically, the NRC's investigation concluded that the underlying causes of the event were, one, a lack of attention to detail in the care of plant equipment.

Two, a history of performing troubleshooting maintenance and testing of equipment and of evaluating operating experience relating to equipment in a superficial manner. And as a result, the root causes of the problem were not always found and corrected.

Three, the engineering design and analysis effort to address equipment problems was frequently either not utilized or was not effective. And, finally, the equipment problems were not aggressively addressed and resolved.

With respect to specific characteristics of an appropriate safety culture, I offer the following. Number one, an appropriate safety culture mandates the existence of a proactive maintenance regimen for all plant equipment, regardless of its safety classification.

Two, an appropriate safety culture exists when employees are confident that their concerns affecting the material condition of the plant equipment will be expeditiously addressed and resolved.

Three, an appropriate safety culture exists when employees who raise legitimate equipment concerns receive positive recognition for raising those concerns.

Four, an appropriate safety culture exists when equipment issues are timely reviewed by all facets of plant management.

Lastly, an appropriate safety culture exists when plant economics does not indiscriminately interfere with a decision to perform immediate corrective action.

With respect to why some nuclear facilities perform better than others, Commissioner

Zech of the NRC, in the March-April 1988 issue of Nuclear Industry, stated that, "If there is one key, it is what I call leadership involvement -- leadership involvement, with an emphasis on and real understanding of quality."

How far down the organization does the chief executive officer look to find out why his plant isn't operating as well as it should? Through the operators, to the maintenance people, to the technicians, communications is so important. Standardization is important, if the industry is going to survive in our country.

I submit to you, gentlemen, that the necessary ingredients to achieve a desirable safety culture include management leadership, personal integrity, technical competence, personal reliability, and two-way communications.

Mr. Keisler will provide more detail as to the attributes that are necessary.

Thank you.

MR. KEISLER: Culture is not a soft issue in reactor and public safety. It is the most dominant factor. Just as radiological material decays to a lower energy, the same is true of organization personnel behaviors.

Organization half-life is a characteristic that becomes visible when it is ignored. Organization half-life must be proactively managed to prevent material condition degradation if actual reactor and public safety are to be achieved.

The management of organization half-life was first advanced by Mr. Ollie Bradham at the V.C. Summer Nuclear Plant. Davis-Besse illustrates and confirms that organization half-life is the disintegration factor in reactor and public safety that is presently unmonitored.

The lack of safety culture at a nuclear plant does not mean there is no culture. At Davis-Besse, that culture is one of systemic refusal to perform requisite maintenance. Retrospective from today, the Davis-Besse culture has sustained through three management regimes. Approximately every eight years since commencing commercial operations, the Davis-Besse nuclear powerplant has yielded an unacceptable equipment challenge to the nuclear plant's established margin of safety.

The common denominator in each of these eight-year half-life periods is the recurring failure of regulatory oversight to recognize the degrading culture prior to the equipment challenge of the margin of safety. That regulatory failure is not by complacency, nor laxity, nor nuance.

Davis-Besse has a distinctive organization half-life regarding reactor and public safety that must not be ignored. As the nuclear industry postured towards risk-based management, the culture at Davis-Besse was inappropriately not factored. The culture at Davis-Besse, embracing superficial analysis and inspection as well as the systematic refusal to perform maintenance, has always been incompatible with the risk-based management strategies.

The hole in the reactor vessel head, or something similar to it, was inevitable, and the occurrence was anticipated, if not even predicted, as early as 1988. Since 1988, the nuclear industry has deviated from its ethical foundations.

Risk-based management is sound science; I support it. But risk-based management requires a much higher degree of organizational self-discipline than other more prescriptive strategies. The science of risk-based management has truly been misapplied in some applications. Risk-based management can stratify maintenance priorities. However, risk-based management cannot eliminate maintenance.

This fallacy is being articulated from the highest levels of the nuclear industry. This is not so nuanced in the perceptions. The articulations are contrary to nuclear industry experience.

The pinnacle events in the nuclear industry over the years show interactive failure between safety-related and non-safety related equipment. Nothing in a nuclear plant should be allowed to run to failure, not enough lightbulbs. The hole in the reactor vessel head at Davis-Besse is an indicator. It is not simply a statistical outlier.

The premise of operating some equipment by a run-to-failure premise is unacceptable in lieu of proactive maintenance where there is a lack of safety culture, or the culture is those refusals. The run-to-failure mentality affects the managing organization and impacts safety-related and quality-related structure system and components.

Erosion and corrosion are known to be functions of how a nuclear plant is managed. Just as the Davis-Besse reactor vessel head is being destructively examined for the industry, the same level of examination needs to be performed regarding the historical culture of this licensee.

NuMIC's determinations are counterintuitive as to how risk-based management strategies have been implemented to date. Material condition control -- when that becomes the focus as a byproduct of organization culture management, more so than simply systematic maintenance

While human emotion cannot will a pressure vessel's integrity to retain pressure, the fact is human emotion dictates human action. Degradation is a continual, time-related process that challenges material condition.

Degradation always demands that humans perform some actions upon the systems, structures, and components in a timely manner, at a nuclear plant that time constants and material condition degradation are generally longer than inherent organization half-life, creating an impact.

The attributes data of safety culture are identifiable and quantifiable. That's premised on the basis that human performance being the dominant influence upon the material conditions of the plant, then there become cause and effect scenarios between human behaviors and structures, systems, and components.

There was a good deal of work done privately in the late '80s with senior nuclear executives at some of the top-performing plants in this country. And at that time I was a senior consultant at the Davis-Besse facility. Also, I spent 20 years in ASME Section 11 activities, in repairs and replacements, pressure testing, welding.

In fact, I was the initial chairman of ASME 11's working group on replacements. So I have been somewhat involved in the regulatory process over the years, and even the culture changes that occurred within those code-making bodies.

From our work, number one, nuclear safety culture is an integration of moral and technical requisites. Leadership actions promulgate the ethical standards into technical confidence and organization etiquette.

Leadership philosophy and its beliefs -- and its beliefs are purely on how it acts, not what it says -- are the determinant of the resulting organization's culture. It is the personal integrity of executives in leadership that governs a nuclear plant's material condition over the long license life of the plant.

Executive actions demonstrate their core values, and they must communicate from the highest level. And it is people who drive programs and not that programs drive people. Leadership actions more so than statements signal the convictions that earned the management's respect.

The overall margin of safety is a combination of personnel integrity and equipment material condition management. Personnel integrity influences the material condition. Material condition must never influence in personnel integrity.

In an effective nuclear safety culture, personnel reliability profile standards are prevalent throughout the licensee at all organizational tiers.

MEMBER LEITCH: Could you slide your viewgraph up just a little bit, please?

MR. KEISLER: I'm sorry. Is that better?

MEMBER LEITCH: Yes, that's great. Thank you.

MR. KEISLER: Okay. I'm ready to change that one anyway.

MEMBER SHACK: Put it all the way up, as far up as you can. Good.

MR. KEISLER: Does that work? One thing that's key is that the organization recognizes that degradation of the material condition is a function of wear, aging, and culture. This degradation trend over the long license life, it does introduce a continuous dynamic into information management, equipment management, and productivity management that is constantly changing throughout the life of the plant.

Proactive material control is a strategic byproduct of four concurrent managements -- information management, which I think a lot of us can relate to back in configuration control through the design bases -- equipment management, organization management, and productivity management -- all of that integrated.

Organization management is the dominant in the integration of these other three managements. The reason for that, and we've heard it stated -- obviously, I think there is some convergence of thoughts here, just even as we progress from what this simple graphic is showing.

Operations, maintenance, and engineering are enterprise-wide, interrelated functions, and not managed departments. Each function is a subculture in itself that requires obvious and continual executive leadership of personnel and administration integrations.

Organizational feedback from the lowest levels to the executive level is requisite, and it must be continuously sold and acted upon by senior leadership through formal programmatic efforts.

Leadership recognizes that organizational communications from the bottom to the top is the foundation of material condition management.

Data in and of itself is not information. The feedback from maintenance personnel -- and that is maintenance with a capital M, not just in the craft personnel -- throughout the licensee organization is the most critical feedback in material condition management.

Programmatic architectures and procedures for systematic maintenance alone do not inherently deliver effective material condition management over the long term.

What should the ACRS recommend to the Commission? The linkage of organizational culture indicators to the plant material condition indicators is necessary to assure the continued reactor and public safety.

The linkage should be codified in law similarly to the regulation of the maintenance rule. It has already been demonstrated that not all licensees can perform meaningful self-assessment with appropriate resolution.

The ACRS is the only entity with vested interfaces to the Nuclear Regulatory Commission, the

Department of Energy, the Department of Defense, and the Defense Nuclear Facilities Safety Board. The ACRS is the only body that is currently empowered to lead an industry advance towards the establishment of a meaningful nuclear safety culture within both the industry and the regulatory agencies with responsibility for the protection of the public.

It seems that two efforts appear requisite. The ACRS should demand the research, development, and codification of standards which marry organization culture relative to nuclear plant material condition. Nuclear safety culture that delivers an actual margin of safety requires a more advanced integration of the behavioral sciences with engineering and physics than currently exists today.

There is evidence suggesting that the demise of the nuclear industry from its early ethical foundations is at a level of deterioration that could become alarming.

The ACRS, secondly, should demand that a nuclear industry code of ethics be created and formally promulgated through training of all nuclear plant personnel throughout the nation in an effort to begin elevating personnel integrity and reliability to a common standard.

The nuclear industry has drifted into an era where the most critical aspects to nuclear safety from organizational feedback regarding the material condition management are routinely forwarded as anti-company, anti-industry, and whistle-blowing.

This mentality has permeated the ranks of some licensees and the regulators alike to the point where reactor and public safety are now being seriously challenged.

In conclusion, I mention in the research that I had done I had worked -- some people I had mentored under early that brought the first plants in this nation to the top of the world in performance. That did not just happen. There were culture changes that happened then. I started my career with Duke Power Company at Oconee Nuclear Station.

The leaders in the nuclear industry of just one generation removed understood one thing profoundly. No one can make a nuclear plant perform by rhetorical superlatives. Those who set the industry standards understood that excellence is the personification of ideals. Excellence was a single word -- integrity.

The hole in the reactor vessel head at Davis-Besse has illustrated that no amount of science or financial resources can offset those original understandings that had originally garnered the public's trust.

The challenge now before the Advisory Committee on Reactor Safeguards is truly of national and international dimension. It is not unprecedented. The culture change that occurred at the Oconee Nuclear Station between 1974 and 1984 delivered Duke Power Company from the brink of financial default to becoming the first American nuclear plant at the top of the world in performance. Was I witness to that change?

Duke Power's success was achieved from its leadership and organization-advancing technology to address reality. It was not the application of technology to offset leadership. The number one candidate of the ASME International's code of ethics in its nuclear cogent standards policies and procedures clearly states, "Engineers shall hold paramount the public safety, health, and welfare."

The license of a nuclear plant is a contract with the public. The license was issued upon a premise that the licensee continually assure the public that the material condition of structures, systems, and components conform with the design from its fit and function.

Nuclear plants are not cars, nor trains, nor planes. But decades-old comparisons for justifying nuclear safety are of technological naivete now that we have experienced a throughwall breach of a reactor vessel head's pressure boundary.

The staggering energy that is contained in a nuclear plant core must never be underestimated. That is the most pro-nuclear industry statement that can be made in light of the past realities.

The ASME code of ethics states that it is the engineers -- people, not the science -- that shall hold paramount the public's safety, health, and welfare. Culture is reactor and public safety. Culture is shaped exclusively by the integrity of executive leadership. Excellence must be personified.

A senior executive at the Davis-Besse plant once made the following question regarding the Davis-Besse plant. He said, "If my superior tells me that the wall is brown, why should I ask the cleaning lady what color it is?" Sitting here today, that answer is so simple -- and it was then -- you must ask her, because she knows what color the wall is. If you do not ask her, executives can end up with a hole in the head, and that's not a metaphor and it never was then.

Thank you for the opportunity to appear today.

MEMBER APOSTOLAKIS: Thank you very much.

Any questions for these gentlemen?

MEMBER POWERS: I guess there is a question maybe just to explain a little bit on your philosophical approach here. Earlier in your talk you said, "Gee, we shouldn't run anything to failure," not -- shouldn't run anything, any equipment to failure, not even lightbulbs.

MR. KEISLER: Right.

MEMBER POWERS: I think that quotes you. Which I interpreted as saying there's no gradation in your approach here.

MR. KEISLER: No. I said that risk-based management can stratify maintenance.

MEMBER POWERS: Okay. So --

MR. KEISLER: There can be a hierarchial tier to it.

MEMBER POWERS: So there can be a degradation.

MR. KEISLER: Right. But what I think we've drifted into, sir, is that the run-to-failure mentality, because we're -- it's obvious in -- now we know we've had sublicense life of steam generators that ruin your curve and bring it to 10 years out, or 20 years.

MEMBER POWERS: Okay.

MR. KEISLER: That's an obvious component.

MEMBER POWERS: Okay. I was just --

MR. KEISLER: You've got 15,000 valves in a plant.

MEMBER POWERS: You have to have some sort of --

MR. KEISLER: Safety-related numbers and all of these other things --

MEMBER POWERS: You have to have some sort of degradation.

MR. KEISLER: Right. That same degradation trend, though, we've now seen it with a license life of the reactor vessel head going from hundreds of years to less than 25 years, into a function of how you do business.

So when you introduce this other thing, it affects the entire mentality. And you end up with 10,000 backlog valves you hadn't gone to do any leaking on, because it doesn't directly in the PRA show up. Nevertheless, the corrosion that's coming from all of that is going to take you over the edge of the cliff. Does that make any sense, what I was trying to illustrate?

MEMBER POWERS: Yes. I think I --

MR. KEISLER: Because I tried to do with the curved trend that, theoretically, when you put all of the hundreds of thousands of pieces together, there's a single point -- overall material condition. That's that that approximated, and all of these other things come into play.

But I do believe that risk-based management, and particularly in how you do your preventive maintenance program -- to get the biggest bang for the buck, we stay in front of it. Those correlations have to be.

But the one point back that it -- it's what I understood always, and close involvement at that time, almost led to where this body did recommend the maintenance rule, because we talk about tech specs and surveillance tests that are all legislative. In early years, we had people doing no PMs, and some people doing too much PM. We went to reliability-centered maintenance, and a number of other things.

But it came to a point of emotional constrictions where it's not regulated, and that's the organizational discipline you have to perform.

MEMBER POWERS: Another area that you brought up that I struggled with is you pointed out that -- you had a little triangular diagram, and it had the engineering maintenance operations. That diagram is not so pertinent here as the concept.

Each of those areas has a culture, a subculture.

MR. KEISLER: Sure.

MEMBER POWERS: Within an overall culture. And when I look at safety culture by going in and examining each one of those elements, I will find a different safety culture in each one of those. How do I arrive at an overall safety culture from those component parts?

MR. KEISLER: In that case --

MEMBER POWERS: I can think of a lot of addition -- I can take the average. I could take the worst, you know, whichever had the worst safety culture by whatever measure I had for safety culture. And so that's the safety culture I'll ascribe to the plant.

Is there some other additional mechanism that I should be using here?

MR. KEISLER: Well, there was another point I was trying to make. First of all, the function is enterprise-wide. It moves through all of these. But the only thing, you can look at the first bullet under that in -- back in the text.

These interfaces require continuous leadership involvement by executive management. That would be what we'll be hearing characterized all day is their visibility and their interaction. That's a management responsibility to control. And so that you don't have that deviation -- even within the distinct cultures they have different roles that they play. But if you're seeing that as what you start to sense as a culture, it indicates there's a leadership question.

MEMBER POWERS: I always will, though. I mean, only in the ideal will you be able to have uniformity, even across those interfaces. So that if I have -- if I were to have some measure of safety culture, and I would apply that to each of those three elements, I'd get some differences.

This is a really good tool. I don't know what it is, but I've got a really good tool for measuring safety culture. I'll get some difference. How do I get from those examinations of the subelements of a facility a measure of the safety culture for the overall plant?

MR. KEISLER: I think it's like some of the earlier commentary was, that there is a number of things that start showing up because to do an outage well, refueling outages, forced outages, or whatever, it takes all of those departments and everybody working together.

So there are other things that start showing up early on and keep cascading the other way. If it's not truly there, in a way it will continue to deteriorate. But it will manifest in what we could look at -- outage durations, inability to keep schedules, just it will show up in aggregate in some ways that would be symptomatic of I think the condition that you're describing, as I understand it.

MEMBER APOSTOLAKIS: Any other questions? I mean, you also emphasize the leadership -- the importance of leadership, which I believe the other speakers did, too. But that brings me back to my pattern, my question that I raised earlier.

What can a regulatory agency do about the leadership? I mean, we're not supposed to run these plants. But that creates a problem for me because, again, as you correctly pointed out and other speakers did, this agency is charged by the American people with protecting the health and safety of the public.

Period.

It doesn't say, you know, but don't get involved in senior management issues, and so on. It says, just protect the health and safety of the public.

MR. KEISLER: That's ultimately what it's all about.

MEMBER APOSTOLAKIS: Right. And it seems to me that we are all agreeing here that leadership of the plants is extremely important. And yet we are very reluctant to get into that. And do you have any thoughts on that? I mean --

MR. KEISLER: Well, I made --

MEMBER APOSTOLAKIS: -- what do you see the agency doing?

MR. KEISLER: I made a statement in there that in the organization half-lives, and I am intimately familiar with the history of this plant --

THE WITNESS: Right.

MR. KEISLER: -- you will go look -- and I think there's more work to be done, but there was a common theme in each of the half-lives, and that was a regulatory failure to act, even in the aftermath of obvious events, things that occurred that should not have occurred.

There's a mentality being conditioned by that. Those requisites were already there. I think that the labyrinth to protect the public health and safety does exist. What's so perplexing now is this failure didn't happen overnight, and all of the signals were ignored. So I --

MEMBER APOSTOLAKIS: Do you know why? Does anyone know why?

MR. KEISLER: Those signals were there.

MEMBER APOSTOLAKIS: Okay.

MR. KEISLER: And those archives will reflect that even now. I think there is more work to be done, and in the vein, too, that it is that important to where we are as an industry, because there is now -- the entire spectrum has widened. A lot more plants are better, I would agree with that.

But the single event that we're talking about on a nuclear plant can never be allowed to happen. It's not a matter of averages.

MEMBER APOSTOLAKIS: Right.

MR. KEISLER: There can be done. We came to the brink of now -- no airplane crash could ever approximate what might have been, to the point that none of us ever assumed that that could even be there. They didn't assume that people could ignore what got ignored for that long.

So but also again, too, in my mind everything in a plant exists -- its design basis, and that other curve looked at distinct errors, and there was one reason for that. Design and construction startup, HFT, this could verify that we build it to what we designed it to. We can operate it within the bounds.

So there is some maximum level there from the design bases of an overall physical condition, and that's where we start, and say we do have enough history now to know that there is a slow physical decline in aggregate over time. That's what throws the challenge continually to organization.

In particular, aging it forces a different diagnostic technique. It's not just like change the oil filters, do this. We get into passive degradations, the NDE technologies that go -- not every -- I mean, this area is a specialization, and you have to build an organization proactively to have that capability to stay in front of it, because it's constantly deteriorating and coming at you.

And once you get behind it -- I had a farmer once tell me, he said, "It seems like you lose money on a property. If it's down a dollar, you need two dollars to get back even." He said, "I don't know why it is, but it takes three."

Well, you are behind, and you've got to get up front and get your profit money back, too. And once you're behind that curve, it accelerates faster. And I think we've all been disturbed with erosion/corrosion as to how fast it can affect the total plan. You know, and that trend is coming at us at a 25-year interval rather than what we would have thought maybe in 30 to 40 years on a plant, and we've also gone into life extension now. We're already in six-year intervals here.

But I still see it that -- and what the researchers, the people who had led those plants, and we sat down many, many hours trying to figure out why it worked. These other things came out, and the thing was you've got to manage the organization with an intense effort. This isn't a part-time effort. It probably takes 80 percent of your efforts to deliver that byproduct.

And if you just function on maintenance procedures and other things, you will build that wall, but it will be so straight and so tall that it will collapse in the wind. It won't have the integrity that you need to hold that place solid.

That's how I see it. I don't know whether I'm explaining it --

CHAIRMAN BONACA: The question I have is the issue of leadership was recognized from the time of TMI. I mean, that has really led to the formation of INPO. Do you see a role for an industry organization such as INPO or NEI, I mean, to -- you know, in this sense? I mean, where the regulator cannot interfere in the running of a plant? The industry has organizations that, in fact, do monitor leadership and --

MR. KEISLER: Well, I don't think that -- I'm not sure I'm buying completely that you can't do that. I think that's part of the culture drift that is occurring now and that we're hearing, because in the obvious cases that are really in the outliers, like a hole in a reactor vessel.

And we had an indication -- we had the same problem happen at Turkey Point way back. That's what largely influenced Generic Letter 88-05. There was special -- and what you're seeing now in the industry, ASME Section 11, we were all required to attend special sessions of those meetings to look at the physical films of that reactor vessel head.

This is not something new. It got

ignored. That was in, what, '86 or '87. I mean, I sat through those presentations, and what was clear then, because Turkey Point's reliability had increased, and all of a sudden they got into continuous runs that were unprecedented. And I think it was a canopy seal leak that caused that drip, and in that 200- or 300-day run there was a crevice from the top of the vessel that nobody would have ever thought before could have gotten there that fast that deep.

There was a problem on a reactor coolant pump motor stand mount at Rancho Seco that -- with the main closure gaskets leaking, literally eroded four to six inches back up into the motor stand that was invisible. You almost had a structural integrity of the motor to the pump.

MEMBER APOSTOLAKIS: I think we should move on.

MR. KEISLER: Okay.

MEMBER APOSTOLAKIS: And then if we have, as I said, some time at the end of the presentations, to revisit some of these issues.

Thank you, gentlemen.

MR. KEISLER: Thank you.

MEMBER APOSTOLAKIS: The next speaker is

Mr. Alan Price. David Collins, sorry. Now, that was not a systematic error, you understand.

(Laughter.)

MEMBER SHACK: What do you call that, a slip or a lapse?

MEMBER APOSTOLAKIS: It was a lapse.

So tell us a few words about yourself, and then proceed with your presentation.

MR. COLLINS: Okay. Good morning, members of the ACRS and guests.

MEMBER APOSTOLAKIS: Speak into the microphone, please.

MR. COLLINS: How is that? Can everybody hear me now?

MEMBER APOSTOLAKIS: This is good.

MR. COLLINS: Is that good? I work at Millstone, which a few years ago was auctioned by Northeast Utilities and bought by Dominion. The views I express here are my own, and may or may not be shared by Millstone or Dominion.

In the early '80s, Northeast Utilities was considered one of the top nuclear operators in the U.S. By the mid '90s, it was viewed as one of the worst. Like many operators, NU began to aggressively manage costs in reaction to deregulation, preparing for competition. NU did a good job with costs, but not as good a job with culture. This presentation will discuss some reasons why and suggest some tools for measuring and managing culture.

Now, if George thought that Tom Murley had too many slides -- I will be moving fairly briskly, not sharing quite a bit as I go along. And at the end we can go back and review any particular slides people would like in detail.

How about if I -- Slide Operator?

MEMBER APOSTOLAKIS: It's over here.

MR. COLLINS: Oh.

MEMBER APOSTOLAKIS: You're already up there.

MR. COLLINS: Okay. How about if I just raise my hand for the next slide? Okay.

Okay. So why is it important to manage culture? INPO analysis of events says that 70 percent of the most significant ones are related to culture.

Now, how does one go about managing culture? To manage something you have to be able to measure it, and to measure something you have to be able to define it.

Former Chairman Richard Meserve said at an INPO CO conference last year that the term "safety culture" hasn't been crisply defined, and that's really the reason the NRC has trouble measuring it. So what I'm going to talk about is defining, measuring, and managing culture, and along the way what creates it and what destroys it.

Now, defining safety culture starts with defining safety. Ethics is caring about people, and safety is caring that no physical harm comes to people. So safety is a type of ethical behavior. Next we need to define culture.

The simplest definition of culture is -- this is from Edgar Schein -- the way we do things around here. Now, Schein is considered by many to be the gooiest guru of culture. He's an MIT professor. And one of the quotes from him is, "We could argue that the only thing of real importance that leaders do is to create a managed culture." And I think that that's been expressed here many times.

So leaders create culture. How exactly do leaders create culture? By a leadership attitude of ethical management. You can see that safety culture is part of the -- part of leadership culture and part of human performance culture and part of organizational culture. Leadership creates the culture in the other two, and flows from leadership to the other two.

So putting all of this together, we come up with a new definition for safety culture, which is a leadership attitude that ensures a hazardous technology is managed ethicly, so individuals in the environment are not harmed.

Dr. Jonathan Wert, President of Management Diagnostics, says there must be a champion for nuclear safety culture. The chief nuclear officer/president should be that champion. Leadership drives the culture. So what exactly are the tools? What are the attitudes that leadership uses to drive the culture?

The first one is trust, and during most of recovery that was the huge issue. That was basically expressed as the root cause, that the public and the regulator had lost trust that Millstone was operating safely. John Carroll of MIT did a wonderful paper which I just shipped over -- I hope we can find the stuff -- called Managing Change -- or Driving Change in the Midst of Crisis.

And Rickover had a word that he coined called "say-do," which is basically trust, doing what you say. And in Dominion reactor head replacements, I think I read an NRC transcript, they were pointed out as a good example of doing the right thing.

The next value is commitment to excellence. Again, we have Rickover with his rising standards of excellence. We have INPO's excellence in human performance. And Lee Olivier, when he was at Millstone, established a best of the best program.

The third and final one we have is care and concern. The motto of Hugh Kelleher, CEO of Southwest Airlines, one of the only airlines making money I think, is take care of the employees, and they will take care of the company. That was very much an attitude of Mr. Olivier. And Dominion's work-life balance -- Thomas Capps is very big on ethics. He has written about it. James O'Hanlon is another very impressive guy. I think he headed up the excellence in human performance task force for INPO. And Mr. Alan Price, to my right, I think is a good example of that.

So my key concept, third key concept, is that determinants of a safety culture are the leadership-demonstrated ethical attitudes of trust, commitment to excellence, and care. Really, all we're talking about is doing what's right, which is trust, doing your best, which is commitment to excellence, and treating people right. It's really pretty simple.

Now, the most important of these when you

-- an organization needs to adapt to cost-cutting lean production is care and concern for all stakeholders and individuals, which is called an adaptive culture. An adaptive culture is one that maintains a proper safety focus as production becomes more and more lean, and this is out of this strategic management textbook.

It says the outstanding trait of an adaptive culture is that top leadership demonstrates genuine care and concern for the well being of all constituencies.

And the next slide is just basically a rehash of that.

So when we have a safety culture like -- problem like Millstone had in the '90s, where the safety culture failed to adapt along with the cross-cutting, it's usually because of a lack of the care and concern.

So what is it that destroys safety culture? Here we have some words from -- John Beck was told by the NRC to monitor safety culture for a while after Millstone recovery. And he said in his last report, his final report to Millstone leadership, "Never forget that previous management failed so miserably not because they were not intelligent, not because they did not understand clearly what successful economics look like in a competitive environment; they failed because they were arrogant, dismissive, and refused to listen to the issues and concerns of the people who make this place run."

And here are some of the messages that were rolled out by NU leadership in the early -- late '80s and early '90s from the NU CNO. We can no longer -- these are in the general meetings with employees. We can no longer afford to be a Cadillac. We must become more like a Chevy. If it is not absolutely necessary to do something, it is necessary to not do it. We have to do things differently now to be competitive. If you don't like it, there are 100 people waiting outside the door to take your place.

An employee responded at the meeting, "What about company loyalty to employees?" and the CNO responded, "If you want loyalty, I suggest you get a dog."

MEMBER APOSTOLAKIS: Are these in writing somewhere?

MR. COLLINS: These are -- I can go and get you as many, you know, witnesses at Millstone as you want. This is right open in public meetings.

I actually went to a stockholders meeting and asked the NU Board of Trustees, "Where were you guys when all this stuff was going on?" because there were so many reports. And they said they never saw the 14 different reports on the pervasive, shoot-the-messenger attitude with any nuclear organization.

Now, the question is: is this a lack of care on the -- by the trustees, or is this a lack of culture metrics? And I would say that they weren't getting the information that they needed to make the calls.

I have a slide on the same stuff on Davis-Besse, but I'm really not here to discuss it. A lot of other people are going to discuss that, so I'll just move on and come back to it if people want.

Okay. Metrics -- how do you measure this stuff?

Leadership skills. The INPO SER in Davis-Besse says, "Assess that your organization has the leadership skills to maintain the proper focus on safety, and identify long-term, underexplained, abnormal conditions."

Now, Lou Holt says if you want to know if you have a good leader you just need to ask three questions. Can I trust you? Are you committed to excellence? Do you care about me?

And when I started thinking about culture, really, can I trust you just connected with the trust issue at Millstone, and I started thinking about the other ones and I said, "If leadership drives the culture, maybe these are the kind of litmus-type questions that we can assess the leadership culture."

So I went around at Millstone and I asked a bunch of employees these three questions about the chief nuclear officer that we had and about Lee Olivier, who was the officer we had at the time, which most people didn't know Lee felt he had an excellent culture. And without a single exception, the answers were all no for the first guy and all yes for the second guy. So I said maybe these are the questions in our litmus to see if the leadership has the skills to manage a -- properly manage a safety culture.

Now, back to this Venn diagram of the leadership skills. You'll see at the top that the leadership behaviors are really the determinants of the culture. That's what controls the culture. And the others -- the human performance attributes in the culture are the resultants of the culture.

This is John Sorenson commenting on this approach, looking at leadership. He says, "David, I think the idea of using" -- let me back up. Mr. Sorenson wrote this paper, which I consider to be probably the most excellent paper on nuclear safety culture. I don't know how long he spent on it. He did it for the ACRS, and he looked at safety culture methods from all around the world. An incredible paper -- I suggest anybody read it to learn about culture.

But he said, "I think the idea of using leadership culture as a surrogate for safety culture is a good one." And then he goes on to say, "You've laid out a promising approach. I think it has a good chance of advancing the state of the art."

So back to this measuring the determinants. Now, if you look at the second block, body fitness, how do you measure your weight? You step on a scale. But this isn't really information you need to know to manage your weight. The information you need to know are the determinants of weight, which is diet and exercise. So you need to measure and control what you eat and how much you exercise, and the result will be that you'll control your weight.

I'm sorry. Back up to that slide for a second. So it's the same thing. Up here I have leadership behavior, attitudes, as a determinant, and I have the organization culture, latent organizational weaknesses, and human performance culture. And this just sums up the same concepts. Skip that.

Now, where do you get this information on how the culture is doing, both leadership and LOWs? INPO fundamentals, HP fundamentals, say the worker is the best source of information about the weakness of the organization.

Back to John Carroll of MIT, who wrote that paper that I held up a while ago, he says, "Really, the most important thing is to institutionalize surveys and dialogues with workers." And, again, that's the key to effective safety culture management.

Now, what are some methods for measuring safety culture? Now, as far as actually what this is is the different organizations that we have. What is something that INPO could do to help measure safety culture? Well, they could develop approaches for institutionalizing worker feedback.

What I did at Millstone was I ran a sample survey, if I could find it here -- where did that go? Do you have some paper that's blue over there? Oh, there it is. It's a simple survey. It just asks the basic questions. Do you care about me? Are you committed to excellence? Can I trust you? And it does it through the whole worker's food chain, and it basically gives a read to the leaders on his culture.

And it cross-references to lots of the different latent organizational weaknesses that we'd find in the culture. So, basically, it doesn't just say, do I like you or don't like your face, it says, what are the specific issues that I feel I don't -- that the leader is weak on.

Now, methods for managing culture -- we have INPO here promoting human performance leadership and organizational training. I think they have something called the Academy, and they have some wonderful human performance literature on leadership and organization, which really every leader should read.

And the second one is promote training above the chief nuclear officer level. People like Peter Berg of FENOC -- I mean, I think he's a great CEO, but some of the things that he talked about as far as how he -- metrics he was using for culture, he was saying he was using -- how long was the plant online, what was the industrial safety metrics. I think he needs different metrics.

Now, the plant needs to improve leadership behavior through feedback -- somehow kind of feedback by talking to workers, and that survey is a way to do it, improve the corrective action program when there's not enough resources for it and focus resources, and for the NRC they need to monitor all of these things. And also, they need to start using the reactor oversight process performance indicators to flag when there's culture problems.

Here's a quote from reactor oversight from an ACRS transcript from somebody who works in reactor oversight. Mr. Johnson said, "The problem was we predicted," or "we predicated," I should say, "about 15 out of the last four of them. You know, we overpredict." So how do we assess risk without overpenalizing the plants?

I suggest that we could take a look at the type of information that was -- all the plants culled together from the response to the Davis-Besse SER, and here's a sample from the plant I worked at. There's about 70 items. Risk assess those, you could use the EPRI assessment tool, the action matrix, and make a weighted plot of the latent organizational weaknesses for risk on a normal distribution.

And then, the small tail on the right side of the distribution would be that the plants that have an unusual number of these risky weaknesses that haven't been addressed, and the other side of the equation would be plants that don't seem to be reporting them effectively.

So a key concept here is to create -- we need to create an objective risk-based management method, safety culture, and it requires developing a baseline, which requires analyzing latent organizational weakness data from U.S. plants.

That's a summary that you can read if you like. I'm just going to skip through it for now.

And conclusions is that plants need INPO and the NRC to do a better job with safety culture, and corrective action program assessments. My opinion is that Davis-Besse's safety culture is probably no worse than many other plants out there, and that everyone who manages nuclear should be trained in safety culture, both posturing and assessing it, especially above the CNO level.

This is a slide from the ACRS meeting transcript, and it's basically saying that, should we just keep doing the same things over and over with safety culture? And isn't that the definition of insanity?

So concluding remarks is safety culture is really a safety-related system, but it's a human behavioral system, not an electromechanical one like we're used to. So we don't maintain it like a safety-related system, but we should.

This concludes my presentation. I'll be happy to try to answer any questions.

MEMBER APOSTOLAKIS: What did you mean by the second bullet in your conclusion that the Davis-Besse safety culture is probably no worse than many other plants out there. Is there a message there?

MR. COLLINS: Yes, there is definitely a message there. I'm saying that there's no objective way to assess whether the safety culture at Davis-Besse is necessarily the worst in the industry or necessarily represents risk unless we create a baseline on some kind of a distribution of risk.

I think Randy Fast of Davis-Besse said in one of the meetings that Davis-Besse has the best material condition of any of the FENOC plants, and the operators have one of the lowest error rates of any plant in the country. So there's a couple of indicators that don't -- that say that there may not be all that bad a safety culture at Davis-Besse. It may be a localized type thing.

But the NRC has been reporting -- now we have an event at Davis-Besse, and everyone says, well, Davis-Besse has just the worst safety culture that there is. But the NRC has been reporting that the safety culture is acceptable, and the corrective action program is acceptable.

So with those kind of indicators, to someone like Peter Berg at FENOC, how is he supposed to focus more resources on corrective actions if he is getting information from the NRC that says the safety culture seems fine?

MEMBER APOSTOLAKIS: Any questions?

MEMBER ROSEN: I have one, George.

MEMBER APOSTOLAKIS: Yes.

MEMBER ROSEN: David, I just don't understand the slide on -- which gets to the heart of the question for me, the methods for oversight, ROP slide. They don't have any numbers of them, but it's the one with the distribution on it.

MR. COLLINS: Yes.

MEMBER ROSEN: And what you're suggesting we do is analyze some data, these latent organizational weaknesses --

MR. COLLINS: Specifically, this data.

MEMBER ROSEN: -- data which we don't have.

MR. COLLINS: Well, okay. I'm not saying

you have it. I'm saying it exists.

MEMBER ROSEN: Well, tell me more about it. Since I don't have it, I haven't seen it, and, therefore, I don't know what it is.

MR. COLLINS: Okay. This is probably the disconnect between INPO and the NRC. INPO has asked all the plants to do three things in response to Davis-Besse. One is to train people on the event. Another thing is to assess the leadership skills necessary to maintain a safety culture. And the third one is to assess --

MEMBER ROSEN: Is this all in the SOER?

MR. COLLINS: Yes. There's three -- and this INPO guy here, he can talk more about it. And the third one was to assess the long-term issues that are out there, the latent organizational weaknesses.

MEMBER ROSEN: So that when INPO asks the plants to do that, this particular piece of paper is Millstone's --

MR. COLLINS: Yes.

MEMBER ROSEN: -- assessment, and it --

MR. COLLINS: Yes.

MEMBER ROSEN: -- and what kinds of things are there in it?

MR. COLLINS: Well, I don't know if Al

wants me to talk about that or not.

MEMBER ROSEN: Well, I'm not asking -- I'm just asking what are the categories of things.

MEMBER APOSTOLAKIS: The type of things.

MEMBER ROSEN: In Millstone.

MR. COLLINS: It all cuts across the spectrum. The categories of types of things that INPO asks for were long-term unexplained conditions. And some of them will have some risk significance.

MEMBER ROSEN: Those are the LOWs, those long-term --

MR. COLLINS: Yes. Some will have some risk significance, and some won't. And what I'm suggesting is that the ROP already has some pretty good tools for assessing risk, and you can see from that slide that they predicted 15 out of the last four of them. So they get some -- a lot of information on risk. But what do you do with that information? You don't want to hammer a plant, you know, unnecessarily.

So what I'm saying is, by distributing the plants on a normal distribution, a weighted distribution, so it's not just quantity but it's risk significance, and then what you do is you go after the plants that have the worst risk represented by the latent organizational weaknesses, and you tell that plant that that ROP performance indicator is going to stay that color until you put enough resources into your corrective actions program, until you get that down to where James Reason says you get that wheel of cheese that's got those holes in it. You get those holes down in size and number, so that you're back in this distribution where you don't represent an unreasonable risk.

DR. MURLEY: I would just comment, if I could, Mr. Chairman --

MEMBER APOSTOLAKIS: Sure.

DR. MURLEY: -- that unfortunately, David, plants with a poor safety culture would look at themselves and respond to the SOER by saying, "We looked real hard at ourselves, and we're just fine."

MR. COLLINS: That's why part of this -- and I think I go back on this slide, methods for managing, is that the NRC's job would be to monitor how the plant is doing these. The resident inspector would have to go out and say, okay, let's take a look at -- are these people reporting responsibly?

MEMBER APOSTOLAKIS: So this dialogue that you would like to see institutionalized, this would be done by industry groups, not by us.

MR. COLLINS: No, it would be done by the plant.

MEMBER APOSTOLAKIS: By the plant.

MR. COLLINS: They could use this or any type of survey.

MEMBER APOSTOLAKIS: Right.

MR. COLLINS: Something that Dr. Carroll said is this survey is really the least important part of it. The important thing is you initiate the dialogues with the employees, and what's important about a survey is that you ask the kinds of -- the important -- that you ask the right questions.

And the Millstone culture surveys that were done typically had 150 to 200 questions and took about 40 minutes to fill out. This takes about five minutes to fill out. It really only asks three questions of everyone in your food chain. So it's really designed to be administered quarterly initially. And then, if there's no problems, maybe yearly.

So it's not a tremendous resource thing at all for the plant to do. It's not a difficult thing for the NRC to assess. And it's -- something that Edgar Schein said was --

MEMBER APOSTOLAKIS: So NRC will get into this?

MR. COLLINS: The reports, the summary reports. NRC isn't going to do any of this legwork, but the NRC will get the summary reports on the leadership. And all they'll do is watch to see that the leaders that show a bad -- you know, a culture that's substandard or -- will be corrected, where there will be some reinforcement coaching of those leaders to get them above some minimum.

MEMBER APOSTOLAKIS: So are you recommending, then, that this committee recommend to the Commission that something like this happen?

MR. COLLINS: Yes.

CHAIRMAN BONACA: But you said that the NRC will have to monitor that, in fact, they have properly provided --

MR. COLLINS: Right.

MEMBER ROSEN: That's not usual, Mario. The NRC always has to check to see that it's accurate.

CHAIRMAN BONACA: I'm trying to understand how that --

MR. COLLINS: Let me make a quick -- can I make a quick --

MEMBER APOSTOLAKIS: Sure.

MR. COLLINS: A quick comment is I read through a lot of pages of ACRS transcripts on safety culture. One of the concerns that ACRS raised was they don't want to get into -- the NRC doesn't want to get into management's shorts. They don't want to get into the game of managing the plant.

I just wanted to quote something from Edgar Schein. He said, "If you can make a distinction between leadership and management, it's that leaders create the culture and managers live within the culture." So this isn't management. This is leadership that we're talking about, and there's a difference.

We're not just talking about the top leaders of the company either. We're talking about point leadership -- the people who are right where the rubber meets the road, who are right at -- you know, if it was Davis-Besse, the people doing the boric acid control. And so that's the dual message, really, that has to go out. But it's the same thing; it's leadership.

MEMBER APOSTOLAKIS: Any other questions? Last question. I notice that whenever you quoted somebody you included their picture.

(Laughter.)

MR. COLLINS: Not everybody. I'm sorry that --

MEMBER APOSTOLAKIS: Except for Mr. Sorenson, who --

MR. COLLINS: Well, actually, I quote you at the end, too, and I --

MEMBER APOSTOLAKIS: -- who didn't work for us. But Jack Sorenson, he deserves his picture --

MR. COLLINS: Is Mr. Sorenson here? All right. He is quite a guy. A very impressive -- once again, everybody has got to read that paper he wrote. It's really -- it's incredible.

And I apologize for not quoting you, too.

MEMBER POWERS: Let me ask just a question that continues to nag at me. Quite a few speakers have said, gee, these are the characteristics of a good or a bad safety culture, and it was really just an inverse, we'll convert it to the proper adjective. And if you look at these things, you'll decide what kind of safety culture you have.

But then, Mr. Collins, you pointed out that Davis-Besse had a superb material condition, few operator errors, which one or another speaker or various authors have characterized poor material conditions as indicative of a bad safety culture, and high operator errors as indicative of a bad safety culture.

What I never see is something quantitative that says, oh, I've measured these characteristics that I think are indicative of a safety culture, and indeed when I compare that to the event rate at this plant, there's some sort of a positive correlation.

MR. COLLINS: You want something quantitative on Davis-Besse?

MEMBER POWERS: And what I know from Mr. Sorenson's work is that he did find within the chemical industry some characteristics of plants which had a positive correlation with some measure of events. But I never see the corresponding thing for the nuclear industry.

MR. COLLINS: Okay. Let me -- I can sketch it out real quick for you. I'll just go back to a slide. This is a slide on Davis-Besse that I just skipped over and said if you want to come back to it we can, but I can give you an idea of what kind of quantitative analysis we can do to come up with the safety culture for Davis-Besse if you want.

MEMBER POWERS: Well, that doesn't help me very much.

MR. COLLINS: No? Okay.

MEMBER POWERS: Because the going-in assumption is that Davis-Besse had a poor safety culture. Okay? And so we'll find a correlation between something. I mean, you can look around and you will find some correlation.

What I'm looking for is a plant that has not had an event that you can find something to measure that says, "Will that plant have event?" and you can validate.

MR. COLLINS: A plant that has not had an event?

MEMBER POWERS: Well, I'm looking for something -- some correlation that has some predictive capacity to it. Not an after-the-fact sort of thing, because I always find something after the fact.

MR. COLLINS: I think the type of predictive capacity I'm talking about is -- and there may have to be some research to generate the type of statistics I think you're talking about, but if you look at statistics, let's say, on drunk driving, a drunk driver will drive about 100 times on average statistically before he gets into a serious accident.

So the assumption that I'm making is that the plants that live with a lot of these latent organizational weaknesses long term set themselves up statistically for more events. That's an assumption.

MEMBER POWERS: Yes. And what I'm asking

for is, is there any truth or validity to the assumption?

MR. COLLINS: I think the way to get your handle on that, if someone wanted to do a research project on it, would be to start with the INPO analysis of 20 most significant events, and take a look at the cultures. You'd have to kind of backfit the culture studies to these plants, and then take a look at the leadership behaviors and the organizational weaknesses for those plants and take a look if they're more significant than the average plant.

That's something I actually talked to the guy who wrote that paper about at INPO, and he thought it was a very interesting idea.

MEMBER POWERS: And the trouble is -- with that again is there's something blind about it. We know that an event has occurred.

MR. COLLINS: Well, then, what you do --

MEMBER POWERS: Therefore, I will interpret things in light of that.

MR. COLLINS: Well, then, what you do is you go to plants that, by whatever assessment the NRC or INPO has, considered the top performing plants, and then you do a similar study.

MEMBER POWERS: And sit around waiting for them to have an event.

MR. COLLINS: Well, I think you can probably use your ROP process at that point and take a look at some of the things that they've had and probably -- you know, you may not have an event like Davis-Besse, but you'll probably have --

MEMBER POWERS: Yes, I can define an event any way I want to.

MR. COLLINS: Right, right.

MEMBER POWERS: But I --

MR. COLLINS: Anyway, the point is there's many different ways to --

MEMBER POWERS: If that's the case --

MR. COLLINS: -- I think get at the solution that you're talking about.

MEMBER POWERS: If that's the case, if I can use the ROP, then I'm in good shape, because I've got the ROP. I don't have to do anything. I just sit there and wait.

MR. COLLINS: Right. Exactly. Exactly, that's right. You wait until you see --

MEMBER POWERS: Well, okay.

MEMBER ROSEN: But I don't think that's right, Dana. I mean, the ROP we have, but it doesn't have the indicators in it that we need.

MEMBER POWERS: Well, he says it does.

MR. COLLINS: No, no, I'm not saying that. I'm saying the ROP needs to be changed to do that normal distribution, so that when you're in the tail that your color changes on your ROP. We don't have a real risk assessment I think of LOEs that's connected to the ROP.

MEMBER ROSEN: LOEs? LOWs?

MR. COLLINS: I'm sorry. LOW, yes, latent organizational weaknesses.

MEMBER ROSEN: So they need to change the ROP to incorporate some of the information that you say is now being routinely collected but we don't see.

MR. COLLINS: Right. To connect the long-term latent organizational weakness risk items that the plants are now collecting in response to INPO, connect those to the ROP.

MEMBER APOSTOLAKIS: Can we have that or is that --

MR. COLLINS: It would be up to Alan Price.

MEMBER APOSTOLAKIS: Okay.

MEMBER ROSEN: I think what we need to do is let Mr. Price talk here at some point. Dana, why don't you conclude when you're comfortable, but we do have one more presentation this morning.

MEMBER POWERS: Well, again, I mean, I -- I see lots of things saying -- I have no difficulty, actually, with the fact that we can't define safety culture. I can't define defense-in-depth very well either, but I live with that.

So the fact that we can't define safety culture doesn't bother me very much, but I see lots of people saying this is indicative of a good safety culture.

MR. COLLINS: I would disagree that we can't define safety culture. I would ask people to read the definition I gave.

MEMBER POWERS: Well, let me stick with mine. I think I --

MR. COLLINS: Okay.

MEMBER POWERS: I think I am on safe grounds when I quote Professor Apostolakis by saying there is no universally-accepted definition of safety culture.

MR. COLLINS: I think until that becomes the case, I think probably the first thing for safety culture would be to get some kind of a task force that the ACRS might --

MEMBER POWERS: That's not my point.

MR. COLLINS: No, I'm saying it's a huge point. For managing culture, if you don't define it clearly, that's your basis for managing safety culture. You have to start with that. If you don't, you're never going to be able to really manage culture.

MEMBER POWERS: My point is that I see lots of people telling me this is indicative of a good safety culture, and that a good safety culture will prevent you from having events. But I don't see anything quantitative. I don't see -- I mean, they seem plausible enough to me, but I --

MR. COLLINS: Is a normal distribution -- is that quantitative enough for you? Wouldn't that be quantitative?

MEMBER POWERS: I would like to see something that borders on a correlation.

MEMBER APOSTOLAKIS: Yes, this is a subject more appropriate for the general discussion later. But I think the point has been made.

Is there a clarification question here?

MEMBER RANSOM: A comment.

MEMBER APOSTOLAKIS: Go ahead.

MEMBER RANSOM: I was very glad to hear

you talk about leadership and its importance, and, you know, and the management caring for the people, you know, who work in the organizations. The only comment I have is it seems like these attitudes in management organizations persist through many, many years, the ones I have worked for maybe 10, 20 years.

You can go in and find that they still have the same kind of characteristics in their management style that they had 10 years ago or 20 years ago. So the problem I see is when you find bad management, which I think has a big effect on the culture and safety culture, what do you do about it?

MR. COLLINS: I think there is, in my view, a misconception about culture in that it takes years and very, very slow change. I don't think culture change is a function of time at all. I think it's a function of expectations and reinforcing expectations.

If Alan Price here were to tell everyone at Millstone they need to wear a red shirt tomorrow or they're not going to be allowed access to the plant, I guarantee you everyone at the plant is going to be wearing a red shirt tomorrow. It's just a question of the expectations that you set and how you reinforce those expectations.

MEMBER RANSOM: It's a lot more subtle than that I think.

MR. COLLINS: I would --

MEMBER RANSOM: It's the arrogance of the management style, you know, that an organization has created over time, and it's passed on from generation to generation.

MR. COLLINS: You can certainly get an entrenched, arrogant management style, and I definitely saw that at Millstone. And I've got to tell you, it's no fun working at a plant like that. But I also tell you it can change instantly if you get dynamic leadership in there that sets a different course, and I saw that at Millstone II.

MEMBER RANSOM: The only one I've seen is in National Labs, where you throw out one management team and bring in another one. There is a definite change.

MR. COLLINS: What I'm hoping is that there will be a method in place, instilled by the plants, so that if you do have an arrogant, unacceptable management team, one that's toxic to culture, one that's toxic to safety, that the NRC ROP drives change and doesn't let that stand.

MEMBER APOSTOLAKIS: Let's move on now and maybe we can revisit these issues during the panel discussion.

The last speaker for this morning is Mr. Alan Price.

MR. PRICE: Good morning.

MEMBER APOSTOLAKIS: Good morning. Maybe you can take one of the microphones.

MR. PRICE: Oh, thank you. Is that better? Can you hear me now?

You mentioned early on to please describe why we're here. Clearly, I'm here because I was issued an invitation.

(Laughter.)

I wasn't sure why I was issued an invitation.

MEMBER APOSTOLAKIS: You could have refused, of course.

MR. PRICE: Oh, I didn't realize that was an option.

(Laughter.)

I've been with Dominion for 24 years. I began my career at Surry Power Station. And in 1996, when the three units at Millstone were shut down, I had the offer to go to Millstone at the time for what I thought was going to be a fairly brief period, and

I was there for close to three years. Most of that time was spent as the plant manager for Unit Number 2 during the recovery.

When the plant was purchased by Dominion just over two years ago, I had the opportunity to go back in June of 2001, and I'm now the site vice president. So I presume that has some of the reason for me being invited to speak.

The slide behind me you'll see on the left-hand margin there is an open lock, and as we proceed forward through the next set of overheads you're going to see keys for the lock. I thought very seriously about trying to find a picture of a chain with a broken link, because we're only as good as the weakest link in the chain.

The first overhead that I have is the definition of safety culture, which we have gone over several times today. I am going to leave it up -- request that we leave it up just as a backdrop for an opening statement.

I don't know what else I can add after Mr. Dugger and others have preceded me this morning with regard to the effect that leadership and senior management has on the safety culture for an organization. And I truly appreciate the positive comments that Dave Collins made about me personally.

From my perspective, it's much more of a struggle than Dave gives me credit for. I believe that it is slow and constant, slow and steady, and it is definitely walking the talk. It's leading by example, and it's also -- I think it takes much longer to change the culture of an organization, and at least my current experience is that it's taking longer than I ever thought that it would.

I also believe that if I make a bad decision, or if senior management makes a bad decision -- when I say "I," I'm not referring to myself personally, but rather senior management -- if senior management makes a bad decision, its impact is prompt, and its impact goes through the organization very quickly. And its impact from a single act can have an impact that lasts for a long time.

Trying to change things for the better, trying to achieve standards of excellence, however, takes constant reinforcement over and over and over again. And the things that senior management would like to have happen in the plant is not always what -- those characteristics are not always exemplified in the organization immediately.

If we could go to the next overhead on the safety culture model, please.

Many of the attributes of a safety culture that we've heard about this morning I believe are properly presented on this overhead. What this represents is a three-tier approach. One is at the corporate level, where policies are established to depict what the overall policy and organizational characteristics that are desired by the corporation.

For Dominion, this includes our nuclear safety policy. It also includes our principles of professionalism. The two things that are included in the nuclear safety policy and the principles of professionalism is we try to make a tie from the corporation to the individual team member at the power station, no matter who it is, no matter whether it's the reactor operator on the bench board or the individual who is delivering the boric acid from the warehouse to the aux building where we're going to make a boric acid batch.

Everyone at the plant owns nuclear safety, and one of the things that we try to do is we try to personalize that, so that everybody understands that they own part of reactivity management. And we are all stewards of the plant, and we all represent the plant to the local community as well as the global community.

On the left-hand side, the plaques that we have around the power station has a large red circle around it with the words "you are here," and we use those in our management meetings. What we try to do is we try to drive home to the people in management, from first-line supervisors right through to senior managers at the power stations, that this is the regime where we normally operate.

We're the people who are representing what the corporate policies are.

MR. PRICE: We're the people who are living the nuclear safety policy and their principles of professionalism every day. We're the folks who are demanding rigorously that we do the pre-job briefs before we go out even on the most mundane activity, because a mundane activity remains mundane when things go as you expect, but a mundane activity can quickly turn into an accident situation if things don't go as you expect. So we try to drive home to our managers that you can't take the eye off the ball even if there's something out there that you think is quite routine.

And then at the individual level, as I said before, through our training programs, through the interactions that we have with the Plant staff, whether it's in the pre-job briefs, whether it's in department meetings, tailgate meetings, post-job briefs, all-hands meetings or whatever series of meetings that we have, we try to reinforce the individual responsibility. Would you go to the next overhead, please.

Senior plant managers' role. It's our duty and responsibility to affirm and articulate a strong safety culture vision. That's not only the words that we say in the plaques that hang on the wall but as I've indicated before also the actions that we have. We have to establish clear organizational values and priorities. That's everything through our business plan right down through our outage goals, what our acceptable industrial safety accident rate is, what plant key performance indicators we're going to track. We have to be accountable ourselves and to expect organizational accountability and encourage teamwork and to build trust within the organization.

It's not just a management thing, it's a management thing that includes every member on the team so that there's an environment that exists where anybody on the team is encouraged to bring forth a question or an example of a degraded plant condition and know that that individual is going to be listened to. That individual may not go away happy, but the individual should go away knowing that he's been listened, he's had an opportunity to air his or her thoughts or concerns. And also if he or she is not happy or satisfied with the answer that someone in management is providing, they need to know that there's a work environment that exists at the power station where they have other avenues that they can go and express their opinions without fear of retaliation -- intimidation, retaliation or discrimination or harassment.

We also need to understand and expect the organization will share an understanding of the details. What that means is that we can't just trust that -- I can't just trust that what I say is going to actually manifest itself in performance at the power station. We have to follow up, which means being in the field, observing and not doing drive-by observations but going out and having meaningful interactions with the client staff. It means recognizing that our business is not an eight to five, five days a week business; it's 24/7, 365. And senior managers need to be in the Plant talking with the plant staff on off-hours, on weekends, nights and holidays in various different work environments. And what that means is we need to be visible, we need to be vigilant and we need to champion safe operations.

I'm going to talk about three departments today. I'm going to talk about plant operations, I'm going to talk about plant maintenance, and I'm going to talk about plant engineering. Plant operations, the operators in the Plant, this is the PEOs right up through the shift managers, need to know that we demand and we respect conservative operational decisions. Sometimes a conservative decision is manually trip the reactor from 100 percent power. Sometimes a conservative decision is don't start the Plant up. Sometimes a conservative decision is I've got a unexpected degraded condition on the unit, and we really should not be maneuvering the unit right at this time, the Plant is stable, let's get the degraded condition repaired and then we'll maneuver the unit if necessary.

There needs to be an extreme commitment to training, not only the fundamental training for the reactor operators in the Plant, equipment operators but also the continuous training that we learn internally or within our company or externally throughout the global community. We always need to try to learn from others' mistakes in a training environment rather than replicate them at our own plant with either a unit of power or in a shutdown condition.

Operations sets the standard of the Plant. What we tell our operators is that the Plant will never exceed the command and control, the rigor, the diligence that exists in the control room. So you all set the standard, you have set the bar as high as it's going to go. The Plant can always perform at a lesser value than you all set in the control room, but if you don't set the highest standards of excellence in the control room, then the rest of the Plant will never reach those levels of excellence that we desire.

Defense-in-depth of plant management, making sure that we maintain our safety systems, we always maintain those degrees of redundancy. And degrees of redundancy are not only in plant equipment -- charging pumps, HPSI pumps, LPSI, containment spray -- it's also in how we make our decisions. If you're an unexpected or an unusual situation, one of the things that I require of my shift managers when we're training them or when somebody's up for a promotion to a shift manager is don't think that you're carrying the world on your shoulders. If something unusual comes up, we have a number of telephones in the control room for a reason. Pick up the telephone and call somebody and get some assistance.

Risk-informed decisions, I believe very strongly in the risk-informed environment that we're in now. I think that it's helping us make better decisions, and I'm a huge proponent of it. Adherence to procedures, we have to have good quality procedures, we have to have been trained in their use, and then we have to go out and adhere to those procedures. If we can't adhere to those procedures, then we need robust processes to get the procedure changes done. I've already spoken to continuous learning.

And the last thing that I'll mention is on the focus on nuclear safety. As we were going through the SOER 0204 training, I personally conducted, either myself or when I was not at the power station my senior directors conducted the training, we remind our folks that while we're in a training environment, we have two nuclear reactors right across our alleyway that have nuclear boiling sites right now, and no matter what decisions we make with regard to training or administrative processes or questioning attitudes, the reactor demands that the heat be safely removed from it and never ever forget it. And that brings it right back to our principles of professionalism.

What we ask of our plant maintenance staff is adhere to plans, procedures and schedules. Sometimes there's a balance when -- perhaps balance is not the correct word -- sometimes there's a struggle when we get into our refueling outage or an outage of a piece of equipment. Is there a sense of urgency to adhere to the schedule? Is there an oversense of urgency to adhere to the schedule. I believe that there needs to be a sense of urgency to adhere to a schedule. Schedules are developed to make sure that we have proper coordination between different crafts, that we have adequate margin to limiting conditions of operations. So we ask our maintenance staff to get involved very early on, make sure that our schedules and our scope of work is appropriate, that they're well thought out, and then when we have a schedule established stick to the plan. If you can't stick to the plan, make people's phones or pagers ring very, very quickly.

We need a strong interface between maintenance and plant operations, and this is plant operations, the bit "O," which includes operations and engineering. Someone mentioned earlier in one of the models that was up there that there could be a different safety culture in Engineering, Operations and Maintenance. Is that a good thing or a bad thing? I personally believe that that's a good thing if we handle it correctly. I think that one of the strengths of our business if we leverage it appropriately is the diversity that our industry has. People in Maintenance look at the world through a different set of glasses than the people in Operations or the people in Engineering. If we can bring that collective together in a healthy respectful environment, we're a lot better off than just listening to one group of people or to expect that we're going to have the same culture in each of those organizations.

Strong quality assurance programs. I like an intrusive quality assurance program. I like an assertive quality assurance program. I think that having an assertive quality assurance program helps us rub the two pieces of metal together, perhaps, and keep it nice and shiny and keep a nice sharp edge at the power station. So I like it when our QA auditors of QC inspectors or whomever come in and say, "We went out and we saw this. This is what we saw, we didn't like what we saw." Gets us together and helps us improve.

Continuous learning, I've mentioned that before. A strong operating experience program. That includes internal operating experience as well as external operating experience.

The last thing I'll mention is craft ownership. I love it when I go out in the field and you don't need the first-line supervisor to exhibit craft ownership, it's the mechanical in the valve or the electrician in the breaker that you just have confidence that that individual is not going to leave that piece of equipment until they can guarantee that it's going to work to their satisfaction.

Moving to Engineering, I believe a healthy Engineering Department understands and controls their design basis. They establish and they maintain a strong and healthy set of engineering programs. These are your high-energy line break programs, your Appendix R programs, the EQ programs and the like. I also believe that there needs to be a healthy and respectful interface with Operations, Maintenance and Training. You've got to have the engineers working elbow to elbow with the operators in the Maintenance craft. They need to know each other by name, they need to know who the system engineers are. The system engineers need to be in the Maintenance shop and in the field and understand their equipment. The operators in the Maintenance craft need to know who to call when they have an equipment problem.

Engineering is a very tough job, in my opinion, these days. There are many more demands made of our Engineering Department than they can ever achieve. They can't please everybody, and sometimes our Engineering management feels like they're pleasing nobody. They have to attend to day-to-day operations to make sure the Plant operates today safety and reliably. They also have to think long term, where are we going to be two years from now? We need to have resources allocated to this modification that we're not going to implement for another two refueling cycles. Sometimes that doesn't give you the satisfaction when you're going home, when the engineer goes home and says, "Gee, I met my milestone today. We're going to be successful two years from now." The engineer doesn't feel nearly as good as knowing that he went home and was out in the aux building working with a craft or an operator getting a heat exchanger repaired.

And then the engineers need to help us assess equipment reliability. How are we making use of operating experience? How are we evaluating our equipment officer license? Do we see degrading equipment problems based on the trends that we see, whether it's from our Section 11 programs, our ISI programs or our vibration monitoring?

Moving to employee training and skill. The balance here is highly skilled operators and technicians, use of industry, internal and external OE, use of the training programs. When we benchmark, one of the biggest benefits I think we get of benchmarking is attributes that we can come back and we can put out in our training program so that we can learn in a simulated environment and make mistakes in a simulated environment before they're transferred into the operating environment.

Management knowledge of the Plant. Our Company is a strong believer that people in senior management positions need to have a knowledge of the Plant, need to have a diverse background, need to know what the operators are doing, need to know what the craft is doing, need to know what's happening in the training environment in the RP and the chemistry areas. This includes controlled management rotation and use of mentors to make sure that we're continually improving and that our managers are not getting stale and also that a department is not hearing only one person's perspective of how to do business. So we do do reasonably frequent rotation and fairly frequent use of mentors.

Performance monitoring, programs need to be robust in measuring and paying attention to trends, whether it's vibrations thermography, human performance errors, industrial safety accident rates, contaminated square footage. We have well over 100 key performance indicators that we monitor at our Plant.

Predictive risk analysis, if we're going to have a refueling outage or a forced outage or take a piece of equipment out of service or a system out of service, proactively do risk-based analysis to make sure that what we're doing is appropriate and we have taken the appropriate compensatory actions. Use of internal and external performance assessments, that's using our own hen house resources as well as inviting others in to assess our performance.

And work environment feedbacks. Mr. Collins mentioned earlier some surveys that he is personally associated with. We have done surveys and interviews as part of our recommendation for the SOER 0204. We also do at least on an annual basis management surveys where we get that feedback on management knowledge, skills and abilities at the power station.

Plant investments. It takes a lot of resource to maintain our plants and to have them prepared for future long-term reliability. I believe that in an appropriate safety culture there's a consistent model that's used to help management prioritize where it's resources are going to be allocated, and I'm talking resources of the human resource, the dollars, the materials, the engineering. I believe that a good way to inculcate safety culture into your decision making process is to ask yourself is this modification or activity going to improve safety of the plant, is it going to improve industrial or environmental safety for the plant, is it a regulatory requirement, is it a equipment or plant reliability requirement, and, last, what's the return on investment for the utility?

So where does the Plant staff come in? Employee behaviors, sensitivity to degraded plant conditions, a willingness to question unusual or unexpected results, a focus on continuous learning, demanding for the management team that they be provided adequate training, a focus on human performance, which includes peer coaching and peer monitoring in the field, not only of themselves, the people that they work with but also senior management. Just yesterday at one of our management meetings I was given some observations, and I asked our management team, am I only the person that gets coaching from the Maintenance craft when I'm in the Plant, because I get coaching all the time. Maybe it's just me. Also willingness to advance items that they feel is important to safety.

Which brings me to my next to the last slide, I believe. That's the safety conscious work environment. Employees at all levels need to be knowledgeable of the avenues that they have to advance their concerns, and they need to have confidence that they can advance their safety concerns without fear or reprisal. We've conducted extensive training for our employee staff as well as our management team. We've provided alternate paths for employees to pursue their concerns, which includes a senior management review of potential or perceived reprisals and a shared trust and respect at all organizational levels.

Some of the metrics that we use to assess our safety culture is equipment reliability. What are the performance trends of the systems and components?

What are our long-range plans, are we planning for the future? What about our forced outages, how many have we had, how have we performed? And then how are we doing on our refueling outage planning and execution? From an organizational effectiveness perspective, have we done integrated cross-functional assessments, and what have they told us and what are we doing about them? How is our reactivity management, are we having events, are we having precursors? What are the trends? What are we doing about it?

How effective are we using our operating experience? Has it be inculcated throughout the organization? Do we do leadership assessments? What are we doing with the leadership assessments? And I think, very important, are we providing back to the Plant staff what the leadership assessments are telling us? At our power station, we do them and we do provide feedback to the Plant team. And then with regard to adherence to standards, how are we doing with regard to procedure, quality, use and adherence, our commitment to training and corrective actions?

While the units were offline, a very detailed set of metrics were developed that got you to a number for safety culture, which included these types of attributes. Each was weighted for its significance and then there was an algorithm that went in, and every month we trended our safety culture index. We have modified that over time as the needs of the station and performance of the station have changed. We still monitor safety culture index. We use these types of metrics and we look for trends. We look not only for trends but we look for specific individual activities or events, precursors, transients that need to tell us something.

I guess in closing I know that one of the questions that's been asked of a number of presenters before me is should we pursue regulation with regard to safety culture? I personally do not believe that we should. I believe that the current regulatory process is more than adequate for giving us the tools that we need. I also believe that we are getting very valuable feedback from our resident inspectors as well as our visiting inspectors and from senior NRC management. I believe that if we try to regulate safety culture and we try to put a set of metrics in that is a one-size-fits-all for every power station in the United States, that we're going to miss something, and then two years from now we're going to be back saying what did we miss, what other regulations should we put in place? I think the current regulatory infrastructure is adequate, I think it's up to us just to implement it appropriately. And that concludes my presentation.

MEMBER APOSTOLAKIS: Thank you very much. Steve?

MEMBER ROSEN: Okay. What sort of additional information should we ask for, if any, from the plants?

MR. PRICE: What sort of additional information should you ask --

MEMBER ROSEN: Yes, data, indicators we get on safety culture. Is there something that we should be doing different than what we've done before, in your view? I understand you don't think we ought to recommend to the Commission that there be new regulations. I happen to share that view, but there's a lot you can do short of new regulation.

MR. PRICE: Yes.

MEMBER ROSEN: And is there something that you think the staff and the ACRS ultimately should see short of regulation in terms of information, perhaps indicators, perhaps some of the things you just laid out on your last slide and the data from those efforts, all to the idea of looking for trends or changes that one could then say, "Hey, Alan, this is different than it used to be. Do you see these differences? Are they meaningful?"

MR. PRICE: I really don't know. That's my answer, I don't know. I know that for -- I was at our Surrey Plant for 16 years, and the culture, the work environment, the needs of Surrey were very, very different from our North Anna Plant and very different from our Millstone Plant. I believe that our senior executive management recognizes the difference in the needs, recognizes the differences in the weaknesses between the three locations, and we don't use a one-size-fits-all. So for me to try to give you an answer that you all could apply to over 100 plants I just don't think I can do that.

MEMBER ROSEN: Do you think we should ask the plants what they think makes sense for them to submit and to avoid the one-size-fits-all question? Would that make sense? Because I recognize that makes sense, not to have a one-size-fits-all --

MR. PRICE: I think it would make sense to ask licensees how they assess their safety culture. I think that would make sense. In effect, that's what INPO has done of the individual licensees as part of the SOER. And I think it's been very healthy for us to do that. That gives us the flexibility to determine what is appropriate for our power stations with where we are in our time and give an assessment for ourselves, what type of environment that would be done in. What type of protocol would be used, I don't know, but I do think that would be appropriate.

I think it's also appropriate, and we will do this, to share the results of our SOER reviews with our resident inspectors. I believe that we have already done that. So a lot of this work has already been done and is done on a monthly basis for us.

MEMBER APOSTOLAKIS: Any other questions? Tom?

MR. MURLEY: I regret that I have to leave for an airplane in about ten minutes. I agree with what Alan just said, though, that it may be the best approach, if you accept that we're not ready yet for a regulation in this country of some kind, but to ask the utilities themselves how do you measure your own safety culture? That could get them -- some do, some do a very good job, like David said. It might be best if it were an industry initiative with some help from NRC prodding along the way.

MEMBER APOSTOLAKIS: Yes. I'd like to come back to what Mr. Price said. I do appreciate the point that you don't want to see any new regulations.

Now, I assume that means rules, but would you object to what Tom Murley presented, some sort of regulatory intervention in the -- again, I come back to my earlier point: We have an action matrix here which is part of the reactor oversight process. Its first column is really the most benign one. It says licensee response column.

Basically, what the agency does is tells the licensee you're all green but here are some problems that you may want to look at. That would be a form of intervention which can be either after the second box or after the first box in the diagram that Tom showed us. And the mere fact that the NRC is raising the question attracts attention by the utility and usually there is a response. Would you object to something like that, to make it a little more systematic, perhaps, so that we make sure that all the regions do this or maybe they're doing it already, I don't know.

MR. PRICE: It's not so much that I would object to it, it's that I believe that almost all of us are already doing it, so it's a question of making use of what we are already doing. So I believe that all the tools are there. I also believe that the interactions are already taking place with the resident inspectors as well as with regional management. It's a question of what are we doing about it.

MEMBER APOSTOLAKIS: But don't we have a problem, though, if we say, yes, all the tools are there, and yet Davis Besse happened. And as someone said earlier, we can't really regulate this industry based on averages, everybody has to be on board. How would that look to the public? I mean one of the strategic goals of the Commission is to enhance public confidence in our activities and of course in nuclear power plant safety. How would it look if the Commission said, "Yes, Davis Besse happened but what can you do? It was an exception. We have all the tools we need so we're not going to do anything about it." Would that help us in gaining public confidence in what we're doing. By we I mean the Agency, but you can extend that a little looking at really the input in the industry. And by the way, it seems to me we're moving now into the general part of the discussion, so anybody who wants to participate please feel free.

MR. PRICE: It's my opinion that safety culture is very subjective -- I'm sorry, the measurement of safety culture is subjective: How far-reaching do you want to go? Dave has brought with him one of the early outputs from our review of unexplained conditions at our power station. I don't agree that all of those represent latent organizational weaknesses. Some of them are just unexplained things or recurring problems that we just have not taken care of over the years.

I also believe that the regulatory processes' expectations have changed over the two plus decades that I've been associated with the industry, and it's not like under the ROP process, we've just now had a significant event. We've had other significant events under the SALP process and under other enforcement processes. So I don't think it's a failure of the current regulatory process. I think the current regulatory process has a lot of strengths in helping us look at the risk associated with activities and with deficiencies that are identified.

I think that depending on what the decisions of the ACRS are, that good intentions that you all may have could have unintended consequences for the industry. For us to assess safety culture, I'm not saying that we need to do things outside of the light of the day and in closed rooms that you all are unaware of, but for us to assess our safety culture and for us to assess our management and our leadership we need to be very, very critical and we need to be very critical sometimes subjectively.

Someone was asking earlier how can we come up with a set of metrics that are predictors of future failure? That's tough to do, but I think you all know that that's what management's all about. When we're assessing a first-line supervisor's performance or a senior manager's performance or a site Vice President's performance, my boss is looking at how I'm conducting my business, what type of decisions am I making, how am I expressing myself, how effective is the unit being operated, and it's his job to make sure that I'm removed before we have a significant event. So that's not part of the regulatory process, but those things happen every day in our industry.

MEMBER APOSTOLAKIS: Anybody who would like to address this issue? The issue in my mind is would we enhance public confidence in this Agency if we say the regulatory system is fine, David Besse was an outlier and do nothing? Let's give the Panel first, I'll come to you. Please. You have to have a microphone in front of you. Go ahead.

MR. KEISLER: Can you hear me now?

MEMBER APOSTOLAKIS: Sure. No, it's for the reporter.

MR. KEISLER: There is precedence. ASME Section 11 was an entire retrofit code on an existing industry, not just the commercial industry, all the experimental reactors, everything in the nation. That's exactly why there were over a pair of programs, replacement programs. Where you go from here I don't know. There are a lot of things in place, but the whole concept underlying and the underpinnings are still evident within that code body, the actual documents. The diversity what's there to reach back in and have everyone that needed to be but at the same time there was control. And that data started coming in, and you keep adjusting to that, and you set an ongoing process within there.

So the issue of safety culture now began through all of breach. In fact, I don't know of ever sitting an inquiry session in 20 years that allowed the cladding to be taken credit for as a pressure boundary. It's a point of law. The code becomes law by incorporation. There's been a year and a half of discussion about how they protected everything. It's a moot point. But there are strategies and those things have been used. It is an arduous process, but it becomes a continuum too, and you set in motion to do. And one key example of that would be ASME 11 and how it was retrofitted into evolution over the long haul as to how that brought it into play to where it is now used in the sites by the industry. He mentioned in his slides how he takes credit for those programs, a vital part of managing that Plant.

MR. WHITCOMB: Dr. Apostolakis, I would just like to try to address your question perhaps with one perception. With respect to the findings of the Inspector General's Office in December regarding the safety culture of the NRC, my sense is that the public is concerned that there are some safety culture issues within their own regulatory agency that's tasked with protecting its interest. So to do nothing perhaps wouldn't bode well or support that perception, and I think that it would only manifest itself and grow. And I think there's a mistrust because of information that comes in spurts and pieces and doesn't always appear to be forthright. And I think that that coupled with this perception or the findings that the NRC itself has to wrestle with its own internal problems apart from the industry I think is a concern for the public at large.

MEMBER APOSTOLAKIS: Please identify yourself.

MR. MEYERS: I'm Lew Meyers. I'm with

FENOC, and I present later today so I've got to watch how I ask this question. You know, I'll talk about Davis Besse, and my advice is look at Davis Besse as a plant. When Davis Besse event happened, I was the VP of another plant, and I had to respond back from the other plant from a regulatory process and an INPO process and everything else on the material condition of the reactor vessel head at the plant I was working at. I had to respond back in a certified letter, I had to have telephone calls, and I had to do inspections. And I look at the differences of the way we approached the issue at the plant that I worked at, the same company, versus at Davis Besse. So there's plants and there's differences in plants, like Mr. Price talked about a while ago and the cultures and the behaviors of the unions and everything else.

But then I always step one step higher and I look at the industry through INPO's eyes and the regulatory process through the NRC's eyes. And what I'm proud of today sitting here is that the industry experience that we had in this country and others drove us to assess our heads and forced us to shut down and go really do a thorough inspection of the heads that we have today in this country. And as a result of that, you know, there was no real Davis

Besse loss of integrity. We were fortunate, and it wasn't as timely as I'd like to have seen it, but somewhere along the line you all guys got to realize that the process that you had in place did work. I'm not talking about Davis Besse, I'm not talking about the NRC process. It did work. It protected the health and safety of the public. Now, do you have enhance that? I don't know. But it did work. That would be my comment.

CHAIRMAN BONACA: Something mundane but it's important too I would like to point out. We just found out that the cafeteria is going to close today at one o'clock.

MEMBER SIEBER: Why?

CHAIRMAN BONACA: Because there is some ceremony. So my suggestion would be that maybe you wrap up by 12:30, leave at least half an hour for people to get something to eat and continue the discussion in the beginning of the second session, however you want to handle it.

MEMBER RANSOM: Or we can start at 1:30.

CHAIRMAN BONACA: Yes. We'll start it again at 1:30. Or whatever. I mean we can continue for ten minutes, but at least we leave some time for people to feed themselves.

CHAIRMAN APOSTOLAKIS: Okay. Any other comments? Yes, please.

MR. COLLINS: I'd just like to say that I believe that there's a couple of NRC inspection procedures for safety culture and for a corrective actions program. And after -- it seems like what happens is we don't flag any problems until after an event like Davis Besse, and then we say, "Oh, the safety culture is terrible or the corrective action program is terrible at this plant." And I think that we're at the point now where we really need to -- the NRC really needs to take a look at those tools that they use to assess those things and whether they should keep using them in the form that they are.

Because the problem is if you're feeding information to an operator like FENOC that you're not really sure of, I mean right now we're all sitting here saying that -- or at least Chairman Meserve said last year that safety culture hasn't been clearly defined, so we can't -- NRC or anyone else hasn't found a way to unambiguously measure it. Well, if that statement is true, then what business does the NRC have telling plants that their safety culture looks fine? That's my comment.

CHAIRMAN BONACA: Well, let me go back to the issue of Davis Besse now. We have an event, and at the end of that one could conclude that you have an isolated event and so we will react to it accordingly. And the other possibility is that a number of indications then are found which corroborate or substantiate the perspective that says, oh, there is a safety culture issue. That came out pretty quickly. I mean we were just looking at what evolved there, and the number of the indications that were brought to bear were, for example, action statements on a very frequent basis. Well, very unusual and yet didn't anybody notice that? And so the clogging of the filters and a lot of other things that happened.

Now, the conclusion of that is there is a safety culture problem, and now we're all jumping on safety culture. So let me forget about safety culture now and simply say how did we miss, not only the Plant but also the NRC and everybody else, this issue, these indicators that were telling us something was going on? Okay? I mean it just is a legitimate engineering technical question. I mean it's a just a legitimate leadership question. How did we miss this?

And the next question is for safety culture that's okay, but it's so much more intractable than safety culture. Let's just talk about the indications and what can we do at other plants today to make sure if we see these indications we jump on it and infer, and we are raising issues about questioning attitude and so on and so forth. And that's simply the facts of the matter now. I'm afraid at times when we begin to say all these indications are safety culture and now we jump on safety culture we really lose sight somewhat of what the job has to be. And so what we're looking for here, I think, is also some perspective from people with experience in running power plants and from NEI and everybody else on what can we learn that we can put in place so that an event like Davis Besse will not occur again, and I think we all have the same objective there. I mean nobody's trying to say our objective is to regulate safety culture, it's just simply to prevent that lapse from occurring again.

CHAIRMAN APOSTOLAKIS: Yes. To expound on this, does the Safety Review Board have a question, are they really doing anything or are we just visiting, saying -- receive a few presentations, say a few nice words and leave? Where was INPO? I mean we have to answer these questions first. For years now I've been hearing here that INPO has these great programs to do this and this and that, but they can't tell us about it because it's proprietary. Well, where were they? I mean they are famous for being very frank with plant management. Did they forget to be frank this time? These are the real issues I think. I mean on paper it looks very good. You have the plant, you have external oversight, you have the NRC inspectors, and then the whole system seems to collapse. Why? Why? Why did that happen?

CHAIRMAN BONACA: One disturbing element is some of the elements that we normally consider attributes of safety culture as an effective corrective action program seem to be okay. That's really the message we got. I mean it wasn't that bad. Now, when you say it wasn't that bad about a situation like Davis Besse it means it probably was pretty good, and so on and so on. So that's the other intriguing part, that some of those attributes that we normally consider elements of safety culture as indicators were not so bad after all. So that's why we're left with that puzzling question about how do we prevent a repeat in the future. I mean not necessarily that there's going to be one. I'm saying --

CHAIRMAN APOSTOLAKIS: Do the Panel members care to make a comment on this?

MR. WHITCOMB: Yes.

CHAIRMAN APOSTOLAKIS: You don't have to.

MR. WHITCOMB: I would like -- before I address that specifically, I'd like to echo what Mr. Collins said about reassessing what the tools are in place. And the reason I say that's twofold. On the afternoon of the same day that it was reported at a public meeting the problem with the reactor vessel head, the NRC had an exit and gave Davis Besse all green in performing assessment -- performance assessment, okay? Now, later, perhaps six weeks later, there's a determination that this is -- the root cause is a safety culture issue, okay, which perhaps wouldn't have been identified through the normal routine assessment of plant performance.

But I would echo Mr. Collins' concern from a little different perspective. In 1985, at Davis Besse there were the independent failure of 14 different systems, and that's why they issued a blistering assessment as to the superficial maintenance practices. Now, that was 18 years ago, 17 years before the identification of the reactor vessel head. How did we ever let that get to that point where we were once again surprised by that very same plant that had the same kinds of problems? That's the issue of safety culture that truly hasn't been addressed in any of the assessments. And particularly when they get a glowing all green report card it just is unfathomable.

And the public is concerned, Mr. Apostolakis. They really are concerned because they're scratching their heads saying how can we have such great performance reviews but have this near disaster? So I think there has to be a review, and I think it's got to go beyond that. I think there has to be a new road paved. I agree with Mr. Price, there's a lot of things that are being reported, and I think to a large degree many of the plants are doing the right things, and they are assessing their culture, because that's the right way to manage. But for those who don't give the same attention to that, I believe their guidance needs to be put in place. Thank you.

MR. COLLINS: Can I just mention what I think is probably the single most fundamental issue for measuring safety culture? And I've been corresponding with this Dr. John Carroll of MIT who wrote this wonderful paper, I recommend people reading it, really analyzing Millstone, but he's also studied many different nuclear plants' safety culture. And what he says, and it's part of my presentation, and this is shared by INPO as well, that, well, INPO says the most important source of information is the worker, and Dr. Carroll says we need to start institutionalizing dialogues with workers.

Now, after Davis Besse there was a root cause report done and it said that a large amount, I believe, of the Operating staff felt like the keys were taken away from them starting early '90s. Is that a good characterization, Mr. Meyers? And I think that was very similar to what happened at Millstone, and I also believe it talked about the focus on the cost control as being part of the issue.

So really I obviously respect -- I don't want to say anything what the Panel is saying, but I don't think we need safety culture studies done of Millstone right now because I think the culture is great, but I think we would definitely need the NRC to take a look at the Millstone culture before 1996. So can we leave it up to the licensees to just manage it on their own? I think there needs to be at some point something -- some involvement by the NRC that can remove toxic leadership when it gets installed.

CHAIRMAN APOSTOLAKIS: Is this idea of getting feedback from the workers isn't this what the Japanese industry did with the quality surplus, not the nuclear industry, where they had these -- I think that's what it is. They had managers and workers getting together in groups of eight to ten.

MR. COLLINS: There's models of Japanese and also Saturn in this country, they have the same --

CHAIRMAN APOSTOLAKIS: Saturn, yes.

MR. COLLINS: -- quality surplus.

CHAIRMAN APOSTOLAKIS: Which was more than the Japanese.

MR. COLLINS: Right.

MR. KEISLER: Some of the private work done in what was going on in this nation, and I interfaced with Patel Human Affairs Research Centers substantially through this period. I knew a number of people through the code activities individually just like you guys know everyone. They did a number of the comparative analyses for this nation against the Japanese industry, the European industries, against FAA and aerospace industries domestically. Also what was evident then, and it was overall efforts to assess the status of maintenance at the domestic industry now that the larger plants were coming into play and larger numbers of them. But they had not dissected what was going on at the leading plants in this nation, and I happened to have worked close in with the leadership of those in my own career, which was the essence of why I went back to look in detail to go through that.

But what you're seeing there, there were modified quality surplus plants, there were psychologists on staff working to create programmatically the innovation I cited, Mr. Ollie Bradham with the V.C. Summer Plant. Ollie had been the Maintenance Superintendent at Oconee, and actually when he had executive migration into the start-up of the V.C. Summer Plant, I would go back to what Mr. Price said, different plants were there. And that was true in Duke with Catawba and MacGuire versus Oconee and the culture changes and differences.

V.C. Summer and also being a very small utility with one reactor but they implemented some of the lessons learned that were not well-documented through that era. There was no INPO at that time at all, but we went back in and what were the elements of that and very formal programs to assure that those craft personnel had access all the way to the Board of Directors if they needed that and set up of architecture procedurally, programmatically and then actually brought in professional expertise of psychologists to work with and to do that. And they went to a couple other plants in the nation in 1987 and that's what was the premise of my point in talking about a generation digress now, we moved in the other direction. We were headed there, it didn't captured in all the official documentation, as I understand it.

CHAIRMAN APOSTOLAKIS: Okay. I think we're pressed for time now. So before we recess, I'd like to ask the Panel members, are there any issues that you would like to raise that were not discussed so we can spend 15 minutes with the same panel after lunch or do you believe we've covered everything and this is it for Panel 1?

MR. WHITCOMB: I think I have nothing else to raise.

CHAIRMAN APOSTOLAKIS: Very good. So thank you, gentlemen, for coming here. This was very helpful to us. We'll recess until 1:40. Thank you.

(Whereupon, the foregoing matter went off the record at 12:39 p.m. and went back on the record at 1:40 p.m.)

CHAIRMAN BONACA: All right. It's time to start the meeting again. So we will resume the meeting with the second panel discussion.

CHAIRMAN APOSTOLAKIS: Okay. The subject of this afternoon's panel is attributes of safety culture, which is of course what the ACRS is really interested in, whether we can define these attributes and maybe measure some of them. We'll follow the same rules as this morning. Please try to keep to your time to allow, the allotted time. And then we'll have some discussion and then at the end we'll have a roundtable discussion.

The first item on the agenda is the overview and status of the NRC staff's activities. Mr. Trimble?

MR. TRIMBLE: Thank you. My name is Dave Trimble. I'm the Chief Operator in Licensing and Human Performance Section within the NRR staff. And as you'll see shortly, the Commission has tasked the staff with monitoring efforts of foreign regulators to measure and regulate safety culture and the effectiveness and monitoring efforts to develop objective measures and indicators of safety culture.

We're currently doing this through a team from across offices, and it consists of Team Leader, Clare Goodman, who's on my left, who will be presenting the details of the information that is in this presentation. And Clare is our -- as a Senior Human Factors Analyst within my section. Also, although he's not actively participating in this panel discussion, Jim Bongara is also on the team of my staff. I also have Lisamarie Jarriel. Lisa is -- you want to stand up, Lisa? Lisa is the Agency's Allegation Advisor. And we also have -- she's within NRR. And we also have Dr. J -- Julius J. Persensky who's from the Office of Research, and I don't think Jay's in the room right now but he will be shortly. And he's also a member of the team.

Consistent with the mission of this team, several of the members, Clare, Lisamarie and Jay, are also members of the NRC inspection team working on the -- looking into the Davis Besse issue.

Our purpose today is to -- go to the next slide -- just to give you an overview, we want to, first of all, refresh everybody's memory as to what the current guidance that we have provided by the Commission, and then we're going to list the set of attributes of the safety culture that was developed by the -- under the IAEA's auspices, the International Safety Advisory Group and set forth in INSAG 15, which I was very impressed with when I first read that document. And, anyway, it certainly represents a lot of thinking that's evolved on the issue, but -- well, we use those as sort of a baseline document. And for each attribute we will describe what characterizes these attributes and then what guidance we have against these attributes, what guidance we currently have.

And I want to say on the outset we currently assess and monitor safety culture within the inspection program, but it's on a limited basis. And we'll try to show you what we do and then give you a little flavor for what we don't do. At the end, we'll provide some conclusions regarding our plans. And simply put, our plans are to try and work within the guidance that we've received from the Commission. And if we do find that we see a need for regulatory enhancement, then we would be obligated and we would plan to go back to the Commission to basically get their buy-in and approval to move into a new area.

I want to now -- again, time is limited, but I want to shift seats here with Clare Goodman as our team leader. I'd like Clare to go through those attributes, and then we'll get on with the discussion.

MEMBER POWERS: Well, maybe just ask you one question --

MR. TRIMBLE: Please.

MEMBER POWERS: -- before I leave. Suppose that you said, "Gee, we've got to regulate in this area," wouldn't you have to do a backfit analysis?

MR. TRIMBLE: Yes, we would.

MEMBER POWERS: How do you do a backfit analysis?

MR. TRIMBLE: How would you do it?

MEMBER POWERS: Yes.

MR. TRIMBLE: I think it was mentioned this morning that it could be difficult and challenging. I haven't really thought about it enough, Dr. Powers, to know whether it would be impossible or not but it certainly would be challenging.

MEMBER ROSEN: What you really mean, Dana, I think is if you wanted to establish a new rule to regulate in this area without a backfit analysis.

MEMBER POWERS: No, you can't regulate --

MEMBER ROSEN: But you couldn't establish a new rule.

MR. TRIMBLE: Yes. That's a good point.

MEMBER POWERS: If you try to impose new requirements on a reactor, you have to do a backfit analysis.

MEMBER ROSEN: If you try to impose new requirements, that's right. But I'm not talking about that.

MR. TRIMBLE: Right.

MEMBER ROSEN: I'm talking about what you look at within the scope of what you have.

MR. TRIMBLE: Right. If you have -- yes. In other words, if you -- I think what you're saying is if you were to enhance your inspection program or something, it may not -- of course, you'd have to be very careful in that area that you're not through the inspection program --

MEMBER ROSEN: You're adding new requirements.

MR. TRIMBLE: -- putting new requirements, right. But maybe in the monitoring area, NRC staff monitoring.

MEMBER SIEBER: Even with that you can't impose a monitoring data requirement except by agreement with the industry or with the licensee.

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

MEMBER SIEBER: Right.

MR. TRIMBLE: We're going to do a switcharoo here and let Clare have the microphone.

MS. GOODMAN: Although I've been known to speak plenty loud enough that I don't need a microphone. Just as some background for some people, I've been working on the NRC staff since 1980 in a number of areas of Human Performance. And if I put up my hand, can you see, that means the next slide.

I'm going to basically skip over this fairly quickly because this morning we went over the definition for safety culture. NRC is using the definition, as Thadani indicated this morning, that was put forth in INSAG 3 and 4. And also in the nature of time I'm going to move to the current Commission guidance fairly quickly. As Dave indicated, I'm going to go through what currently is our Commission guidance and within the boundaries that we're operating at the moment.

First on this list is a 1989 policy statement. It was probably issued during Tom Murley's time as NRR Director on the conduct of operation. And it's the only regulatory document that we have that directly addresses safety culture. It starts out by stating that, "The Commission believes that the working environment provided for the conduct of operations at nuclear power facilities has a direct relationship to safety." It also states that, "Management has a duty and obligation to foster the development of a safety culture," and it does use the word, "safety culture," "at each facility and to provide the professional working environment in the control room and throughout the facility that assesses safe operations." And throughout this talk I'll give a couple more quotes from that policy statement.

The Commission has also provided further guidance in three staff SRMs that have been issued that are listed here. The first SRM, issued in 1998, approved only the current staff practice of inferring licensee management performance from performance-based inspections, routine assessments and event follow-up. That SRM specifically said that efforts to develop leading indicators of performance should not use licensee management performance or competency as an input, and the inspection program should focus on performance-based inspection findings. And, lastly, that SRM eliminated resources directed at developing a systematic method for inferring management performance.

Probably the most important thing that came out of this SRM is that NRC should not be addressing management competencies. And I think it's important language-wise that that SRM was addressing management competencies more than it was safety culture as we're talking about today.

In the second SRM, which was mainly about safety conscious work environment, but at that point the definitional differences between safety conscious work environment and safety culture were used interchangeably, so it's unclear if the guidance was referring just to safety conscious work environment or also to safety culture. But the guidance of that SRM was the staff should continue with current policy with the addition of development and implementation of additional guidance and training in support of more complete and consistent program implementation. It didn't further give any details.

Lastly, and more recently, the Commission in an SRM this year issued quite a bit of guidance on safety conscious work environment, and at the end of that SRM had two additional points related to safety culture. Those points were that the staff should monitor the efforts of foreign regulators to measure and regulate safety culture and assess their effectiveness. In particular, because the subjectivity is a principal objection to the direct regulation of safety culture, the staff should monitor efforts to develop objective measures, indicators of safety culture. And that's probably the most recent guidance that we've received.

This slide lists the key issues of safety culture from INSAG 15. I'll refer to them as attributes. Others have referred to them as principles or elements. In any event, they're the selected topics by the International Nuclear Safety Advisory Group, or INSAG, and these are the group of attributes that have resulted from a maturation of a number of documents.

First, INSAG 3, which dealt with basic principles of safety, to INSAG 4, which specifically dealt with safety culture, all the way through INSAG 11, which dealt with developing safety culture and practical suggestions for utilities to use. INSAG 13 dealt with the management of operational safety. And, finally, the document, INSAG 15, dealt with a number of attributes that are listed here for safety culture. And I think the important thing to take away from this slide is that this is an international set of principles that have wide applicability and cut across multiple cultures and applications.

The first attribute, commitment to safety, means that safety is put clearly and unequivocally in first place from the top of the organization. There's absolute clarity from the organization safety philosophy. The following slide addresses some of the places that NRC talks about this type of commitment.

MEMBER POWERS: Does your previous slide mean that you're demanding that organizations say safety is
their number one priority?

MS. GOODMAN: Correct.

MEMBER POWERS: That can't possibly be.

MS. GOODMAN: Yes. I heard you this morning that -- I think it's best stated that management exhibits safety first practices. And by that we're not talking about the ultimately shutting down the facility because the only way for a facility to be safe is shut down.

MEMBER POWERS: Yes, but some of our facilities are not safe if we shut down.

MS. GOODMAN: Yes, that true.

MEMBER POWERS: It would be bad to shut down a spent fuel pool.

CHAIRMAN APOSTOLAKIS: Why are you giving us the INSAG 15 attributes? Is there anywhere -- did the Commission say you should look at those?

MS. GOODMAN: No. The guidance from the Commission is limited to three SRMS --

CHAIRMAN APOSTOLAKIS: Right.

MS. GOODMAN: -- that we received. I'm using those attributes because those are the best definition for safety culture and attributes of safety culture agreed upon at the moment by a panel of experts, they've matured over time, a number of years, a number of committees have met that have led to the development of these attributes. And I'm using these attributes to show you where there are pieces of NRC regulatory rules or guidance and where there are not. It's more a methodology to sort of present what we do cover and what we don't cover.

CHAIRMAN APOSTOLAKIS: Okay. Okay.

MS. GOODMAN: So it's an effective list to start from.

CHAIRMAN APOSTOLAKIS: So you may go back to the Commission then and give some recommendations at some point --

MS. GOODMAN: Yes.

CHAIRMAN APOSTOLAKIS: -- regarding the ones that are not covered.

MS. GOODMAN: Yes.

CHAIRMAN APOSTOLAKIS: Okay.

MS. GOODMAN: The policy statement on conduct for nuclear power plant operations, I've read from it already, it also says that, "Management must provide the leadership that nurtures and perpetuates the safety culture." It says that, "The starting point for the necessary full attention to safety matters is with the senior management of all organizations concerned." And it, lastly, sort of wraps up by saying, "Management should review their procedures and policies on the conduct of operations to assure they support an environment for professional conduct."

We also have technical specifications that require certain administrative controls related to organizations, including PORC and other senior management review groups, and we also have an SRP that has some limited guidance.

So in summary, we have limited coverage of this attribute, and we should in particular understand that policy statements are not directly enforceable, they're not rules.

Next attribute, use of procedures. Very quickly, this states what the characteristics are of that attribute. Procedures need to be clearly written, simple, understandable, fit for their purpose, appropriate for task and accomplish what is needed to maintain safe operations.

The next slide identifies a number of areas where the NRC does have some rules and guidance. Appendix B addresses procedures directly. Reg Guide

1.33 endorses ANSI 3.2, which provides a list of activities that should be proceduralized. Also, there are inspection procedures. There's one inspection procedure listed here. Now, the copies of your slides that you have are a prior one where I listed some supplemental inspection procedures. Under the reactor oversight process, we have baseline procedures, and then we have special inspection procedures or supplemental inspection procedures, such as this 95003 and then we have further supplemental procedures, such as plant procedures or EOPs or human performance that could be used in conjunction with 95003 if that was the appropriate issue that was being dealt with.

So, in summary, we have -- we've written guidance that cover this attribute, though to some extent implementation is restricted by the ROP process because a number of our items are in supplemental procedures and not part of the baseline.

The next attribute deals with conservative decision making. Most incidents in the industry occur because somebody failed to consider or question in a conservative manner decisions that they've made, and this slide is just a list of those characteristics. The next slide provides again a number of places where NRC does provide documentation or guidance to the two inspection procedures listed here, 71111.15 and 71111.14, are part of the baseline ROP process. So they would be conducted at all plants on a regular basis.

The operability evaluations reviews evaluations to ensure that operability is properly justified and that components or systems remain available. The personnel performance baseline inspection procedure reviews personnel performance during planned non-routine plant evolutions or non-routine unplanned events. It also reviews all LERs.

Lastly, the policy statement, again the same one that I talked about previously on conduct for operations, addresses this attribute by stating that open attitudes are required in such staff to ensure that information relevant to plant safety is freely communicated. When errors of practice are committed, their admission is encouraged. By these means and all pervading safety thinking is achieved allowing an inherently questioning attitude. The prevention of complacency, a commitment of excellence and the fostering both of personal accountability and corporate self-regulation in safety matters.

So, in summary, we have a number of specific indirect guidance in this area, but we have a limited coverage in the global sense of conservative decision making. And, again, just to repeat what I've already said, the policy statements of course are not directly enforceable.

The next attribute is reporting culture. The characteristics are listed in this slide. In summary, in this particular area, we have a fair amount of coverage of this attribute. There is a policy statement -- go on to the next slide -- there's a policy statement on freedom to raise safety concerns which sets forth expectations that licensees will establish and maintain safety conscious environments in which employees feel free to raise safety concerns, both to their management and to the NRC, without fear of retaliation. A safety conscious work environment is critical to a licensee's ability to safely carry out licensed activities. The baseline procedure, IP 71152, which is called the identification resolution of problems, has been revised to give guidance to inspectors on the topics of willingness to raise safety concerns.

The next attribute is challenging unsafe acts and conditions. This attribute speaks to the process for identifying, reporting and correcting unsafe acts in the plant. An important feature of this attribute is that employees are fully involved in the process and are trained to know how to challenge in a constructive way. The next slide.

This attribute is a cost-cutting issue in the reactor oversight process, or ROP. In the ROP process, it's addressed through the inspection procedure IP 71152. A fundamental goal of actually the NRC's ROP process is to establish confidence that each licensee is detecting and correcting problems in a manner that limits the risk to members of the public, and in fact a key premise of the ROP process is that weaknesses in licensee's problem, identification and resolution programs will manifest themselves as performance issues which will be identified during the baseline inspection program or by crossing performance indicator thresholds. And so, in summary, we have a fair amount of coverage for this particular attribute.

The next attribute, learning organization. This is a little bit trickier. If an organization stops searching for improvements in new ideas by means of eliminating say benchmarking or seeking out best practices, there's a danger that it will slip backwards. Ideally, all employees are involved proactively and --

MEMBER POWERS: What does that mean that there's a danger it will slip backwards?

MS. GOODMAN: Operational experience and benchmarking both are crucial ways that a facility can find out about either prior near misses at their facility or at other facilities. And I -- can you -- am I answering your question or --

MEMBER POWERS: It's to slip backwards. If somebody stays constant, how do they slip backwards? That's what I'm struggling with.

MR. TRIMBLE: I think the point was that if you're not -- it's one of these things that you -- the old saying is if you're not out there constantly looking at how others are doing, others are improving around you, are you keeping up with them, not that we have a rising standard necessarily but for the organizations that don't keep looking, then obviously have missed opportunities to find problems.

MEMBER POWERS: This sounds like the continuous improvement kind of philosophy that the DOE likes to pursue with their facilities, and I thought we were smart enough in this Agency to avoid that kind of thing.

MR. TRIMBLE: Well, like I said, I was trying not to go so much at the rising standards as more as the missed opportunities. I don't know whether you call it going backwards, but at least you miss the opportunity to see some other event or see other issues at facilities, and I guess that's what we --

MEMBER POWERS: I think you want to avoid the accusation of ratcheting.

MS. GOODMAN: Yes. I don't think we're really speaking of ratcheting here. We are speaking of making yourself aware of near misses. Research has shown that approximately -- is it ten -- ten near misses occur for every event. Now, I could go back and get you more information on that, but if you miss those ten near misses and you don't know anything about those ten near misses, you've missed information. I think that this Agency does recognize that assessing operational experience, though, is in important. In fact, the prior Chairman of the Commission did at House testimony on Davis Besse did say, "The assessment of operating experience, integration of operating experience into training and review of program effectiveness action plan will provide for a comprehensive evaluation of the current programs for collecting, evaluating and disseminating operating experience."

MEMBER POWERS: I won't hold you responsible for that statement.

MS. GOODMAN: Yes.

MEMBER POWERS: How fortunate he's not here.

MS. GOODMAN: Yes. And he was -- well, I'm quoting from some past testimony.

CHAIRMAN APOSTOLAKIS: But this, though, implies that you have a good root cause analysis methodology, right, in order to learn from the experience. And if root cause analysis, say, stops at hardware failures, you really don't learn much. I mean that's something that -- does the Commission encourage anybody to do that or does the industry do that? I mean depends on --

MS. GOODMAN: I think in the new LER rules, although those people aren't here right at the moment, I think we did take a step in the direction of trying to get licensees to go considerably further when evaluating and writing up and LER to go into Human Performance items. The guidance in NUREG 1022, is it, on LERs gives a number of human performance areas, and we do expect that they do discuss not just hardware failures. And in fact when we review LERs still about half of the LERs, actually maybe a little bit more than that, do contain and write up human performance items. So we do get feedback from the licensees on Human Performance. I'm sure the industry would feel that they very much are involved in reporting human performance. It may not be at the level of detail that we'd like but it's come a long way in the last 20 years.

CHAIRMAN APOSTOLAKIS: We are running out of time, so let's --

MS. GOODMAN: Yes. Okay.

CHAIRMAN APOSTOLAKIS: So what's your --

MS. GOODMAN: There are --

CHAIRMAN APOSTOLAKIS: Go ahead. I'm sorry.

MS. GOODMAN: Yes. Let me very quickly, maybe I can just skip through. With regard to training, we're definitely -- we have some guidance. We're possibly missing guidance on management training, but that may or may not be an issue here. We're not really ready to make recommendations in that area. The underpinning issues are communications, clear priorities and organization. Those three areas are covered by Appendix B which deals with corrective action, and we have a very limited coverage really with these attributes. We don't have certainly any direct guidance in the area of communications.

Lastly, in conclusion --

MEMBER ROSEN: Before you get to the conclusion, one point about training. In the area of training, the Agency has agreed with the industry to support the National Academy for training and to use the requirements thereof in lieu of a rule on training.

MS. GOODMAN: Well, we have a rule on training --

MEMBER ROSEN: So in a sense -- but in a sense, we are coordinating with the industry on that one.

MS. GOODMAN: Most definitely. That does, as you well know, involve ten positions that are named -- or ten categories, positions, that are named in 50.120.

MEMBER ROSEN: But to say that we don't have much on training is not exactly the whole story.

MS. GOODMAN: No, that's really not. I'm sorry, I was starting to rush. We are on -- management training is not an area --

MEMBER ROSEN: Oh, management training.

MS. GOODMAN: That's what I meant to say. So in conclusion, the Commission has provided some direction to the staff with regard to safety culture. They've directed us to monitor safety culture developments in the international arena and to monitor events, both domestic and international. In fact, our EEO Bill Travers recently chaired a meeting on safety culture of operational events.

In summary, we sample attributes to various degrees, but our program is limited. We don't have a process to look at issues as a set or a whole. We admittedly looked at safety culture from sort of performance individual facets rather than as a whole. In fact, using an overused cliche, we tend to focus on the trees and not the forest. You might say the forest is possibly still elusive.

CHAIRMAN APOSTOLAKIS: Well, the question that comes to my mind after your presentation is it appears that we are addressing various degrees, most if not all, of the attributes from INSAG 15, and yet we give all green to Davis Besse and then it happens. Something is missing here. I don't know what it is. Is it because of our limited involvement? Is it because these attributes are not a complete list? I mean they seem reasonable. What is it that creates that?

And if you are to make any recommendations in a SECY, I assume, to the Commission, perhaps you should expand what you're doing and look at actual events. Mr. Thadani this morning had a slide where he said domestic events, Indian Point 2, Cooper, Millstone and David Besse. And go back and see what is it that happened there and if we had a reasonably good system covering these attributes, would we have prevented it or we would have known enough in advance to do something about it?

I think, as you pointed out, also as many others as well, operating experience is the most important input you can get, right, because that shows you how things really work. So I'm still puzzled. I mean we are past the first panel, we're beginning the second, and I still don't know why Davis Besse happened. I mean how can you help with me that?

MR. TRIMBLE: Well, I think, as I -- we did want to bring out the limitations of the program, as you referred to. It is limited in its scope, and I know this morning one or two of the speakers mentioned the dangers of making an assessment based on a limited program that can give you a false degree of confidence in the area. And I guess I have to say that we're in the thinking process. As we go and we're doing the inspection at Davis Besse, we're learning and we're trying to keep an eye on, okay, is there a way that we could have or should have known about these problems, and I guess we haven't gotten the answer, but it's an open question and we're working on it. That's about the best I can do right now.

CHAIRMAN APOSTOLAKIS: One thought that occurs to me is, is it possible that because of Davis Besse we are focusing on the wrong things? We were urged this morning to bring behavioral scientists into the way we do business around here. If you look at Davis Besse, they explained away the indications they had and then some people argued that they didn't have the required questioning attitude to lead them to alternate models, alternate hypothesis that would explain also, which tells me now that maybe we should train them to understand uncertainties in models, which has nothing to do with behavioral science. It's an engineering issue, it's a risk assessment issue. So do our people out there understand that there may be very different hypotheses that can explain the symptoms and -- it's not just behavioral science here, and it seems that we are all focusing on safety culture because everybody says safety culture is important, and maybe it's an engineering problem.

MEMBER ROSEN: Well, George, I know you're pushing hard on this issue, but there are three people on this panel who I think would have a fairly good -- ought to have a fairly good answer to that: Mr. Meyers, Mr. O'Connor -- not Mr. O'Connor, Mr. Meyers and Jack Grobe.

CHAIRMAN APOSTOLAKIS: Okay.

MEMBER ROSEN: At least, maybe Sonja.

CHAIRMAN APOSTOLAKIS: You guys know our charge, for you to answer this question.

MEMBER ROSEN: And they may be able to address why our regulatory system --

CHAIRMAN APOSTOLAKIS: I hope my point is clear.

MEMBER ROSEN: Yes, but you're pushing on the wrong spring.

CHAIRMAN APOSTOLAKIS: I'm not pushing, I'm just raising --

(Laughter.)

MEMBER SIEBER: There is an answer to this. The question is the same question as why didn't the PRA give you a probability that this event would occur. And the answer to that is underlying all the trees is a deterministic analysis of what can happen. And it turns out that nobody anticipated that leaking boric acid in this configuration would lead to creating a large hole in the reactor vessel head. When you get to the point of should the utility have been able to identify it, the answer to that, in my view, is they probably should have. They should have questioned why the leak rate changed and went up. They should have questioned why the filters needed to be changed all the time. I mean there were indications out there that something was wrong, but not necessarily was there enough information to tell you you're eating a hole through the reactor vessel head.

I have another question, however, related to this presentation. It seems to me that if you take the INSAG attributes, INSAG 15 attributes, what you've really done is to look through Title 10 and policy statements and inspection procedures and so forth to try to match up do I have something that addresses some piece of one of these attributes, okay? And you can draw a conclusion, yes, I have an inspection procedure or a reg guide or Appendix A or Appendix B or something like that that addresses bits and pieces, but it certainly isn't comprehensive.

My question is in order for an inspector in the plant, the NRC inspector, to be able to get a handle on safety culture, he would have to weave his way through the 15 or 20 different procedures and reg guides and parts of Title 10, and some of those are pretty gross. Like the description of job requirements that's in the tech specs, it goes back to the ANSI standard, I think, because it says -- it's almost like what do you need to be under the Constitution to be in the House of Representatives? You've got to be 21 years old and a resident for seven years. And so they are not very demanding standards.

The question is using the inspection procedures and all the policy statements and the regulations and the reg guides, the guidance that comes with the regulations, could you come to a conclusion that the safety culture was good or bad based on their relationship, the regulations relationship to the attributes? And the answer is probably no. Is that correct or incorrect?

MR. TRIMBLE: Yes. And also our ROP process is performance driven to -- you also would have to -- you'd have to not only do this integration but you'd also have to see an accompaniment with performance issues.

MEMBER SIEBER: Well, the bigger question is, which gets back --

MS. GOODMAN: You get back to this morning's issue where Tom Murley had, you know, do you have the performance first or the safety culture first? We're arguing which of those boxes comes first. In fact, I might argue that you might have either one.

CHAIRMAN APOSTOLAKIS: Or both.

MS. GOODMAN: Or both. They might be on top of each other.

CHAIRMAN APOSTOLAKIS: In a line.

MS. GOODMAN: And I think that we will within the Commission guidance and if we see necessary, I think we'll go to the Commission for further guidance. We'll review the ROP process. It's our intention to work within the ROP process, but I think what we did for this presentation made us take a look at could somebody, could an inspector pull all these pieces together or do we have the pieces all over the place? So it would be kind of a very difficult task for the inspector to pull them all together. And that's one thin we accomplished and you made us accomplish, I guess, by doing this presentation, and maybe that's a first step and we've got some other steps to go.

CHAIRMAN APOSTOLAKIS: Do you plan to send a SECY to the Commission on this?

MS. GOODMAN: At the moment --

MR. TRIMBLE: Well, our thoughts are what we want to do is to be very clear to make sure we're communicating well with the Commission as to -- if we decide to get back in this area, we want to make sure that the Commission is in agreement with that. That may translate to a Commission paper, it may not, but maybe communication can be done in some other way. But we definitely want to -- I think we see a need to at least talk to the Commission before we get -- you know, here at the earliest, at the onset, before we get rolling too far in any direction.

MEMBER ROSEN: Do you plan to come to the SERS' Human Factor Subcommittee and discuss what you have --

MS. GOODMAN: I think, yes. In fact -- yes. I think that it would be very appropriate for us once we have got together a plan that we would come to a subcommittee or that we would come to the ACRS to discuss our plans, and hopefully we would do a joint office presentation.

CHAIRMAN APOSTOLAKIS: I don't want people to feel that we're giving more time to the staff than the guests, but --

MEMBER SIEBER: I have one short question.

CHAIRMAN APOSTOLAKIS: One short question.

MEMBER SIEBER: I think that it's important to remember George's first question, which is, is this all safety culture or is there something else, and I think there's two issues. There is a technical issue, and that issue is have we really thought about all the way these corrode and crack and otherwise fail and alert ourselves to look for that? The other issue is the culture issue that causes people to say, "I wonder why I'm changing all these filters all the time. I wonder why the leak rate went up," and those kinds of things.

CHAIRMAN APOSTOLAKIS: I think we are already in the discussions with Mr. Meyers.

MR. MEYERS: Nobody has said this yet: If you're going to look at what -- go back to the -- after the event started that's one issue. But what allowed it to start? There was 9701 and we wrote you all safety evaluations from the owners group. Each owners group did that. The safety evaluation said that we would do head inspections, which you all endorsed. I still read that safety evaluation thinking it was a well written safety evaluation.

So we would go down and do head

inspections at every outage, we would have surveillance procedures in place to do those head inspections with and that we would look for one cubic inch of boron for criteria. And if we found one cubic inch of boron, that's what the safety evaluation gave you, I said, then we would do detailed engineering analysis of where it came from before we started back up.

You can look at the Davis Besse event and you could look at Davis Besse, period. The procedures that we had in place did not implement that safety evaluation. The owners groups did not make sure that we had procedures in place. The owners group wrote you the safety evaluation, the owners groups didn't make sure that each utility put in procedures and surveillance procedures that implemented that safety evaluation. And then when you all inspected it or INPO inspected it, you didn't call us to task either. So all of those failures are right there. If any of those failures had taken place so that we had surveillance procedures in place, inspections every outage and look for one cubic inch of boron, we wouldn't be sitting here today. Nobody's saying that, which were the failures.

CHAIRMAN APOSTOLAKIS: Which were

failures. I think it's time to move on, and we have the next presentation by Mr. George Felgate of INPO.

MR. FELGATE: Thank you. I appreciate the invitation to be part of the meeting today. I'm Vice President and Director of the Analysis Division at INPO. The Analysis Division at INPO is responsible for the analysis of all the plant-specific data that we use in preparing for our various interactions with our members. It's also the division that analyzes all the data that we use to detect emerging industry trends, and we manage the industry's operating experience exchange program.

As far as several had addressed why they thought they were here, well, INPO's name has come up a couple times, so that's a good reason to be here. But also I think it's totally appropriate. If there's a discussion about safety culture in the industry, I think INPO should be at the table, so I'm very --

MEMBER ROSEN: Will you pull the microphone a little closer?

MR. FELGATE: So I appreciate very much the opportunity to be here. Next slide, please -- or our first slide. That's good.

What I'm going to talk about briefly is INPO's perspective on safety culture, meaning how have we approached looking at safety culture? We're going to talk about Davis Besse lessons learned. That's not the subject of the meeting, I realize, and I'm not going to go into all of the lessons learned. I'm just going to mention those that impact directly on safety culture. I'll mention briefly the significant operating experience report that we've issued, and that's been mentioned a couple times, and what we're doing with that. And then, finally, I'll discuss some of the actions that we have planned going forward. Next slide, please.

Just briefly, I draw your attention to the last bullet on this slide, which is safety culture or looking at safety has been an integral part of INPO's activities going back to its formation. The Camity Commission said there needed to be at the time of Three Mile Island a dramatic change in the industry's attitude towards safety, and the INPO, of course, was the industry's response to the Commission, to the Camity Commission. Next slide, please.

This is INPO's mission, and, as you can see, it is to promote the highest levels of safety and reliability. So safety again appears prominently in our mission. It's really in our fabric of what we do at INPO.

MEMBER ROSEN: And the word there is "excellence," which implies rising standards of performance.

MR. FELGATE: That's correct. The discussion we just had about ratcheting, we do ratchet, and we do it openly and willingly and with our members --

MEMBER ROSEN: Without apology.

MR. FELGATE: That's right.

MEMBER ROSEN: Now, the staff has a different problem for a regulatory agency.

MR. FELGATE: And understandably. That's part of the differences in our two organizations.

CHAIRMAN APOSTOLAKIS: There's no backfit rule.

MR. FELGATE: No backfit rule, that's right. Next slide, please.

MEMBER ROSEN: The rule is backfit at INPO.

MR. FELGATE: As I've mentioned, it is fundamental to INPO's mission, but we have not always -- our activities have not always used the term, "safety culture." We've often gone about our activities looking at safety and dealing with safety but using different terminology in some of our interactions with our members. For example, safety focus or deep respect for the core or reactivity management. A lot of emphasis in the past by INPO on subjects like reactivity management. So while it's in our fabric, it's in everything we do at INPO, it's -- the words, "safety culture," are not spoken perhaps as often as they should be.

MEMBER ROSEN: But they do show up, do they not --

MR. FELGATE: Oh, yes.

MEMBER ROSEN: -- in the performance objectives and criteria.

MR. FELGATE: The very first --

MEMBER ROSEN: The 1997 version at least was very unabashed. It has a section, in fact it's Section 1 --

MR. FELGATE: Right.

MEMBER ROSEN: -- and it's entitled not deep respect for the core, not reactivity management, not safety focus, it's entitled, "Safety Culture."

MR. FELGATE: Safety culture, that's right.

MEMBER ROSEN: So INPO has been there for at least six years.

MR. FELGATE: But someone looking -- I

guess my point is someone looking at just what's printed on paper would get the impression that it's one of many things whereas my point is it's really embedded in a lot of what we do.

MEMBER ROSEN: But I just want to be very clear that I'm making the point, and you're confirming it, that INPO has had that focus with those words in its performance objectives and criteria, which is like the Bible for the beginning of the evaluation process.

MR. FELGATE: That's right.

MEMBER ROSEN: Since 1997.

MR. FELGATE: That's correct. Next slide, please. And I will answer the question that's on your lips there, Mr. Apostolakis.

Principles for enhancing professionalism of nuclear personnel was issued in the '80s, and as you can see, just an excerpt from that, it spoke to the nuclear professionals thoroughly and viewed with a great respect and sense of responsibility for the reactor core, for reactor safety, and all of his decisions and actions take this unique and grave responsibility into account. Another way, really, to define safety culture.

Our performance objectives and criteria, as Mr. Rosen has mentioned, says that individuals at all levels of the organization consider nuclear safety as the overriding priority. In 1996, we had a CEO conference, and for those who don't know, the CEO conference gathers together all of the CEOs in a conference at one time once a year. The focus of that workshop was safety focus during changing times, and why we picked that theme at that time was deregulation and the forces of the increasing need to keep the units online, that the pressure to produce megawatts and the impact that might have on safety focus.

Starting also in 1996 we moved to cross-functional areas where we placed a greater emphasis on the organizational factors that could detract from sustained high levels of performance or could be tracked through safety culture.

And as already been mentioned by someone here this morning, the most recent CEO conference again focused on safety culture, building it and keeping it. It was a direct result of the Davis Besse event. We discussed the lessons learned as a group from Davis Besse, and we focused on actions to not let that occur again. Next slide, please.

So our approach over the years has been an overall look at plant performance, safety culture included, by a team of professionals that have broad experience, many at the management level that are on our teams that visit the plant. Our philosophy has been if safety culture is unhealthy, it will show up in the symptoms that we look at, and I'll cover those symptoms which you could call attributes if you like or we've said they're symptoms of declining performance. Next slide, please.

Our definition of safety culture is just a little bit different. It's an abbreviated version, it's not out of line with the INSAG definition, it's similar to INSAG 4, but it is that set of attributes that results in nuclear safety being the overriding priority at the station, that set of attributes. It's very similar to what you'll read, as has already been mentioned in our performance objective dealing with safety culture.

So what do we look for? What are the symptoms that I'm referring to that we look for to see if safety culture is healthy? Every plant evaluation we look at operators in the simulator and implementing the emergency operating procedures. And it's not just can they successfully get through the procedure. It's what respect do they show for that procedure? When they come across something that is not quite written per procedure, what do they do? Do they proceed even though they may be a bit uncertain? How does the crew manage that kind of situation? Or do they blindly follow the procedure when they turn the switch or a dial and not really understand what might be happening outside the control room by turning that switch? So it's more than just seeing if they can make through the procedure satisfactorily.

We look at any evolution that might be occurring on how operators -- any evolution that affects core reactivity. It might be something simple like a boration or a dilution, or it could be a more complex evolution. But we watch very carefully how that evolution is approached and with what care and caution that evolution is performed.

We take a look at where the problems are not reported or are allowed to linger -- leaks in the plant or deficient plant equipment. We do a pretty thorough inspection of the plant, and we identify any equipment deficiencies that we come across. We check to see that they're in the system, their system, for identification and resolution. If they're not, a good question is, well, why isn't it? Are there reasons that that deficiency hasn't been identified? Does it have something to do with the culture at the station, for example?

Importantly, we watch a wide range of activities, maintenance activities, operations activities, and we take a look at do the operators or the technicians stop when uncertain or facing unexpected conditions? And over a two-week period with a team of 50 or so people on site, you will run across several evolutions where it doesn't quite go as planned, and it's very telling how the organization deals with that when they come across that situation. Is there an attitude that says, "Oh, well, it's not quite the way it's written in the procedure, but we've done it this way before, and I know I can proceed." Or do they stop, put the system in a safe condition, contact the supervisor and approach it in a conservative manner? It's very telling.

MEMBER ROSEN: You skipped the fourth bullet, and I'd really like to hear what you say about that.

MR. FELGATE: Oh, I skipped the -- safety systems are unavailable longer than need be. They may meet regulations. Their safety system unavailability may even meet the 2005 goals as one of the performance indicators, but if it's planned to be out of service, online maintenance, let's say, it's planned to be out of service for ten hours and it's out of service for

12 hours, why? Is the organization doing everything they can to ensure that operations and RP and maintenance are coordinated so it goes out of service promptly or crisply, let's use that word, and then when it's ready to be put back in service there are no inefficiencies associated? In other words, there's a respect or a recognition that that safety system, even though it may meet the rules, should be in service the absolute maximum amount of time possible. That's what's meant by that bullet. Next slide, please.

How risk is measured and managed. We look at the planning going into outages as well as the planning for online maintenance and how well the risk management of systems being taken out of service is handled by the station. We look at modifications that are installed. Do they adequately question the impact that's going to have on the margins? And it may be subtle things. It may be more than this -- just to give an example, power uprates have caused several consequential events recently in the industry but on the balance of plant side, not necessarily directly related to the power uprate scope itself. It may be that increased steam flow has caused an erosion/corrosion issue on the secondary side of the plant. Is the thinking of the plant broad enough to include that scope of impacts, unintended consequences, if you will, in equipment as well as extra challenges that might be posed on the operators in the control room. Somewhat subjective.

CHAIRMAN APOSTOLAKIS: When you say the plant whom do you mean, the management of the plant or everybody?

MR. FELGATE: Everybody, top to bottom.

CHAIRMAN APOSTOLAKIS: Top to bottom.

MR. FELGATE: Yes.

CHAIRMAN APOSTOLAKIS: So individual workers should have a good idea as to how what they're doing at the moment affects the big picture.

MR. FELGATE: That would be correct, yes. How comfortable is the plant staff with raising problems? We'll spend a great deal of time interviewing surveys, just spending time with the board operator in the control room. And after a few days with the board operator, there's a certain relationship that's established, because typically the people on our teams are board operators on another plant or SORs at another plant. And you'll see something deficient and you'll ask why is that item -- have you raised that to your management? And if you get an answer like, "I've raised it three times but it never gets taken care of," that's a culture issue, and it's a red flag to the team that there's something that needs to be addressed with the organization.

Now, that's not intended to be a complete list of the attributes, there's other things. We mentioned here in another presentations today the respect or the way operating experience is dealt with, the engagement by the management team. Do they actually go out and put their eyes on the problems in the plant themselves?

MEMBER KRESS: How many of these symptoms have to show up before you deem the safety culture to be not quite good enough?

MR. FELGATE: Actually, I'll answer that question now, next slide, because it's at the heart of the Davis Besse lessons learned. We identified a number of the organizational contributors that led to the -- that we've been talking about here off and on this morning that led to the problems that occurred at Davis Besse. We did not put it all together. We did not aggregate those organizational factors, and in doing so we did not send a compelling message to the leadership at First Energy at the time that there were degradations in safety culture, that if it wasn't going to be a head wastage problem, it was going to lead to a significant event somewhere in the Plant.

So just like the Agency, we have a lot to learn at INPO about not letting an event like that occur. And the next event won't be boric acid corrosion of a head, it will be something else dealing with -- and we want to avoid that, so we have much to learn. There are 14 recommendations for INPO coming out of that. I'm not going to cover those. The first two, though, are key to what we're talking about here, that we need to do a better job recognizing and more openly discussing with our members safety culture issues. Actually, getting to the point where when there is a set of organizational issues that are not working well, it raises the red flag, and we're very comfortable and the organization is very comfortable sitting down with us and having that dialogue about safety culture. But it's not a yes or a no; it's a continuum, and we need to have that dialogue without getting the defensiveness of the station up.

CHAIRMAN APOSTOLAKIS: I really like the argument you made because I was about to object with Tom's question, I mean why do I need to have an assessment of the whole culture, but then you said because that may lead to problems somewhere else.

MR. FELGATE: Yes.

CHAIRMAN APOSTOLAKIS: Which is a good point. But were there any symptoms other than those related to the head problem, the vessel head problem?

MR. FELGATE: Oh, yes.

CHAIRMAN APOSTOLAKIS: There were other symptoms.

MR. FELGATE: Yes.

CHAIRMAN APOSTOLAKIS: And those could have led to a problem?

MR. FELGATE: Yes, and I don't think I'm speaking out of school, because these have discussed in fairly public forums, but things like not using operating experience effectively, which is generic. If it wasn't a head problem, it was going to bite the organization somewhere else. There wasn't sufficient rigor in the way engineering organization was approaching issues. We had concerns about the supervisors and how much time they spent actually coaching and observing.

So as I said, if you list the actual organizational contributors that today in our 20/20 hindsight we know caused or led to the event and then listed the ones that we identified at INPO, we've got probably more than half of them. But what we didn't do is we didn't aggregate that. We didn't say, "That's enough for us to be worried about," to send a strong message to First Energy senior management, "There's a worry here, and you need to be worried about it." That's where we need to be better. Next slide, please.

MEMBER ROSEN: Now, would you get better by tripping sooner, by being --

CHAIRMAN APOSTOLAKIS: Paying attention.

MEMBER ROSEN: -- more sensitive by risking having too many false positives?

MR. FELGATE: Well, there's a long list of things that we're doing to not get the -- actually not let a member down like we did in this case again. One is an entire -- the entire division that I had up has been strengthened to do better data analysis.

MEMBER ROSEN: Better what kind of analysis?

MR. FELGATE: Data analysis.

MEMBER ROSEN: Data.

MR. FELGATE: We've changed the evaluation process to place greater emphasis on organizational factors rather than on functional areas, maintenance engineering. We're looking at cross-cutting management leadership issues more aggressively. So there's a whole host of things that we're doing, and

I'll mention a few more of them as we go along here.

MEMBER POWERS: Let me ask a question. I know you haven't explored all the things that you're doing, but why do you think that these kinds of things that you're doing are going to be effective and that you won't be in here 20 years from now saying, "Well, we aggregated everything together so badly that we couldn't find the specifics for the next event."

MR. FELGATE: I guess the only way I can answer that is by, just as you are doing, by getting the collective intelligence and wisdom of a lot of people together from the industry, from INPO, using the international documents and studies that have been done, doing a better job learning from what operating experience is telling us, to look for and putting greater focus -- the other thing I would say is putting greater focus on outliers. The industry record, I could show you curves of safety statistics and data that show the industry, but it's been said here that's all good and well, but if one plant has a safety-significant problem, we're going to be sitting here talking about it again.

So all I can say is that we think that we can learn from the experiences at Davis Besse and put things in place that will preclude being surprised by that again.

MEMBER POWERS: I guess I'm just worried about the general's problem of fighting the last war.

MR. FELGATE: Yes. No. Well, our focus from the start is not to address this as try to prevent another boric acid event but to look at the organizational factors that lead to a decline in performance. And to the point you were making, we are seeing -- just to answer a question you raised earlier, I didn't grab the microphone then but we are identifying some indicators that correlate well with decline in performance. One is the -- just to give you an example, one is the sum of significant and noteworthy events. We get a lot of events, more than the Agency gets, and we categorize them in various categories. And we found a strong correlation in the sum of significant and noteworthy events to plants that have experienced in the past a safety-significant event or an extended period of shutdown.

We're now applying that to plants that are running fine who have that same trend in indicators and having a predictive, having a proactive communication with those plants, saying, look, we're not saying you're about to have a significant event tomorrow, but your indicators are trending in the same direction and why? You ought to look at that, we ought to look at that together. We need to grow that set. We believe there are a set of predictive indicators that will correlate well and help us identify declining performance before it results in a significant event. Next slide.

I think -- just back up one if you would. Let me mention the SOER just a minute because it's come up several times in the discussion. We issued a significant operating experience report on the Davis Besse event. It is our top level operating experience document. We don't issue many of them, one or two a year. It contains recommendations that our teams, evaluation teams follow up with to make sure that they have been thoroughly implemented. That's what the key or unique about an SOER, significant operating experience report, is the recommendations that are followed up and not closed out until they are satisfactorily implemented by each station.

MEMBER SIEBER: Could you, just so I can complete my notes, tell me what the three recommendations are?

MR. FELGATE: I will, yes. It's on a later slide.

MEMBER SIEBER: Okay.

MR. FELGATE: This was our first red SOER since 1997, and red means urgent action required by our members. Next slide. And this SOER contains an event description, contains the causes and contributors we think that -- and we worked closely with the utility, in this case First Energy, to capture accurately those causes and contributors. And then it contains recommendations. Next slide, please.

In the case of Davis Besse, there were three recommendations. We asked every utility to conduct case study discussions with the entire management team, all the way down to first-line supervisors on the causes and contributors that led to the Davis Besse event and how they applied to that particular utility, and there was high-level involvement. At one utility, NMC, for example, the CEO personally facilitated those case study discussions. So that alone sends an important message to the organizations.

The second was to perform a self-assessment of safety culture at their stations, and we asked them to send us those self-assessments.

MEMBER ROSEN: Was this the document that Mr. --

MR. FELGATE: Yes.

MEMBER ROSEN: -- the fellow from Millstone was showing us?

MR. FELGATE: Yes. He referred to it. I don't think he's in the room, but this is what required -- we asked each utility to perform a self-assessment of their own safety culture. And what's different, a little bit unique here for this SOER, is to send those results to INPO. We're going to use those and I'll show you how in just a minute.

And, finally, the third recommendation was to identify and document any abnormal plant conditions, and every plant has them. You sort of live with them. You start the pump in this train, and it runs smoothly; you start the pump in this train, and the pipes shake a little bit and there's a little bit of a water hammer, but that's just the way this plant runs. We've asked them to get all those things on the table, identify why. Is there something more insidious about that that maybe isn't fully appreciated by the organization?

Just to address Tom Murley's point, he said if you ask a utility to do a self-assessment of their own safety culture, of course it's going to come back okay if they've got a safety culture problem. All of the safety self-assessments I'm aware of are being done by teams from multiple utilities, and the safety check or the backstop, if you will, is that we're going to look at the quality of every one of those, and we're going to go back and if it's not a quality self-assessment, we're going to ask the utility to work on it further.

MEMBER POWERS: I am itching to point out that I know of at least one example of where an operating entity looked at its safety culture and said it didn't like what it saw.

MR. FELGATE: Right. I can tell you I've seen the first ten or so that have come in now to us, and they're quite candid.

MEMBER POWERS: I was very impressed with things that Duke has done when it saw declining human performance. It turned out everything it was doing fell in the world of safety culture, but they avoided using the word, "marvelous."

MR. FELGATE: Understand. Next slide, please. Just very briefly, since I know I'm running short on time, some of the actions that we have going forward. We put a task force in place at INPO to address safety culture just like you have. It's a high-level task force because it crosses all of our cornerstone activities. Fred Tollison chairs it, I'm a member of it, we have an industry advisory group that's going to be working with us on it, and we're also getting international input. I'm aware of -- someone asked earlier are there any utilities that are looking at safety culture indicators, and we know of two, EDF and OPG, that have actually developed safety culture indexes, and we want to get their intelligence and their input into this also.

MEMBER ROSEN: But didn't we hear that Millstone had done just that as well?

MR. FELGATE: Alan Price, yes.

MEMBER ROSEN: Yes.

MR. FELGATE: As I mentioned, the safety culture self-assessments are all coming into INPO, and we're going to review each one of those, not only for the purpose of quality control but we think all of the utilities telling us what they think are important attributes in the self-assessment they did of their safety culture, aggregating all that is going to be a tremendous important source of information on a good list of attributes that ought to alert us when a station is declining in safety culture.

MEMBER ROSEN: But, eureka. That is exactly what we have been asking to have done. Am I not right, George, that we would have a set of indicators for safety culture?

MR. FELGATE: Well, these will be attributes.

MEMBER ROSEN: Attributes. Which would then have indicators, presumably.

MR. FELGATE: Well, that's the next step. I didn't -- it's not on the slide, but --

MEMBER ROSEN: Well, to what degree can we work together on this thing?

CHAIRMAN APOSTOLAKIS: No.

MR. FELGATE: Well, actually, I was going to --

MEMBER ROSEN: Wait a minute. Before you say no let's just --

CHAIRMAN APOSTOLAKIS: I just said it.

MEMBER ROSEN: Okay.

(Laughter.)

MEMBER ROSEN: I said to what degree and you said no. Okay. You have given the zero answer.

MR. FELGATE: I will jump to the end here then and say that everyone else has addressed their input on rules, whether rulemaking is appropriate in this area. It's really not INPO's area of expertise, but let me offer that this strikes me as an area where INPO is particularly well suite because of the subjective nature of culture, because of the -- you're not talking about rules, you're talking about very fine intuition maybe even is a word that you can use that something isn't quite right in the organization that you want to bring to the management team's attention.

We think we're particularly suited, and I would suggest that perhaps the discussion we should have is to what extent can the NRC monitor INPO's activities in this area? What does INPO need to do? What additional sharing with the NRC does INPO need to do to give the Agency sufficient assurance that the industry is in a robust way addressing safety culture to the point of not allowing another surprise like Davis Besse to occur?

MEMBER LEITCH: George, can I --

CHAIRMAN APOSTOLAKIS: And I would say yes to that.

MEMBER ROSEN: You would say yes to that.

CHAIRMAN APOSTOLAKIS: I would say yes to that.

MEMBER LEITCH: Can I --

CHAIRMAN APOSTOLAKIS: Go ahead.

MEMBER LEITCH: -- give you some observations and get your reaction to them? Like you, my own personal feeling is the NRC has all the regulatory authority they need, and where they don't have absolute regulatory authority they have considerable influence that they can exert on the management of an organization, even extra regulatory authority. But yet Davis Besse happened and what can we do about that situation?

And in my mind, I go back -- and how can INPO help in that regard? In my mind, I go back to the very creation of INPO following the TMI accident, and we talked about in the year or two following that what we could do about operator training or training of nuclear plant personnel, in general, and whether the NRC should do that or exactly how we should proceed in that regard. And I think there are a lot of parallels between that situation and the situation we're dealing with now.

And what was finally agreed to, and I guess a high-level discussions took place between the NRC and INPO at that time, and basically that work was kind of subcontracted to INPO through the National Academy of Training. They accredit training programs. All the training programs are accredited every four years, there's a high-level panel where there's also an NRC member, I believe, sits on that panel. At least that used to be the case, and I think it still is. And really I think over the 22 or so years since that's been in effect we have had a great deal of confidence in the health of the training programs.

I think there's been very good training programs, and they've continued to maintain their excellent status in the industry, and I think it's because of that accreditation process, which involves plant visits, it involves plant management going down and having to face this high-level panel, and we all know that if INPO doesn't fulfill their role in that to an excellent degree, the NRC is going to jump right in and do it for them, so to speak.

So I really think there's a lot of parallels there. In other words, it seems to me that a lot of this work could be given to INPO to watch, because I think INPO is better organizationally positioned to look at these things than is the NRC, because you have a mission -- your mission doesn't require the same objectivity that a regulator's mission requires. And I think maybe there could be some kind of a blue ribbon panel and senior plant management comes down that is after the plant evaluations and you've collected all the data, all the observations, that senior plant management comes down and faces this blue ribbon panel. In as much the same as we have to defend our training programs, we have to defend issues relating to safety culture.

MR. FELGATE: Yes. I don't know if I would -- I mean there's quite a bit of infrastructure, as you know, associated with the National Academy for Nuclear Training, and I'm not sure I'm sitting here suggesting that we go to that extent with safety culture. My point is just that because of the nature of the issue, I think we're better suited to look at organizational influences on safety culture than the NRC is. Not a reflection in any way on the NRC, it's just the nature of the issue.

And I think that there's obviously some need to observe then what we are doing to satisfy the Agency that we're doing that, the industry is doing that in a robust and thorough fashion.

MEMBER LEITCH: Well, my concern is you're responding to SOER -- you know, the industry is responding to SOER 0204, but to what extent is that going to be institutionalized? Or five years from now, will the industry still be looking for these long-standing problems? Will they still be bringing to the new operators the lessons learned at Davis Besse? There's going to be a lot of turnovers. In other words, is this process going to be institutionalized somehow or is it INPO SOER 0204, they come in and do a plant evaluation, check off, okay, you've done all that, but what about the next plant evaluation and the next one?

MR. FELGATE: In fact, we have a process in place already for certain SOERs that are, based on our industry review groups and our own opinion at INPO, have ongoing importance to the industry. And this certainly would be in that category, our what we call select SOERs, and have an ongoing continuous implementation.

MEMBER ROSEN: Well, I think this is clearly that kind of select SOER, but Grant's point, seems to me, is right on with that idea that some sort of arrangement, a la the training arrangement but not with all the bells and whistles of the National Academy. But not to say that there wouldn't be some sort of formalities in the process but maybe not the same formalities or modalities that are with the Nuclear National Academy. But I think you're right on there --

MEMBER LEITCH: But couldn't we use that as some kind of a model for, hey, this is what how we dealt with some very serious issues right after TMI, and is this any less important?

MR. FELGATE: Yes. Again, I think what I'm discussing here is a concept. As far as the details of implementation, an organization that isn't here right now that would have to be very much involved in that is NEI.

MEMBER POWERS: I guess I'm perplexed, and as most of the members know that's bad when I'm perplexed, I guess.

MEMBER ROSEN: Bad for you, anyway.

MEMBER POWERS: Yes. I mean we've been discussing Davis Besse here and we've concluded that the operating institution at Davis Besse failed. Other people have explained to us how the NRC failed. And we've had an explanation of INPO failed. And then you're coming back and say, Oh, but INPO's the one to correct that." And I'm desperate to try to find out what evidence there is to suggest that INPO who failed just as much as the other institutions involved is in a position to correct itself effectively here? I mean what evidence is there -- I'm sure you're very confidence that your institution can, but don't you have to prove yourself first?

MR. FELGATE: I think that's well said. We'd have to prove ourselves.

MEMBER LEITCH: Well, I think you're organizationally positioned. The mission allows them to be looking for excellence. This organization can assure that there's never another event like Davis Besse. I mean they can make an absolute iron clad guarantee that it never happens again.

CHAIRMAN APOSTOLAKIS: Graham, you mentioned TMI. As far as I know, there was a torrent of regulatory actions after that, so I'm not sure what the model you're talking about is. I mean it's true that the industry responded, INPO was created and so on, but I'm not sure that at any point the NRC said, "Oh, now they have INPO, so we don't have to do this A,B,C,D."

MEMBER POWERS: Well, that's not correct.

MEMBER LEITCH: Well, with respect to training, I think that was the case.

MEMBER ROSEN: Yes. With respect to training there was that agreement, not with respect to the torrent, the design changes and all that, with respect to training of plant staff.

CHAIRMAN APOSTOLAKIS: What kind of oversight did the Agency have on that?

MEMBER POWERS: They have a fellow on the panel.

CHAIRMAN APOSTOLAKIS: Sorry?

MEMBER POWERS: They have somebody --

CHAIRMAN APOSTOLAKIS: But, you see, training is different from this issue, because here it seems to me you have to have the trust of the utility management, and one of the hallmarks of INPO's operations, being that they do have that trust, because they're frank with them, but also your reports don't leak out. I mean they don't become public knowledge. And it seems to me if you want to be effective in issues like safety culture and you find something wrong, you do want to do that in a controlled environment and tell them frankly what you think without fearing that that will appear in the newspapers the next day.

MEMBER ROSEN: That is an issue. I think --

CHAIRMAN APOSTOLAKIS: But if you allow us in, well, I don't know.

MEMBER ROSEN: Well, our accreditation reports are also private, just like our evaluation reports are private.

MR. FELGATE: I guess what I would say in closing, and I won't go over the last -- you have the slides in your notebook -- is we're proceeding down this path because it's fundamental to INPO's mission, it's fundamental to what our members expected INPO to do is to not allow another event that has the results in a plant to be -- that reflects a breakdown in safety culture or results in an extended shutdown period for a plant, to not let that happen again. I don't think it would be in the best interest of anyone, quite frankly, for there to be a lot of duplication of effort. We feel this is fundamental to our mission, and we're proceeding on the path that I've tried to outline here today. To the extent that the Agency can monitor and assess our effectiveness, I offer that as an opportunity.

CHAIRMAN APOSTOLAKIS: Thank you very much. I particularly like that slide where you said, you know, we're going to do this and this and that because we failed there. I'm wondering whether the NRC is going to do that at some point and say, "We're going to do a few things because we identified some weaknesses in the way we do things."

The next speaker is Mr. Meyers from First Energy Nuclear Operating Company. Mr. Meyers?

MR. MEYERS: Thank you.

MEMBER ROSEN: You need to tell us why you qualify to be here, a little bit about your background.

(Laughter.)

MR. MEYERS: Let's go to the next slide. I'm Lew Meyers. I'm the Chief Operating Officer of First Energy Nuclear Operating Company, and for the last year I've been assigned to the Davis Besse station for the return to service of that station. From a safety culture standpoint and a return to service, I tell everyone now that since I've been over there I sleep like a baby -- I wake up every two hours and cry.

(Laughter.)

To give you a historical perspective of the Plant and how we got here, and I am proud to be here today, I talk about the safety culture model that we have in place and then the safety culture improvements we've put in place. Today, I listened and I came with a presentation. After listening to Charles Dugger, there were some things that I agreed with and disagreed with, some things that Howard Whitcomb said that I agreed with and disagreed with, and Alan Price and Clare Goodman. So I don't know exactly what I'm going to say now after I listened to all the other people talk. But first history.

You know, I mentioned 9701 --

CHAIRMAN APOSTOLAKIS: But you will tell us where you agree and disagree.

MR. MEYERS: I will. I've got notes. First, 9701. You know, I think if we had implemented 9701 properly, as we said in the safety analysis we submitted to you from the owners group, we would have found the leak very early and probably would not be sitting here today. I think if the owners group had come back and made sure that the utilities did what they said, we wouldn't be sitting here today. And all the various inspections could have kept us from sitting here today. So that's all history.

Now, we did have the event that was identified March 2002, and we wound up entering the 350 process, and the FENOC return to service plan has seven building blocks that I'll show you. Those building blocks were designed using the experience of a lot of other plants that were shut down for extended outages to give us a comprehensive look at our plant and to ensure that when we bring the plant back that we've addressed issues for consistent long-term performance.

Let me show you the building blocks very quickly. The return to service plan has the seven building blocks to the reactor head resolution. We've now cut a hole in our containment, repaired the containment, installed a new head, that building block supply is complete. In fact, the head's on, hooked up, and we've already pressurized the reactor up to 250 pounds.

We went through each and every one of our programs that we identified. I think there were like 45 programs. And we did a type one and type two program reviews. A type one program review was when we brought an independent group to really go through the program in detail and make sure that it met all the industry standards. A type two program was a program in which we did a review to make sure that it meets the regulatory requirements and we had good ownership, and that's comprehensive. And we went through those programs in good detail. That building block is basically complete.

The containment health building block has been enormous. We've installed new -- we painted our dome. About an acre of paint we had to scrape of our dome. We've identified issues in our containment, we've replaced the containment sump strainer, if you will. Now we believe we have the most robust strainer in the industry. And we've taken a lot of other actions in our containment. And if you went in our containment today, we've rebuilt all of our containment air coolers, I mean they're new. The coolers are new. That was a huge, huge job. The ventilation duct work that goes into those coolers is new, stainless steel -- huge job. So there's been a lot of progress there. That building block we should be closing that out on the 20th of this month, so we're looking forward to getting out of the containment. What that means is we'll be handing off to Operations, and we'll put the missile shields doors back on containment. We've already pressurized the containment and done an integrated leak rate test also.

From a system health standpoint, we've gone down all of our systems. We've looked for signs of degradation, we looked for compliance with the codes, we looked for boron leaks, and we qualified people to look for boron leaks, so it wasn't just a bunch of operators go out there and look for boron leaks. We sent them through a training program that we developed ourselves to look for boric acid. So we think that was effective.

The next building block that we have is the restart test plan. That's the plan that we have in place where we will start the -- we will heat the plant up using pump heat and prove that all the work that we've done is in good stead. That's an industry lesson learned, if you will, for plants that start-up and then have a lot of problems. We're going to try to flush all those problems out prior to restart, and so our intention is to heat the plant up. We've already ran the reactor coolant pumps for a couple hours each. We're doing the 250-pound test, but we want to go up to near about 2,250 pounds normal operating pressure and as close as we can get to normal operating temperature, check out all of our equipment that's not run the last year, condensate pumps, feed pumps, and then stay there for seven days.

And then we come back down then it's our intention to do a bottom head inspection at that time. But we've done a very thorough mapping of our bottom head, of our reactor. We did not have a permanent cavity seal, we do now in the containment, and so we've installed that this outage. We've cleaned the bottom head in great detail, so we're going up and stay for seven days. We've had Framatome do some analysis which we presented to the NRC. We know after seven days we can detect ten to the minus fourth leaks.

We've also installed a new fleece monitor on the bottom head. I think it's one of a kind. It's a detecting system using a solid state detectors. It looks for humidity and will detect -- and we're going to test that during that heat-up to prove it. We're going to inject small amounts of vapor into the system, and we believe that that system will detect ten to the minus fourth, I think it is, gallons per minute leakage, very small amounts of leakage in one of the reactors if we ever were to have a bottom head leak. We're the first plant in the United States to install that system. I think it buys us a lot of margin. It's used in Europe by 12 plants, and it's been performed well at those plants, so we're excited about that.

So we'll finish the restart test plan and that gets the Plant back online. Prior to that, and ongoing and even after the restart, there's a management human performance excellence plan that we have in place. All of that feeds into the restart action plan. And then we create an independent panel of what we think are industry experts, and they're really independent. Most of you all would know some of the people on there. That panel provides feedback to us on other things we should look at, and their charter has them to agree with us that -- not justify why we should restart but that we should restart. And there's a difference there.

CHAIRMAN APOSTOLAKIS: Wasn't there a Safety Review Board in place before the incident?

MR. MEYERS: The Nuclear Oversight --

CHAIRMAN APOSTOLAKIS: Yes.

MR. MEYERS: Yes, sir.

MEMBER ROSEN: CNRV.

MR. MEYERS: CNRV.

CHAIRMAN APOSTOLAKIS: Aren't they supposed to be independent?

MR. MEYERS: Yes.

CHAIRMAN APOSTOLAKIS: So what -- obviously, they didn't warn the management that something was wrong.

MR. MEYERS: If you go back and look --

CHAIRMAN APOSTOLAKIS: So why is this new panel going to be independent?

MR. MEYERS: If you go back and you look at that Nuclear Safety Review Board, this one's at a higher level for one thing. They have the right --

CHAIRMAN APOSTOLAKIS: So independence rises as --

MR. MEYERS: They have the right to say yes or no to restart. But the independent Nuclear

Safety Review Board we would tell you that would be one of the things that failed at the Davis Besse Plant. They did look at the potential head leakage with the data they had. They made decisions that probably for the sake of evaluations were okay. So would tell you that group did not serve their function for this particular issue. So we've done some things in that area also.

CHAIRMAN APOSTOLAKIS: Okay.

MR. MEYERS: Which is in the human performance area, okay?

CHAIRMAN APOSTOLAKIS: Good.

MR. MEYERS: In fact, some of the new charter -- new ways of looking at things now they will be involved during outages. We bring them in routinely to help us look at things where they only meeting once a quarter or something and a couple days at the Plant. We're integrating them at various parts now, so there's a new way of business now with that group. Okay.

From a historical perspective also, in August we gave you the root cause report on the reactor vessel head. What we would tell you there is that -- let's see if I can do this correctly -- is the production focused established by the management, combined with taking minimal actions to meet regulatory requirements result in acceptance of degradation. In short, industry experience, lack of industry experience and lack of technical questioning and attitude by the management.

We'll go back and look at the history of Davis Besse. In a few moments, we'll talk about a safety culture model which is much like the Dominion model. We found that our employees identified problems. In fact, they're not afraid to identify problems. Ninety-five percent of our employees say they'd write a CR in a second, and at this time they compliment us on our ombudsman program we have, so we get fairly good marks there.

However, when those programs were identified in our corrective action program, there were 29 CRs written, not that I know this or anything, but the CRs were kept at a very low level and basically given to organizations and thrown away. So we did not raise the CRs to the right level, we did not root causes like we should have, and those were management issues. So if you go look at the building blocks of policy level decisions, management level commitment and employee level commitment, the top two are the ones we would focus on the most for the return to service or Davis Besse.

Some of the attributes that we found by the management and human performance root cause -- if you go look at our management intrusiveness, technical questioning was not there, involvement was not there. The chief operating officer of FENOC was in the containment for the last refueling outage more than most of the managers. He went into containment one time. That's probably not the top of management that the gentleman from Millstone described today or that I would be accustomed to. So the technical questioning and the involvement of Management was somehow limited.

Isolationism was experienced throughout the Plant, not only isolationism to the industry but between group. We talked about that today. You know, the team work was missing. Operations had a hands-off attitude. They became sort of bus drivers. They would run the equipment. When building determinations were made, the engineers were just called over. They then came over, convinced their shift supervisor that their operability determination was correct and explained why, sort of a hands off attitude. So there was isolationism to the industry, isolationism between groups.

The corrective action program was not implemented properly, as I said. At our other plants, we review every CR in the morning meetings, every day to make sure that they're properly classified. Didn't happen at Davis Besse. I'll give you another good example. At our Davis Besse Plant, we thought we had exactly the same corrective action program at all three of our sites. At our other two sites, which I've worked at, an operability issue is called an operability determination. The engineers go off, they do an evaluation, they come back and they explain to the shift supervisor why that evaluation's okay. At the Davis Besse Plant, that same issue was called operability justification. So we told the engineers right up-front what we wanted them to do to justify it.

Root cause like rigor. Operability evaluations were narrowly focused, operations leadership was focused only on operating the Plant, material condition issues were not resolved, silo mentality between plant work groups and then written policies did not support strong safety focus. We found that to be true in the management human performance report, all those issues.

In August of -- if you need to understand our safety culture, in August 2002, we set out to understand that so we did the safety conscious work environment survey that the industry uses. We got some surprises there. What we found was there's reports in place from years ago that there was a clay layer building between management and the employees. The solution to that was not to do anymore surveys, so that probably didn't solve that problem.

January 2003, we developed a FENOC safety culture model, which I'll show you in a moment. And January of 2003, we did an independent review at Davis Besse that was conducted by Ms. Haber and her group, Human Performance Analysis Corporation. That was a -- but that evaluation was very much in line with what we thought to be true. We think that wound up being a very good product for us. March of 2003, the employee safety conscious work environment survey was performed again, and we showed about a ten point improvement in our all areas, so we were happy with that.

Let me share our definition of safety culture, next slide. This data symbol, you have characteristics and attitude. Attitudes in the organization and in individuals which establish an overriding priority toward nuclear safety activities and that these activities receive the attention warranted by their significance.

Now has everybody seen that definition two or three times today? No, you haven't. There's some key words that are different. Well, we also say "and" -- and overriding priority towards nuclear safety, and we changed it a little bit. Very similar. And that issues receive the attention warranted by their significance. That means management involvement, okay? So, you know, that's our definition. It's very similar. We have modified it slightly.

CHAIRMAN APOSTOLAKIS: You should use Word to --

MR. MEYERS: Excuse me?

CHAIRMAN APOSTOLAKIS: You should use Word to underline the differences from the inside definition.

MR. MEYERS: Okay. The word, "and," establishes and. And's different. They have some commas and stuff there in the other one. "Towards nuclear safety" is a difference, so the word, "towards." Activities versus issues -- "and that these issues," so there's a few key word differences there. And that's about it. Other than that, it's the same definition. So we defined safety conscious work environment as that part of our safety culture addressing employees' willingness to raise safety concerns and management's response to these concerns. The gentlemen from Millstone today he said it eloquently. It doesn't matter what the concern is, we need to take them seriously. Everybody's concern is a serious concern to them, and how we address those and respond to those concerns is extremely important to gain trust of our employees.

MEMBER LEITCH: Lew, did I understand you to say that your evaluation came up ten points?

MR. MEYERS: Pretty much across the board, yes.

MEMBER LEITCH: And what time frame was that?

MR. MEYERS: Well, the last one we did I think was in August. I'm sorry, it was --

CHAIRMAN APOSTOLAKIS: March.

MR. MEYERS: -- March, yes.

MEMBER LEITCH: And the previous one was?

MR. MEYERS: I think safety conscious work environment, so August of last year.

MEMBER LEITCH: So they're both after the problem.

MR. MEYERS: Yes. Yes. We wanted to benchline, take a measurement and then we'll probably take another measurement in the fourth quarter this year, see how we're doing. So surveying our employees really --

CHAIRMAN APOSTOLAKIS: What is this ten you mentioned?

MR. MEYERS: Excuse me?

CHAIRMAN APOSTOLAKIS: You said ten. Ten what?

MR. MEYERS: If you go look across the board and you say, you know, how did we improve, we saw a pretty good step change, and it was like 35 questions that we asked and a ten percent improvement across the board --

CHAIRMAN APOSTOLAKIS: Okay. Okay.

MR. MEYERS: -- from the questions that we asked.

MEMBER LEITCH: I'll ask this question of some of you later but in that time frame between those two evaluations, I read an article in the Toledo Blade or something like that where I guess it was the CEO or someone at that level said, "If we don't get this plant back online soon, we're going to shut it down." Do you think that had any influence on the answers to those questions?

MR. MEYERS: No, I don't. In fact, that

was way before that. But, you know, go look a the questions we asked. They're asked in a way where you'd have to ask -- there's correlations between questions, these three questions are correlated, and you've have to get them all right. So we looked for little deviations also, and we did find some deviations but I don't know what they were at this time. But we looked for that correlation, as a matter of fact. But we asked a similar question three different ways.

If you go look at the FENOC safety culture model, it's very similar to what we looked at today. Policy-level commitment is a corporate thing, and it may be true that we have all the policies in place and the policy statements to address safety culture. And to be honest with you, we found that we thought we had all that stuff but, you know, it wasn't nearly as clean as we thought it was or well understand. In fact, if you go look at our Davis Besse Plant, the management value structure, when we got over there we found -- when I got over there I found that the FENOC values were not being used at Davis Besse, neither was the FENOC mission of vision. They had their own.

CHAIRMAN APOSTOLAKIS: So it's not really charts like these that are important, it's how you implement these things.

MR. MEYERS: That's right. It's the -- I'll show you some more in a minute.

CHAIRMAN APOSTOLAKIS: Yes.

MR. MEYERS: From a plant management standpoint, a management-level commitment, that's the commitments that the local management have to safety culture, and the attributes that we monitor are over on the -- the commitments that we monitor are on the left hand side, and then the individual-level commitment areas and then those areas that they would monitor on the right hand side there. Let me go to the next slide.

MEMBER ROSEN: What's the significance of the colors?

CHAIRMAN APOSTOLAKIS: The colors, what do the colors mean?

MR. MEYERS: Well, in our last assessment -- in our first assessment we graded ourselves higher than we did in our last assessment, but we still believe that we've made improvements. But if you ask us right now how we would grade ourselves today as we sit here in each of these areas, before we make a mode change or a change to load fuel or any significant milestone at the Plant, we sit down and so an assessment. Now, you notice I'm not using the word, "monitoring," I'm using the word, "assessment." We did an assessment of what we think our safety culture is there and are we ready to move forward based on that assessment.

And that assessment takes about four days and involves every manager and a lot of the employees at the Plant. So we bring the employees in and we talk to them about management observations at random, and we go through each and every department and we have a group of questions. And I'll give you an example of some of those questions. I've got a procedure back here that we use, but just for example, you know, if you go look at criteria related to questioning attitude under the individual commitment area, we may have five sheets like this where we have quality of pre-job briefing, and the team has to come in and grade how well that group is doing pre-job briefings. So we have specific criteria, and we do that for each and every group, so every group has to come in. And this is only one page of probably 50 pages you've got to understand. It's not 50 but I think it's 40 pages or something.

So they have to go through all this criteria. The percent of CRs per group, and they have to grade themselves on how many people are writing CRs in their groups. And if they're not identifying problems, you know, no one in their group is identifying any problems over a quarter, that's probably a problem, right? The number of programmatic CRs, programs and process error rates we look at and then raising problems, look at the management observation program there. And so we have a group of questions and each group has to come in and present that to the total team.

We also have a quality oversight perspective where they come in and give their perspective on that assessment. And then the team gives feedback to the group. And many times when the group comes in they'll be green and when they leave they're red. So it's like a four-day process that we've used each and every time we've made a change to ensure that not why we should go forward but that we are ready to go forward.

CHAIRMAN APOSTOLAKIS: I'm not perplexed but maybe puzzled --

MR. MEYERS: Yes.

CHAIRMAN APOSTOLAKIS: -- by the first one, quality of pre-job briefs. How does that differ from yellow? It's exactly the same words.

MR. MEYERS: In the red one there's a "not."

CHAIRMAN APOSTOLAKIS: What is the "not?"

MR. MEYERS: Are not acceptable.

CHAIRMAN APOSTOLAKIS: Are not acceptable. Oh, okay. You see the significance of one little word.

MR. MEYERS: Yes. "Not" makes a difference; it's a big word.

CHAIRMAN APOSTOLAKIS: So with some exceptions is different from in general, right?

MR. MEYERS: Right. So some of these things are subjective and some are not. Some are very objective. So there's a lot of subjective questions, a lot of very especially very objective questions, like number of work orders in the backlog, number of late PMs. That's all here too in these questions.

CHAIRMAN APOSTOLAKIS: So if I say the observations -- the procedures in general are acceptable, that's different from the procedures are acceptable with some exceptions.

MR. MEYERS: Right.

CHAIRMAN APOSTOLAKIS: What is the difference?

MR. MEYERS: Well, we have criteria on

there.

CHAIRMAN APOSTOLAKIS: Oh, you have criteria, okay. Okay. This is not the only guidance.

MR. MEYERS: No.

CHAIRMAN APOSTOLAKIS: In fact, this is not guidance at all, this is just what yellow, red, white and green are.

MR. MEYERS: Right, what we would discuss.

MEMBER LEITCH: What, if any, role does INPO have in this process? Is there a point at which INPO comes and does another evaluation and says, "Okay to go."

MR. MEYERS: To be real honest with you, we've asked INPO on several occasions already just to have management -- we've had blue ribbon committees in there, we had an INPO assessment last week, an industry assessment of our ETAP program that we're putting in place. ETAP's an electrical distribution program. We found that the model was somewhat out of date so we've upgraded the model. So we brought some people in from Duke and other utilities and an INPO person. And so if you look just about on a weekly basis, there's some kind of industry group at our Plant doing some assessment.

MEMBER LEITCH: That's a special visit in some particular area. I guess my question really is, is there an overall time at which INPO comes in, looks at the whole process and says, "We agree, and it's okay to go."

MR. MEYERS: No.

MEMBER LEITCH: They're not in the loop as far as that's concerned.

MR. MEYERS: And what we do have is on the Restart Oversight Panel we have an INPO person on that Panel.

CHAIRMAN APOSTOLAKIS: One of the things that this brings up, which is a concern of mine regarding most of what is being said and written about in this field, is that in some instances we focus too much on numbers and this process doesn't seem to be risk informed. For example, I don't care that they had X process errors. It's the one error that is really risk-significant that worries me.

MR. MEYERS: You'll find that there's some questions about significant CRs too. I've got 20, 30 copies of the procedure back there with me.

CHAIRMAN APOSTOLAKIS: Yes.

MR. MEYERS: I'll give it to you to day if you want.

CHAIRMAN APOSTOLAKIS: All 20 copies to

me?

MR. MEYERS: No, I'll give you one.

CHAIRMAN APOSTOLAKIS: Oh, just one.

MR. MEYERS: This is only one sheet out of the whole procedure. It gives you some examples.

CHAIRMAN APOSTOLAKIS: But isn't it true, though, maybe this is part of -- a lot of this stuff doesn't appear to be risk informed. I mean the significance of what is being done doesn't appear to be a factor, so many complaints, so many this, so many that.

CHAIRMAN BONACA: But the number of error sis important because you don't know which ones are going to be significant or not.

CHAIRMAN APOSTOLAKIS: But I'm worried about the single error that is really lethal.

CHAIRMAN BONACA: I understand that but --

MEMBER POWERS: George, you're a POA person. You know that very, very seldom is a single error lethal, that most times it's a combination of things.

CHAIRMAN APOSTOLAKIS: But even in that context, though, not all errors are equivalent.

MEMBER POWERS: I understand that.

CHAIRMAN APOSTOLAKIS: Cognitive errors

are much worse than simple lapses.

MR. MEYERS: We would call that a significant division of quality --

CHAIRMAN APOSTOLAKIS: Yes.

MR. MEYERS: -- in our CR process, and that would be reviewed as part of this. Any significant --

CHAIRMAN APOSTOLAKIS: That's good. That's good.

MR. MEYERS: Okay. And let me give you very quickly some of -- because George used all my time up -- some of the actions we've taken.

MEMBER POWERS: That's very bad form. That never happens on this Committee.

CHAIRMAN APOSTOLAKIS: Go, Lew, go.

MR. MEYERS: Okay. From a policy-level commitment, the Board of Directors passed a resolution on nuclear safety. We do not have that straight from our Board. We established a policy on nuclear safety culture. That policy didn't exist before. We sort of had it laid out some places but it wasn't clear. We have a specific policy on nuclear safety -- on safety culture now.

We created a Chief Operating Officer position. We were looking at that person. Our corporate organization was more of a virtual organization. We actually only had the CEO, our Chief Operating Officer, at corporate, the President of FENOC. So now we've created a person that all the VPs report to that ensures that we're doing things the same at all of our plants. That's my job now, so as soon as I get through the Davis Besse event, I'll try to go do that. And we created an Executive Vice President of Nuclear Engineering. We brought Gary Leidich back and he's in that area now. So we've also elevated and got our engineering more consistent across our sites.

We established a FENOC corporate organization structure. We took our critical programs that we looked at when we did the program reviews, and we've created a whole organization, our 16 floor now, of program owners. The purpose of those program owners is to make that the programs are good quality, that they're being implemented consistently and they meet the regulatory requirements. So there's probably 20 people in corporate now that we didn't have before. So we don't have an isolation type case like we found at our Davis Besse Plant where they had different visions, missions, everything else. And in fact they were still wearing Toledo Edison hard hats over there, rather than our FENOC hard hats.

We implemented an executive level quality assurance position. Quality assurance, if you go back and look at the way we used to do business, reported to the site VPs. And if you go read the -- you know, you talked about that INPO gave you some ideas about some of the things they had found in the past. If you go read our quality assurance reports that we had done at our plant and read the report and look at the conclusions that were drawn at the end, they're not consistent with the material in the report. And we've eliminated that now. That quality is independent. They not only report up to the Chief Operating Officer and the Site VP, they report to the Board. They give a presentation to the Nuclear Subcommittee of the Board once a month. So they actually report to our Board.

We strengthened the employee concerns program. We established a safety conscious work environment policy. Once again, that's focusing on people and people's right, listening to what people have to say. We enhanced the FENOC values, mission and vision statements, went back and revisited all that. From a management level area, we went back and looked back at the senior management team and we said we want people that are dedicated to excellence, that inspire trust and believe in employee development. I'll tell you why. If you look back at the '94 time frame, we had specific things, like we had an operator pipeline program for developing mangers. That got decreased to a certification program, and then it went away all together at Davis Besse. So over time you can see that degradation from '94 to when we did our root cause report.

So we've appointed a new senior team, and that senior team we think has the attributes that I discussed. We've also went down to the next level and we're still working on finalizing some of the management team. We're looking for people that have similar attributes, they've involved in field work, what I call intrusive management, and I think that if you go look at our management team below the senior team now, they're pretty solid citizens. We've got three more jobs we're going to fill, and they'll be very solid then. And so we're finishing up in that area now.

We've established the management observation ties to plant risk. Now, what does that mean? At our other two plants we had a procedure where every day we look at all the jobs we're doing, and we do a risk significance of those jobs. And what we do is for medium risk it requires management review, and for high-level risk it requires director review at the level below me. So, you know, we didn't have that at our Davis Besse Plant, but we had it at our Perry and Beaver Valley Plant, so now we have that at all three plants.

We implemented a major improvements in plant safety margins. I told you about some of those. We then have a leak rate program we think will set an industry standard. That's specific criteria that management has to take on trends, various model increases on trends. And it has things that we can go correlate leaks to, like the filters you were talking about. So it's an integrated process to go ask if you see this change, how can you correlate that the change is real, and it gives you specific areas to go to. So we think that's going to be a model.

We strengthened the corrective action program, established an Engineering Assessment Board. One of the things we had at our other two plants that we've institutionalized here is an Engineering Assessment Board. So if you want rigor, there ought to be some board that your products from Engineering goes through to ensure that you have consistent rigor in those products. And we already had that at our Perry and our Davis Besse Plant -- our Beaver Valley Plant, but it was not at Davis Besse. And that ensures you keep that level of rigor there all the time. It's like a quality check on your engineering products.

We've assigned owners and new expectations to the engineering programs, improved problem-solving decision making processes. We have a procedure that we use that we use the INPO model from. It's where we get teams together of our best people when we have a problem, sit them down and let them bring us, "Here's what we think caused the problem, here's the approach," and then gets management approval. And that structure was not in place there at the Davis Besse Plant, and it is now.

Revised the competencies and the appraisal process to include nuclear professionalism and nuclear safety consciousness. We do evaluations on our managers each and every year, but we did not have those two areas identified as competencies with criteria. We do now. So went back and looked at that. We provide leadership and action training and additional competencies.

Our program for management development is called Leadership in Action. What I can tell you is the feeling I have is that we've really internalized that program at our other two plants, but at Davis Besse it's something we sort of check off and put on the shelf and don't really institutionalize every day like we do at our other plants. For example, if you walk in our meeting rooms at our other two plants, you'll see our leadership principles posted on the wall. They were not posted on the wall at Davis Besse, so that's some significant changes that we've made in the management --

MEMBER POWERS: Why is that significant?

MR. MEYERS: Huh?

MEMBER POWERS: Why is that significant?

MR. MEYERS: It's the behaviors you display in meetings.

MEMBER POWERS: The behavior I display in meetings, if anything is posted on the wall for more than two months, I ignore it.

MR. MEYERS: Well, that's not true. If you post it on the wall, and one of the things we do is a delta check after each meeting to make sure that we comply with the leadership qualities that we profess. So if we don't --

MEMBER POWERS: That might be significant.

Posting it on the wall is not.

MR. MEYERS: Well, let me say this: We've institutionalized those qualities, and we work on them every day.

MEMBER ROSEN: Posting on the wall works, because if somebody steps outside the boundaries of one of those factors, somebody will say, "What about the third bullet up there? Are you really behaving in accordance with that?"

MR. MEYERS: Yes. Do we beat this guy up or not beat him up or do we really take this posting seriously.

MEMBER ROSEN: Well, it's a way of bringing it to his attention without being too toxic.

CHAIRMAN APOSTOLAKIS: Do we as a Committee want to write letters, look at that frame there and ask ourselves whether what we'd write?

MEMBER ROSEN: Sure, we do.

CHAIRMAN APOSTOLAKIS: Oh, you're unique. I never do.

MR. MEYERS: We do that at every meeting. Ours is large too. It's much larger than --

CHAIRMAN APOSTOLAKIS: It's legible.

MR. MEYERS: You can see it a mile away.

MEMBER LEITCH: As an industry, I think

we're fairly good at sharing operating experience, what I would call plumbing and hardware issues, but how do we share these management level commitments? Presumably, there's some very significant management lessons that you've learned here. I mean, for example, you said you made some major changes to your Off-site Safety Review Committee. I mean how does that kind of information get around the industry?

MR. MEYERS: That's an excellent question. One of the things we've done, and we're probably going do another one before long, is we got with INPO and we did a road show, if you want to, with all the executives in the United States, and I went out -- I went to Denver, Atlanta -- where else did we go? Dallas, New England. So we went and had meetings with all the executives at all the plants in the United States. We went over all these lessons learned and more. It was like a four-hour meeting where INPO went over their lessons learned, and I spent a couple hours with questions and feedback in small groups. And we're probably going to do that again sometime in the near future.

MEMBER LEITCH: That's excellent as far as Davis Besse's concerned. I guess I'm just wondering is there any thought to institutionalizing that kind of a process?

MR. FELGATE: Just to address your specific question, one of the other recommendations I didn't address from Davis Besse was INPO to become more involved in reviewing as part of our ongoing evaluations the oversight organizations, corporate on down. But as to the specific question you're asking about, Nuclear Safety Review Board, and we'll factor into it the way we look at those, the lessons learned from Davis Besse. So that institutionalizes that for all the plants.

MEMBER LEITCH: Okay. Good.

MR. MEYERS: Now, from an employee standpoint, we've taken some actions to improve the communications. It's amazing the things that I get told. One of the things we've implemented is what I call the four Cs meetings. That's meetings that I have within employees about compliments, communications, concerns and changes. We talk about the changes we're making in the plants, stuff like that. Today, I think I've met with over 500, 600 employees at our plants in groups of about 20 each. What I do there is I bring an independent person in and they meet with the team -- the people one day so they can bring up issues and I'm not there. And then we can talk about them and have dialogue. What's funny is usually when I go through the issues now the guys will say, "I brought that one up." So it's sort of -- and that's a big change in the behaviors I've seen over the year. I think that's been effective. We've institutionalized -- trying to institutionalized the listening process, if you will.

From a management standpoint, we do town hall meetings, all-site meetings and department meetings now that we routinely schedule to get information out -- and stand-downs. And what you get from our employees when you listen to them is, "Nobody's ever taken this kind of time to talk to us before." So it's really a pretty -- I've really enjoyed the meetings that I've had. I look forward to them. And at the end of each meeting we do a delta check, and then we -- and I take actions that I follow up on, and we agree that I will take actions on these issues at the end of the meeting. And we do the same thing with town hall meetings and the stand-downs, so we think we've improved the communications with our employees.

We provide reactor head case studies to all of our employees. That was a full day training where we stopped things on-site and in groups of about

-- and various work groups just sat down and went through this whole case study. We've done supervisor refresher training, Leadership in Action, supervisor training on the safety conscious work environment, which is specific safety conscious work environment we're giving to all the supervisors now again. We've implemented our operator leadership plan. Remember, one of the issues we had was we told you we did that large root cause too. That spurred us to go do some smaller root causes. And one of the ones we did was in Operations, another one was the independent oversight group that you talked about a while ago. And that made us make changes there. And you heard about some of the issues that we came out with in the Operations root cause. So we've got that plan in place and are tracking items. It all folds up and under the management human performance plan.

We strengthened the individual ownership and the commitment, both in engineering, operator licensing, operational decision making process and the shift manager command and control. Our CEO has met with each one of our shift supervisors personally, and I have taken groups of three shift supervisors at a time to Akron to sit down for a couple hours, each and every shift supervisor that we have at Davis Besse.

And we've rewritten the duties and responsibilities of the shift supervisor on shift and communicated those very well and made sure that we have buy-in across the board. And so we think from an operational standpoint right now the feedback that we get from the independent groups that come in is Operations is probably the strongest organizationally. So we feel pretty good about our Operations group.

We've established a site integration plan for alignment and leadership development intervention, and what that plan is is a plan that's a longer-term plan where we before we start up we're going to sit down with 200 employees, 20 at a time, in groups of 20, and we've got a road map for the next -- to get us to 2004. As we come up, we'll meet our schedules assuming, we have mid-cycle outage we've got to do, we've got -- our people are all worried about the backlogs that we have. We had all these walkdowns and everything, and what you really see is our backlog is going to be pretty low when we start up, a lot lower than we think anyone's seen before. So are we going to be able to manage all that stuff, and the answer is yes. So we've got to sit down and share with our employees all the things we have to do and make sure that we have it aligned not only prior to start-up but after start-up.

Now, in closing, I'd like to say that safety culture can be monitored, I believe, with the existing performance indicators. If you go look at -- now, there's a difference between assessing and monitoring. If you've got a good operating plant, I think you're in a monitoring mode, but if -- I think safety culture can be monitored with existing performance indicators.

There's two real questions that need to be asked when monitoring safety culture of the two plant assets. The only two assets that you have are the material condition of your plant and the people that work there. So that's where you better focus. Are the safety margins at your plant in the material condition and engineering areas improving on a cycle basis? If you can't have some performance indicators that tell you that you're PMs are up to date, your material condition is good, your A1 system issues are being worked off, and the engineering issues you have on your plate are not great and you're gaining safety margins every cycle, I don't believe you can look at it on a yearly basis. I think you have to look at it on a cycle basis. So in that cycle, if you do not gain safety margins in your plant, you've gone backwards.

From a personnel standpoint, you need to look at your programs for strength in your organization: Your employee problem and resolution program, there's several of those, the technical training programs that you have in your plant, the supervisory development programs that you have, the management developmental programs you have and the leadership development programs that you have. So for succession planning if you're not laying leaders out and developing leaders for the future every cycle and you have those identified, you're probably going backwards.

Taking strong actions when degradation exists and any decreases in safety margins, either in people or material conditions of your plant, will ensure the organization is what I call built to last in the future. That's all I have. Thank you.

CHAIRMAN APOSTOLAKIS: Any questions or clarifications? We've asked a lot of questions already, so why don't we take a break until ten past?

(Whereupon, the foregoing matter went off the record at 3:50 p.m. and went back on the record at 4:10 p.m.)

MEMBER APOSTOLAKIS: Our next speaker is

Jack Grobe.

MR. GROBE: Again, thank you very much. My name is Jack Grobe. For the last 15 months or so, I've been deeply immersed in Davis-Besse. I've been serving as the chairman of the Davis-Besse Oversight Panel for the NRC.

I don't think I sleep for two hours and wake up crying, but it certainly is what I've been eating, sleeping and thinking day and night for the last 15 months.

With me today is Geoff Wright. Geoff is a Senior Staff Member from Region 3 and he's been leading each of our inspections in the Management and Human Performance area at Davis-Besse.

My goals today are to discuss the regulatory basis for the inspections we're performing in this area at Davis-Besse. Geoff will describe the inspection approach we're using in some detail. And then I'd like to conclude with providing you some thoughts on potential short and long-term regulatory oversight improvements.

Next slide, please.

(Slide change.)

MR. GROBE: Prior presenters have discussed in quite a bit of detail the current U.S.

and international guidance on safety culture, so I won't go into much detail there. The NRC does not routinely inspect management or cultural issues. The focus of our inspection program is what we call performance based, we look for performance problems and then if they're risk significant, we further engage and drill down into those problems to find out what the root causes might be. Less significant performance problems are left to the licensee to address.

There is one significant regulation that could be used to address this area. It's Criterion XVI of Appendix B, Corrective Action. An effective Corrective Action Program is essential for sustained safe operation. And the foundation of an effective Corrective Action Program is the ability and willingness of the utility to identify all of the root causes of a problem. And those root causes should include cultural issues.

Criterion XVI provides us the regulatory basis for performing the inspections into these areas at Davis-Besse, since the head degradation, root cause involved cultural issues.

The next slide is just a brief summary of what Lew Meyers spent a couple of pages on.

(Slide change.)

MR. GROBE: It's a broad overview of the root causes, the principal causes of the reactor head degradation were cultural.

Let's go to the next slide.

(Slide change.)

MR. GROBE: The Oversight Panel was significantly challenged, given the state of regulatory standards to measure these types of issue against. The challenge was how do you determine that the licensee had made sufficient progress that the plant could be restarted safely and would ultimately operate on a continuing basis in a safe way.

The Panel designed a set of inspections. The inspection that Geoff is going to describe is one of those which will give us insight into those attributes that are essential for safe operation and continued safe operation into the future. So the Panel will be utilizing not only this inspection, but others, as well as the licensee's assessments in a combined fashion to make a determination of whether sufficient progress has been made to restart the unit.

The inspection, the specific inspection, we call it Management and Human Performance, was divided into three phases. The first phase was the root cause assessments and whether or not they were sufficiently broad and deep. There was nearly a dozen different root cause assessments that were performed and there was a very, very broad one using the MORT, Management Oversight Risk Tree approach that went into organizational issues. But then there were separate assessments of the operations organization, the engineering function, quality assurance function, the oversight committees, corporate support and there were several others that combined together and resulted in the corrective actions that would address each of the building blocks.

I believe the Management and Human Performance building block had some 125 or more corrective actions that were identified through these root cause assessments.

Phase I and II are already complete. Phase II was a review of the corrective action plan in each area and the implementation of those corrective actions and that the goal was to make sure that those corrective actions addressed all of the identified causal factors.

The Phase III of the inspection is in process today. That is an evaluation of the effectiveness, the on-going effectiveness of those corrective actions. And Geoff will go into some detail. I just wanted to briefly touch on, again, due to the state of regulatory structure in this area, we're utilizing a combination of NRC and international guidance in conjunction with regional staff, headquarter staff and contract staff that have extensive experience in organizational effectiveness assessments.

And between a combination of that expert team and the guidance, both national and international, we've put together inspection plans, detailed inspection plans to accomplish the assessments in these areas.

MEMBER SIEBER: This plan is unique to the Davis-Besse situation?

MR. GROBE: Absolutely.

MEMBER SIEBER: So you didn't find regular inspection plans in the grand scheme of things that were appropriate for assessing safety culture?

MR. GROBE: That's correct.

MEMBER SIEBER: If a plant has a bad safety culture, where would you expect to see it in the ROP process?

MR. GROBE: If we could hold that question because I've got a number of comments I'd like to get into on that.

MEMBER SIEBER: All right.

MR. GROBE: Go ahead, Geoff.

MR. WRIGHT: If we could have the next slide, please.

(Slide change.)

MR. WRIGHT: The third phase of our inspection program into the Management and Human Performance area is designed to look into six areas that the licensee is working on.

One is assess the process that they have used for their internal assessment, that is what Lew Meyers was talking about on his safety culture model, to take an in-depth look at that, what the attributes were and the standards against which they were assessing their performance.

The second item was what we referred to as the external one which is the assessment performed by Dr. Haber which you'll hear about later this afternoon.

The third item was to take a look at what process the licensee is going to use for monitoring their safety culture in a long-term process, not just for restart, but on a continuing basis for some period of time.

The next areas that we wanted to look at was the Employee Concerns Program as it is a subset of an overall safety culture, as well as those items that they're using to improve the safety conscious work environment at the facility and a review team that they have put in place to monitor and to work on safety conscious work environment, potentially safety conscious work environment type of issues called Safety Conscious Work Environment Review Team.

So those are the six areas that we are looking into. As Jack indicated, we are not judging at the end of this whether the output from some of those assessments, whether it's the internal or the external. My team is not judging the output on whether it's acceptable or not. The 0350 Panel is going to take our input and take a look at the output from those assessments and combine it with all the other inspection activities and licensee activities since the issue covers the whole site and not just a very narrow area. They're going to make that determination. My inspection team is not going to make that determination.

MR. GROBE: Let me say that in a little bit different words just to make sure that message was clear. We are not assessing safety culture at Davis-

Besse. What we're doing is utilizing national and international guidance to assess how they're assessing safety culture and then we're utilizing the extensive inspections that we've conducted in engineering, corrective actions and all other areas to look for the outcomes of the improved safety culture and in areas where we don't see improved outcomes and there have been several of those, we clearly articulate that to the utility and they go back and look again at what they're doing and the effectiveness of their actions.

MEMBER ROSEN: Jack, I think I understand the structure, but the timing is a little bit a mystery to me. Don't some of these things take time to not only be embedded in terms of programmatic aspects, but also to show outcomes because the processes have to evolve. How can you assess the outcomes today of a program you put in place yesterday? That's an exaggeration, but that's the issue.

MR. GROBE: I had forgotten that Plant A, Plant B, that Tom put up earlier today and in some of my younger years I remember that clearly and brought back fond memories. Both Plant A and Plant B met regulatory requirements and were safe as defined by the NRC. Clearly, Plant B had significantly less organizational safety margin than did Plant A.

What we're looking for, for restart decision is sufficient improvement, but by no means do we believe that that will be the end of the improvement process, but sufficient improvement to assure that the plant can be restarted and operated safely.

MEMBER ROSEN: Jack, can you see it? Will you see enough outcomes to be sure?

MR. GROBE: That's for the Panel to judge. I believe the answer to that is yes. We should be able to see it. In some areas, we haven't yet seen it and we're continuing to inspect.

One of the -- I can briefly summarize in kind of some broad contexts what both the internal safety culture assessment process and process done by Dr. Haber concluded. What it concluded is that there were already some substantive changes in the culture of certain work elements at the plant. There were not substantive changes in other work elements at the plant. There was an inconsistency laterally across the organization.

In addition, there was inconsistency vertically in the organization. There was different understandings and expectations at some levels in the workers as contrasted with the supervisors and managers.

And one of the other findings was that there was no long-range vision on organizational effectiveness and a plan on achieving that long-range vision, in essence, the Nirvana of safety culture. Where do you want to be in three years, five years? So the utility has been working on those attributes.

The Oversight Panel will not disappear at restart. It will be in place for an extended period of time after restart, continuing to monitor. And that's why it was important to get Geoff's team in here to make sure that the tools that they're using to monitor safety culture going forward are effective tools so that we can utilize those in the future to depend on them.

It's clearly a long-term process. At some point they've made sufficient progress to authorize restart and we're not there yet.

MEMBER ROSEN: Maybe this is a question for Lew is you're running the place now, but is that -- are you going to keep on doing that after restart?

MR. MEYERS: I said that we have a longer term plan now. And we've got a director we put in charge of organizational effectiveness. Long term plan right now takes us out through the summer of 2004, so we've got a plan in place to continually assess through 2004 and then maybe at that time it will be ready to go into a monitoring phase.

MEMBER ROSEN: Where you'll move back to your corporate home?

MR. MEYERS: I'll move back before then.

MEMBER ROSEN: Well, that was the question, when are you going to move back? And who is going to be running the show?

MR. MEYERS: We've already announced that. We already have a Site V.P. that we selected for Davis-Besse.

MEMBER ROSEN: Is he named officially?

MR. MEYERS: Yes, Mark Bazilla. So he's on site now. I'm still there and I'll move back some time after restart.

MEMBER APOSTOLAKIS: All this activity though and what Jack mentioned, you know, it implies that you have some sort of what's good in your mind.

I wonder whether the reactor oversight process can take advantage of it and maybe in the future be modified so that we will not have an embarrassing incident again where we give all greens for a plant and then something happens. Are there any plans for doing this or are they doing independent activities?

MR. GROBE: That was actually one of the recommendations that I was going to talk about.

MEMBER APOSTOLAKIS: Okay.

MR. WRIGHT: Next slide, please.

(Slide change.)

MEMBER LEITCH: Just a question about the Employee Concerns Program, did you find that it was broken? In other words, was it a failure of the Employee Concerns Program why individuals didn't bring some of these issues forward earlier?

MR. WRIGHT: We haven't made any conclusions. What they have done is at the beginning of this year, an entirely new program was put in place. They had gone from a single individual ombudsman program to an actual Employee Concerns Program with a manager and a number of independent investigators. So we're looking at -- we've looked at what they had before and we're looking at what's in place now to see what are the changes and have improvements been made.

MEMBER ROSEN: In the new program, the new Employee Concerns Program, is there an internal oversight group that looks at what the internal --

what the functioning of that Employee Concerns Program?

MR. WRIGHT: I don't believe -- they have a program to do an assessment of that organization, but it has not been done yet.

MR. GROBE: Let me flesh this out a little bit. The assessment that Lew spoke of that was done last August on safety conscious work environment revealed there was little confident in the ombudsman program. And as Geoff indicated, that program has been completely revamped and strengthened. This inspection team is continuing to look at the Employee Concerns Program, but I believe part of the Safety Conscious Work Environment Review Team, SCWERT, as an acronym, part of their charter is to look at safety conscious work environment. And if the Employee Concerns Program is not functioning effectively, I think that would surface through the SCWERT function in their periodic reviews of the effectiveness of the health of the safety conscious work environment.

MEMBER LEITCH: I guess my question was continuing to look for things that might have identified this problem sooner. And I guess my question was really was the Employee Concerns Program broken and therefore people weren't bringing issues forward and might that be a place to focus on and I guess what you're saying is you still haven't really drawn a conclusion in that matter?

MR. GROBE: No. I think it was broken. I think what Geoff was referring to is they haven't drawn a conclusion on the current existing program today.

MEMBER LEITCH: I see.

MR. GROBE: And I think, yes, it would have been a valid outlet for members of a staff if they felt their concerns weren't being adequately addressed, to bring them to the Employee Concerns Program, but there was little confidence at that time. There was an ombudsman program. There was little confidence in it.

MEMBER LEITCH: Thanks.

MR. MEYERS: I said earlier too, if you go look at the root cause that we did, we didn't find a situation where people were not writing CRs. And the CRs were getting resolved. They were just not getting properly elevated and root causes done. In other words, we have these low level CRs. They were treated as low level CRs and didn't meet the criteria for low level CRs. So you know more than anything else we had 29 CRs written any one of which could have led us to the head degradation issue.

MEMBER LEITCH: I guess -- I don't want to take too much time, but the Employee Concerns Program is sort of a bypass around that CR process and I guess if you had an effective Employee Concerns Program, even if the CRs weren't getting addressed, an individual could say and elevate the concern that hey, I've written all these CRs and nothing is happening. I'm still concerned.

But that program was evidently not functioning effectively either.

MR. MEYERS: What I would say is we had an ombudsman program. We didn't have an Employee Concerns Program. An ombudsman program, the guy sits in the office and waits for you to bring in a concern. We turned our program into a proactive program where we're meeting with people and trying to find out if they have concerns. It's a more proactive program. And we've also done things to improve the confidentiality of the program.

MEMBER LEITCH: Thank you.

MEMBER APOSTOLAKIS: The Davis-Besse incident, it seems to me we're -- obviously, the licensee had problems, but it's still not clear to me what our inspectors were doing there.

Is there a similar panel looking at the NRC itself?

MR. GROBE: Yes. I guess you've asked this question three times, so maybe I should answer it now.

(Laughter.)

MEMBER APOSTOLAKIS: It's been asked three times?

MR. GROBE: The Lessons Learned Task Force presented to you several months ago.

MEMBER APOSTOLAKIS: Yes, I've seen that.

MR. GROBE: And they made approximately 50 recommendations in quite a few areas, both regulatory structure as well as inspection program and other areas, research. They addressed quite a few areas.

They did not touch on this area, safety culture. I think this area is very critical. And Davis-Besse is not unique. Mr. Collins earlier suggested there might be other plants with equally challenged cultural aspects to their organizational effectiveness. There's a number of plants across the country that have had significant performance problems, Cooper, Point Beach right now, Indian Point and I believe there are many cultural attributes. We now use that word, cultural attributes, to characterize what we might have called something different a few years ago. So I don't believe Davis-Besse is unique. And I think it's essential that we do something to address this issue.

Dr. Apostolakis, you asked questions earlier about what were the inspectors doing in response to the leakage was going up and down, and the filter clogging and all of those issues. That was Plant B. They were complying with all of their requirements. Our inspectors were engaging. The branch chief was engaging on a regular basis with plant management, encouraging them to address these issues in a more proactive nature. But they were in compliance with all of our requirements. So from that standpoint, the NRC was limited in its ability to engage in a more structured way, a more formal way.

MEMBER APOSTOLAKIS: What that tells me is that the two inspectors who were there were doing their job, but the Agency was not, because if our requirements allow Plant B to operate, then something is wrong.

MR. GROBE: I think that's the way Bill Travers has characterized at Davis-Besse, it was an organizational failure on the part of the NRC.

MEMBER APOSTOLAKIS: Yes.

MR. GROBE: Let me talk in a little bit more detail. The --

MEMBER LEITCH: But there was a requirement to inspect the head, right?

There is a requirement that you can't have primary system leakage, right?

MR. GROBE: Yes. I wasn't around back then.

MEMBER LEITCH: I mean it's not like they were in compliance with all the NRC requirements.

MR. GROBE: Again, they were in compliance in the context that there were CRs written regarding the boric acid on the head. Those CRs were resolved and closed.

From time to time inspectors would question the resolution of one of those types of CRs and the answer was the head had been cleaned and everything was fine, that there was not the leakage that was being experienced, the identified and unidentified leakage inside containment was not coming from the head because it had been cleaned and inspected.

And that was documented in work orders, in the condition reports. So a head is not something that you can just go out in the plant and inspect. So you have to depend to a certain extent on those types of interviews.

Now one thing we did not take advantage of and we're encouraging stronger involvement in this area is video evidence. We could have pursued further the video record that was made of the head and whether there was video post-cleaning activities. But we didn't do that at the time.

MEMBER ROSEN: Is there any indication that those reports were false or misleading?

MR. GROBE: There is an on-going investigation into many of the aspects.

MEMBER ROSEN: So that's still yet to be determined. That's 50.7?

MR. GROBE: That's 50.9.

MEMBER ROSEN: 50.9.

MR. GROBE: I believe the augmented inspection team follow-up report, it's already been documented about eight different areas where there was inaccurate information. What OI is investigating is what was the cause of that inaccurate information.

MEMBER APOSTOLAKIS: So at some point, someone from the staff will come and talk to us about the organizational institutional changes that perhaps will take place within the Agency?

MR. GROBE: I think Chris Boder and Cindy Carpenter's folks would be glad to do that. There's an action plan in each of the areas. There's one dealing with ASME code requirements and text spec requirements. There's one dealing with research. There's one dealing with inspection.

MEMBER APOSTOLAKIS: Good.

MR. GROBE: And the EDO receives a report on progress on each of those Corrective Action Plans every six months.

I believe one of those reports was just completed in the last couple of weeks.

MEMBER APOSTOLAKIS: Do we get copies of those reports? Very good.

MR. GROBE: Geoff, I think -- why don't you try to quickly go through the slides.

MR. WRIGHT: All I wanted to do, a couple more items here for your information and interest. In the areas of inspection guidance, we do have within the Agency guidance dealing with Employee Concerns Program and we have a specific program, procedure that we can follow. We're using that to look at the new Employee Concerns Program.

I think as Clare indicated before, there are questions that we do get into on safety conscious work environment. We've interviewed about 45 people, I believe, or 50 people on the site, as part of the inspection and have folded in a number of these questions into those interviews in looking into that area.

For the three areas dealing with safety culture, where there isn't any specific guidance on even what a good program should include, we are using some of the international standards, guidance, the INSAG documents to look to see the programs that are being used, do they have some of the same attributes that are mentioned there. We're looking at them both as well as the surveys. Were the surveys an appropriate survey? Did they have the right type of questions? Did they try to discriminate against -- I think the question was if a person knows their job, it depends on their answer. Are you going to get truthful answers. We're looking at the surveys to make sure that there are ways of discriminating against that kind of answer.

The interviews that the people, that the surveys were done, some of the observation of work activities that were accomplished through, by the utility and by Dr. Haber's people. We're looking in those areas to get a feel for how rigorous were the evaluations and can, in the future, can the 0530 panel rely on the output from that evaluation as a good output.

MEMBER APOSTOLAKIS: Has the Commission ever expressed an opinion about the INSAG documents?

MS. GOODMAN: I don't believe the Commission has. Do you think so, Jake? No. Jake Persensky is agreeing with me, that as far as we know, the Commission has not commented on them.

MEMBER APOSTOLAKIS: They are aware of the fact you are using --

MS. GOODMAN: Yes, they have been briefed on those documents. In fact, Jake Persensky has briefed several of them.

MR. PERSENSKY: Jake Persensky from the Office of Research. In fact, Jack also briefed the Commissioner's assistants on this particular inspection plan, what we were doing.

As far as the Commission recognizing the INSAG documents, about the only place you'd see that would be in the policy statement on conduct of operations, where in fact, they refer to and take large quotes out of INSAG 3, which was the only one available at the time of the policy statement being developed, but there haven't been any further endorsements of that process, but we've been using it and it was part of what we were doing in terms of developing inspection program plan for this.

MS. GOODMAN: I was just going to say, we have given a copy of that policy statement to -- if you want a copy for all the members, that policy statement because it is one that has not surfaced recently.

MEMBER APOSTOLAKIS: Because the INSAG documents were not written for the regulator, right? It was general documents of the safety culture.

MS. GOODMAN: But that policy statement sort of incorporates a number, at least what the status was in 1998, have been incorporated in that policy statement. I've interrupted you now three times, I think.

MR. GROBE: That's fine. I was just going to further clarify one issue that Jake mentioned. Due to the sensitivity of this type of inspection, we did brief each Commission office on details of the inspection plan and how we were going to approach it and who is on the team. So they're aware of what we're doing here.

MR. WRIGHT: Next slide, please?

(Slide change.)

MR. WRIGHT: Here you can just see, we wanted to let you know who was on the team. As you can see four of the seven individuals are here today. You've heard from Clare. You've heard from Jake. Lisa is here with us as well and myself.

The two individuals who are not with us are John Beck and Mike Brothers. They're consultants. Both worked extensively at Millstone and have had extensive experience dealing with safety conscious work environments and the like, as well as operations from an executive level in the industry. We thought from a balance on the team that it was important to have kind of expertise along with us. So they are also working with us.

The next slide is rather abbreviated and unless there are questions, I've talked a little bit about the approach that we're using, evaluating the surveys that were done and the interviews that were conducted. I won't go in and take up your time as far as more details on just the how -- but I would respond to questions if you have some in that area.

MEMBER APOSTOLAKIS: Next slide.

(Slide change.)

MR. WRIGHT: Go ahead, Jack?

MR. GROBE: I just had some broad

conclusions, somewhat different than what's on the page. You can read that. That's self-explanatory.

Alan Price suggested that each utility is evaluating and responding to safety culture issues. I think the empirical evidence might not support that, at least wouldn't support that they're effectively doing it because we continue to have performance problems, not necessarily as significant as Davis-Besse's, but still significant performance problems at various utilities.

I believe that there's additional work that needs to be done in this area. The current reactor oversight process regulatory intervention opportunities are two-fold. There's, of course, the action matrix which is a graded response, but that graded responses comes on risk-significant outcomes, so if there are safety culture concerns, it is a lagging response. I don't know which box you'd but the arrow between, but it's later on the right hand side of Tom Murley's slide.

The other area of regulatory intervention is a very limited opportunity to engage in what we call cross cutting areas. The Agency has defined three cross cutting areas, human performance, Corrective Action Program effectiveness, and safety conscious work environment. And the limited opportunity to engage and this might be what you were hearing about in Region 1 is that once a year, we can put two or three sentences into a letter and there are no structured response requirements or management meetings or further engagement. It's simply a few statements that there appears to be some concern in this cross-cutting area.

MEMBER APOSTOLAKIS: But it was made very clear to us that they cannot be dismissed by the utility. Even though they're not regulatory requirements. It would be asking for trouble if they just said --

MR. GROBE: Well, I'm not sure what kind of trouble they'd be asking for. There is no provision to do additional inspection.

MEMBER APOSTOLAKIS: No.

MR. GROBE: It would still be doing just the baseline inspection. So it is an opportunity to express to the utility in a public format some concern that it ends with that, just the expression and concern.

The current inspection procedures under the ROP examine many of the outcomes, the relevant outcomes of safety culture. Again, it's focused on the outcome and it's based on risk significance. The entire ROP, the inspection attributes that are selected, this is now three or four years ago when we initially put together the ROP, it was baaed strictly on risk significance.

Probably, the most significant insights on safety culture can be gained from the review of the Corrective Action Program, as I mentioned earlier. Significant conditions adverse to quality are not only required to be corrected, but that the new policy is expected to be identified and prevention is expected to be implemented.

In addition to that, the utility's trend lower level significance issues, and when there's a trend indicated, there would likely be cultural aspects there. I believe with additional guidance and training of the staff, we could get more intrusive into the insights of safety culture effectiveness of utilities by more thoroughly examining the root cause in those areas.

MEMBER APOSTOLAKIS: But then what would we do? I mean if these are not requirements?

MR. GROBE: Criterion XVI is a requirement. If they have not adequately addressed the root causes to prevent recurrence, then that's not consistent with the requirements.

The inspection reports that are currently available to the public are very broad and the only specific outcomes that are discussed in those reports are situations where there is a violation. There would not be any discussion of organizational effectiveness issues or cultural issues or anything of that nature in the reports the way our guidance is currently structured.

The industry initiatives pursuant to SOER 204 are quite meaningful and I heard some dialogue earlier about the Training Institute. I'd like to clarify just a couple of things. The NRC nominates one individual on the Board. That's normally a very experienced individual who doesn't work for the Agency.

In addition, the NRC observes the dialogue when the licensee is presenting information to the Board and questions that the Board might have for them. But the NRC is not permitted to observe any decision making that the Board does.

In addition to that, there's no public presentation of the findings of the accreditation board to -- so if we were to incorporate safety culture concepts into an INPO initiative, there might be certain challenges with respect to the NRC's need for public scrutability, for public accountability, public confidence.

I was interested in one comment that was made earlier and that was that there was significant infrastructure necessary for the accreditation organization. Well, technical competence of the staff is just one attribute of safety culture. There's many other attributes and if there's a need for significant infrastructure to effectively assess training accreditation, one would think there would be need for substantial infrastructure to assess safety culture effectively also.

MEMBER ROSEN: I don't think that was the thrust of it, Jack.

MR. GROBE: Okay.

MEMBER ROSEN: My sense of that issue is that having been there and done that, the utility has put in place a substantial structure to gain accreditation and to maintain accreditation. So does INPO and the National Academy for Nuclear Training. What I was saying was that if the INPO route which was offered by George Felgate's concept was chosen, that that degree of infrastructure, both in the industry and in INPO need not be put in place because it's really pretty massive in training. We're talking only about -- at least I was talking only about the fact that there's a deal struck between the industry through INPO and the National Academy and the Agency. Well, a similar deal could be struck in the safety culture area that INPO will do certain things and the Agency will have certain access to that and if that meets the Agency's needs, fine and well. If not, no. But the structure that comes with the National Academy of Nuclear Training need not be replicated in another way. You don't need the National Academy of Nuclear Training Two to achieve this objective. We kept some form of averages, true, but not necessarily completely analogous to the National Academy.

MR. GROBE: I'd have to think about this quite a bit and the devil may be in the details of how you structure that and the relationships and things of that nature.

MEMBER ROSEN: I don't think anybody is drawing any conclusion. I'm just pleased to have had the offer, so now it can be considered.

MR. GROBE: A couple other thoughts maybe to consider. The cross cutting areas defined in the ROP may not be sufficient. Safety conscious work environment and Corrective Action Program effectiveness, the attributes that go into a Corrective Action Program effectiveness do capture some of the safety culture issues. But they don't necessarily capture all of them. So it may be appropriate to revisit the cross cutting areas to see if they fully capture what we want to be assessing.

In addition, the mechanism for regulatory engagement in those areas may be appropriate to evaluate that.

As I mentioned earlier, guidance and training for the staff and expanding their competencies beyond the technical realm of evaluating engineering quality and Corrective Action Programs and making sure that thorough root causes in the organizational effectiveness area may be an opportunity to further improve on a short term the effectiveness of the Agency.

In the long time, I think Clare described the direction from the Commission to monitor industry and international activities in this area and evaluate the need for any NRC action.

One other issue I touched on briefly and I think it warrants consideration is that the ROP was originally set up with the inspection attributes selected on a risk-informed based. And Clare went through quite a dialogue of looking at safety culture attributes and trying to see backwards how the program fits into those attributes and found some elements of them in a number of areas.

It might be an appropriate time to revisit the inspection program, not only from a risk, but from a cultural perspective and see if there's a better way to integrated those attributes into the inspection program.

Those are just some thoughts I had.

MEMBER APOSTOLAKIS: Very good. Thank you. Mr. O'Connor from Fermi.

MR. O'CONNOR: Thank you. My name is Bill O'Connor. I am the Vice President of Nuclear Regeneration at the Fermi Nuclear Plant. I'm also here as the Chairman of the Board of the Utilities Service Alliance and we've talked a lot today around what are the attributes and the Utilities Service Alliance is a group of plants that I'll talk about in a second, but we put together what we think is a credible way to perform, at least a one time assessment and then figure how to do it in an on-going way.

Now how did I get to be here today? Mr. John Barton, a former ACRS member, a rather quiet and reserved fellow, as you all know, sits on my Safety Review Board and we made a presentation at our last Nuclear Safety Review Board meeting about what we were doing and the results of our assessment at Fermi and he thought that this form may be one that we ought to come and at least talk about, but appears to be one way of doing it that is getting some positive results.

Next slide, please?

(Slide change.)

MR. O'CONNOR: Again, this is just what I intend to talk about today. Next slide.

(Slide change.)

MR. O'CONNOR: The Utilities Service Alliance is a legal entity. It does involve the stations that are listed on the board. We don't own each other. We don't control each other's stock or anything, but we have a Memorandum of Understanding between us on personnel sharing, common supply chains, things like that, so -- but our goal is to improve the operation of our fleet of plants which is slide 4.

Next slide.

(Slide change.)

MR. O'CONNOR: We want to operate a fleet of safe cost-effective top quartile operators. We've got some strategic objectives in our business plan and that's what USA is all about.

I want to jump what really got us going in this safety culture assessment. At our board meeting in June of 2002, right after Davis-Besse announced the head degradation in March, we had been watching very closely what was going on and one of the questions we asked ourselves at our board meeting was do any of us in our plants have the same kind of weakness that existed at Davis-Besse. So we wanted to do a really deep dive through our organizations to see what can we look at, what can we do to hopefully get ahead of this so that we don't let one of our stations get into a similar situation.

(Slide change.)

MR. O'CONNOR: You've seen the next slide a bunch of times today about what is safety culture. You've seen the next slide.

(Slide change.)

MR. O'CONNOR: So move on about what's a safety conscious work environment.

(Slide change.)

MR. O'CONNOR: Slide 8, we are looking at ways to assess the safety conscious work environment as part of our assessment and I will leave a copy of this report with the ACRS.

This is the training manual we use for the team members that go out on the assessment. It has all the question banks. It has all the matrices that we use to do the assessment, how we do the scoring, so just you can have the details.

One of the things we use is the NEI survey that was developed in 1997, 97-05, around safety conscious work environment. There's about 21 questions there that we had to try and get an assessment around, gee, do people really feel okay about bringing things up. How's your corrective action process, you know your management conduct and performance. So this is one of the areas we do look at and we try to use a consistent survey.

Another one that I use at Fermi is the Gallop 12 survey which looks at employee engagement. It's got 12 very simple questions. Kind of like what you heard around Millstone and things like have you heard from your supervisor in the last 7 days about your performance? It sounds like a simple question, but it's very specific, in the last 7 days, which says is your supervisor out there engaged with you, talking to you? Do I have the right tools and equipment to do my job, not does the station have the right tools and equipment. So it's very personalized down to the individual. We get those results and then we watch the trends of that and I run that survey at Fermi at least once a year. For a while, we were doing it twice a year, but our performance has moved up into the better phases from Gallop's perspective, so we're running it once a year. But just watching that trend of what our employees are telling us.

You need to find lots of ways to see what your employees are telling you, not just about my safety culture is okay, but what other indicators can you use to reinforce that it's still there.

(Slide change.)

MR. O'CONNOR: The next slide you've heard enough about today, safety over-production. The bottom sentence is true. Management is a driving force in chasing organizational change and I think you've heard that from all of the speakers today. People do look to the top of the food chain, if you will, and you're going to do what your bosses do. As an example, at Fermi, I ask everyone during an outage, go get an outage job. You need to help over there. If I don't go get an outage job, am I reinforcing the expectation. Like at one of my outages, I worked as a decontamination technician. That's a fancy name for somebody that gets in two sets of PCs and plastics and cleans up contaminated areas. But the troops see me out there doing that and they know Bill knows, Bill believes it's important for everybody to get an outage job, so go participate in the outage and do something. Again, it's that management reinforcement of what is good culture, do you really walk the talk?

(Slide change.)

MR. O'CONNOR: Next slide, if you get production over safety, then you can get to the left side where you kind of get complacent. You might get isolated and arrogant, not intrusive, because all you're worried about is that bottom line. Am I making megawatts at $12 an hour or $13 an hour, whatever it is, instead of am I doing the right thing?

(Slide change.)

MR. O'CONNOR: Now the next couple of slides demonstrate a number of barriers and we've heard a lot about these things today, management behavior, staff capability and Corrective Action Program. Just flip to the next one.

(Slide change.)

MR. O'CONNOR: Independent oversight, operating experience and regulatory compliance. If all these are in place, obviously, an event won't get through. If none of these are in place -- next slide.

(Slide change.)

MR. O'CONNOR: Then an event can come through and affect your safety of your reactor. So again, had to put a little visual on there.

(Laughter.)

MEMBER POWERS: Is it significant that you chose block rolls instead of reinforced concrete?

MR. O'CONNOR: Excuse me, sir?

MEMBER POWERS: Is there a significance to the fact that you chose block rolls instead of reinforced concrete?

MR. O'CONNOR: No. I probably could have used a bunch of mini containers.

I also had sound effects in it at one point and I thought I probably shouldn't do that.

(Laughter.)

But again, what you see here are all the things you've heard today about management needs to be engaged. The staff has to be really engaged in reporting of problems and dealing with things and technical rigor. All of this together would say you probably have a pretty good safety culture.

(Slide change.)

MR. O'CONNOR: The next slide says gee, even if one or two of them aren't there, enough of them can be there and still result in a safer reactor. It doesn't mean you're not worried about weaknesses in operating experience or weaknesses in management, but it's still -- if you have good staff and good Corrective Action Program, it should stop it and the event shouldn't get all the way through. It's the defense-in-depth concept overall. You need enough barriers in place that something should not be able to get through and affect the reactor.

Now I'd like to talk about the real details -- next slide.

(Slide change.)

MR. O'CONNOR: About how did we get to our assessment? And the first thing we did over the next three slides is just these are all the documents. We stepped back and said, what's everything that's out there that we might use as possible inputs to come up with a set of attributes that we can evaluate. So we looked at the SOER and obviously a bunch of INPO documents, the team input from those of us that run the development team.

Fermi is very close to Davis-Besse, as you know, so we had people at virtually all of their public meetings, trying to gain insights. I was at a lot of the evening meetings, as Jack will attest to, and Lew. So I personally wanted to see it for a couple of reasons. I have the same newspaper, so Tom Henry would go to the meeting and then he would ask me later, well, what's this mean to Fermi? So again, I can say first hand, here's what I heard. Here's what's the same or different.

So again, part of this is making sure you're engaged and understand what's going on.

(Slide change.)

MR. O'CONNOR: Slide 14 is some more things that we looked at. You've probably heard a lot about these documents today. Page 15 are some more items. But the intent of these three slides is not to list every single thing we did. It's to say we try to be very comprehensive in looking at what's available out there for us to better hone our assessment.

Now page 16 starts to narrow down what does it look like or how did we put this into an assessment tool? So one of the documents we looked at was INPO's principles for effective operational decision making. And it has six major attributes with a whole bunch of sub-attributes, if you will, to add up to about 60 or 70 items. This is one of them. One of the items says people at your site recognize potentially degraded conditions. Well, that's a nice thing to say, but how do you know that? The first thing is do they have the right knowledge and understanding of what the safety expectations, including design and license basis? Have you trained them? You can say the top one, but if your engineers do not know what's in Chapter 8 of the USAR around electrical power distribution, it doesn't matter that it's in this nice book that's on the wall called your Updated Safety Analysis Report. You need to make sure that the people really have that.

The second one, are you aware of proper equipment or system operation and trends? If your operators don't know what it looks like to be proper, or your system engineers don't understand it fully, then they can't assess if it's degraded or not working right. They can't trend it because they don't know what it looks like. It sounds silly, but believe it or not, you can't assume that. You really have to dive through it and make sure they understand.

MEMBER POWERS: One of the problems we encountered within the Department of Energy reactors is a culture they grew in running the plants on a bedding ware and spirit gum. And an entire generation went through doing that. They didn't have any idea what a first rate plant looked like because they had never seen one.

MR. O'CONNOR: In any good change model, the first step says you've got to have a compelling reason for the change, but the second one is you've got to have a good vision and a vision means to be able to explain to your people in no uncertain terms what it looks like to be okay.

In other words, what does this change look like? So again, sometimes we skip a few of these steps and that's when you don't do a good job.

MEMBER SIEBER: You might also look at the whole concept of questioning attitude in terms of knowing what the plant is supposed to be doing. When you perform an operation or a test or something like that, questioning attitude comes in. When you see results that differ from what you expect and that's when the question has to come out. Even if it's satisfactory, why is it different?

MR. O'CONNOR: We talk about training. We mentioned it several times today and some of my management observations in our simulator, I noticed over the last three years that the shift technical advisors were losing a little of their edge. And those of us who grew up before TMI and during TMI, I was a licensed operator then and we saw why the STA function was created and why it was so important. But what has happened over the years is we've licensed them. We've kind of integrated them into the operating crews which is good for the day to day thing, but they weren't switching hats when the EOPs come out. So we've been working hard to get our STAs back to look, your job is not to manipulate controls and not to be in emergency operating procedure.

Your job is to look at the critical safety functions of reactivity, inventory, heat removal, all of those kind of things, so when the operators are manipulating, you're in leg one of the EOP, and they do this, did the plant do what's it's suppose to, based on what the operators are doing. So getting that STA back out into the role, so I mean these are the on-going things that we have to keep watching for, to also prevent events. And again, it's a never-ending battle. It's a never-ending struggle. You have to keep after it all of the time.

So again, this slide shows the kind of thing we looked at. The next page is one of the score sheets where we actually took that particular one, rolled it into a score sheet. Go to the next slide.

(Slide change.)

MR. O'CONNOR: We also developed question banks. So one of the questions that relates back to that one was does the station have a trending program to assist in the identification of repetitive equipment issues? And we would interview, we had a set of questions and you'll see it in here from senior management all the way down to workers. So there's a set of questions for middle managers. There's a set of questions for senior managers. There's a set of questions for craft workers to get at this particular thing. One of the answers might be well, gee, we had a particular valve, this F606 in order to fail a couple of times in the last 15 years, yet gee that didn't bounce out as a trend. So they got a score of two. Now what does a score of two mean?

You go to the next page. We put a set of scoring criteria that says 1 to 5. One means every time, all the time, everything is perfect, not a thing is wrong. And we were pretty stingy on our grades when we were out doing these assessments at the plant. It really had to mean every time you did it right all the time.

Three meant you're doing it pretty much all the right kind of behaviors most of the time. In other words, you're pretty confident. Two obviously is a little less than that and one means you're way out of whack. You're down below acceptable and this needs to be worked on.

Next slide. During the week when we're out doing the assessment, let me back up a second. Who did the assessment? We had about 9 or 10 people on each assessment team. It was led by a vice president from one of the other stations. In other words, I'm the team leader for the Columbia Plant. I had Rich Anderson from Susequehanna with mine. There was eight other people from the other utilities. We had members from the international community, OPG, Ontario Power Gen asked if they could participate and we're also doing the same assessment for Goose Pickering, what's their other plant? There's another one, Darlington Plant.

MEMBER ROSEN: One of our distinguished members doubts the effectiveness of peer participation in these things. Can you say something about how critical these guys are? Are they uncritical because they know you're coming?

MR. O'CONNOR: No, not at all. No, not at all. We had one of their vice presidents of engineering at our assessment at Fermi and believe me, he wasn't bashful at all in diving through things and I think the peer involvement, they have a different plant, but they have the same issues, so they bring that expertise just to kind of look at it a different way.

Ask the question a little different way. I'm a very strong proponent of the peers which is why we use these independent teams to go out to the other sites. I've got a group of 8 or 10 people. We also had a couple of INPO senior reps that participated on the teams to watch how we're doing this. In fact, INPO posted this on their website as one way of doing this.

So again, what you see then on the wall during the week and we would post all of the 80 or 90 attributes up there and you see scores of 1, 2, 3, 22, and that's each of the different evaluators coming in. And it's not just the questions. It's we watch meetings. We watched interactions. We saw different things. We had some pre-reads ahead of time, so like this particular one would come out of two, the first one. The second one ended up at 2.6 which says that's below what's considered fully competent. The third one we found people asking pretty good questions. Now these are just some examples -- I just put some numbers in here, but that's how we did the assessment.

The next page, slide 21.

(Slide change.)

MR. O'CONNOR: As I said, we had an interview question bank for senior management, middle management and each team member had a set of questions. There was a set for the senior management. There's a question for middle management. And we would divide it up, like I would be talking to the site VP plant manager level folks, chief nuclear officer, board of directors' member if we could get him. So again, we staggered this to make sure we got a good cross section.

The assessment scoring was documented on our field collection sheets. We interviewed typically about 80 to 90 people at each of the sites. We watched lots of meetings. We attended control room operations. We attended pre-job briefs.

Next slide, slide 23.

(Slide change.)

MR. O'CONNOR: Before we went to the site, each site sent us a ton of material that we reviewed. So this assessment actually starts a month or so ahead of when we go to the site. We ask for any JCO. Now why would you want to look at a JCO? The plant has got three or four justifications for continued operation. That might say, gee, what's up here. It might be an indicator of maybe their safety culture isn't right. We looked at root cause reports, problem reports, adverse trends, corrective action backlogs, self-assessments. Next page.

(Slide change.)

MR. O'CONNOR: Here's some things that you might think, gee, what's that got to do with safety culture? We looked at their O & M and Capital Cost Trends. If we saw any dramatic changes like gee, you're running along with $110 O & M budget and then you see it's just been dropping $10 million a year, that might be okay, but you've also to assess is this just being driven by something by corporate management cutting cost out of things? If you see the capital budget is dropping dramatically, that says maybe they're not reinvesting in their plants and doing the right things.

The bottom was real important, staffing stability. You look at a plant and we had one of our member stations that just went through a lay up. Now they hadn't had one in a long time, but when they let those 150 people go, then we dive into that and say what was your changed management plan? How can you ensure when those 150 people are no longer in your system that the programs, processes and procedures that you had in place can be supported with 150 less people? Howard mentioned or someone this morning about programs and people. I mean the people make the programs work and if suddenly you built your structure on this many and now you have this many, guess what? People are going to have to do what they have to do, so then they start diluting the programs and processes and procedures to be able to cope. So we looked at a lot of things ahead of time and that prompted us to ask a lot more questions as we went on. And this may be an area that George from the INPO side -- I know INPO typically hasn't gotten into those kind of things, but here again, looking at that, that is one of the things that can contribute to a plant not keeping up performance level.

Now what does it look like when we're all done? And I've just included a couple of sample slides that would come out of a typical report.

(Slide change.)

MR. O'CONNOR: In this particular one is around the results out of the effective operational decision making set of attributes and you could see for attribute 2B1, this particular station had a 3.5. So anything above about a 3, we call that's pretty good. You got a strength in that area. Keep doing it. Whatever you're doing there, keep doing. The rest of the ones for that particular site came out of 3.04. So all the rest of the 70 or 80 attributes, the average was about 3.04.

So this station had some pretty good things. Also, on the next page we point out -- in addition to the graphs we give verbiage to say why we thought item 2B1A was a strength. So we don't just say here's your graphs, go figure it out. There's the documentation about why it was considered a strength and what about that the rest of us can learn from it.

Likewise for the areas for improvement. You know this particular one, item 6H, you got a 2.44 on average, so that says you need to pay attention to that and that station management now has some areas that if they go focus on these five or six areas, then can bring them up, that will help the station get better.

MEMBER APOSTOLAKIS: On the scale, 5 was best?

MR. O'CONNOR: Five was off scale. We gave very few 5s on any attribute.

MEMBER APOSTOLAKIS: But how did you decide what 5 was?

MR. O'CONNOR: What we did was collegially we step back and you can have any rating system you want. What we said was we could have picked four numbers or three numbers.

MEMBER APOSTOLAKIS: No, I understand that, but what's best?

MR. O'CONNOR: The best we just said 5 and then we wrote down what does 5 mean? That was that other chart. Five meant you do it right every time, all the time and all the things are perfect in that particular attribute, from our quick snapshot.

In other words, you go in and you look at their meeting. It every meeting they start a meeting with a good safety message, if you saw the team well engaged and you saw senior management sitting back watching and making sure things went -- intervening when necessary. If you went to the control room, the pre-job brief was perfect, then they did the evolution, whether it be a rod pole or whatever. You might check a file.

MEMBER APOSTOLAKIS: So it's really what a group of experienced people believe is the best practice in the industry?

MR. O'CONNOR: Yes, and that's the other part. We didn't say what do our seven or eight stations think is best. We did benchmark against the

INPO criteria for what is best. We did benchmark against the INPO criteria for what is best practice in this particular area. So that was the criteria. You had to be at best practice level to get a 5.

MEMBER APOSTOLAKIS: And similarly of course, for one.

MR. O'CONNOR: Same thing for the bottom number.

MEMBER KRESS: Is 2.87 different from 3?

MR. O'CONNOR: You mean is it statistically different?

MEMBER KRESS: Would you treat it differently?

MR. O'CONNOR: That's where you have to read the verbiage around this one. In other words, you look at what 2.87 was and you say gee, what is this telling me? What it tells me is for some reason I'm not fully competent and then you need to drill through that --

MEMBER KRESS: Just one aspect of that area might have --

MR. O'CONNOR: And that's exactly what this was, one aspect of the 90. In other words, the one example I used was this attribute on paragraph 1B1 says does the station have a trending program? So I went into here and if one of these was 1B1B, that was 2.87.

So he'd go back and say there's something about my trending program that isn't right. Now the team back him at what they thought wasn't right, so that would point the station in the right direction.

Likewise, the INPO warning flags we thought were very important. Now there are several sets of warning flags that INPO has out there, so we put a special emphasis on the warning flags and this particular one, this particular station did pretty good across the warning flags. An example, item GG in our report, that warning flag is the one that says you're over confident. You're looking at your numbers and you're relying on your past history. I've been running pretty good. My capacity factor is up so you've got to kick back. You're living in the past. So we found at this station there was a little bit of living on the past positives and not really saying I need to do any more. So you get into that I'm okay here and everybody else is going to run by me. So this station needed a little wake up call -- because we heard terms like we've been running pretty good for two cycles and you get little comments like that and you start thinking.

MEMBER SIEBER: What are some of the other warning flags?

MR. O'CONNOR: The other warning flags, the second one, FF is industry interaction and bench marks, managing relationships with your regulators, in other words, if we sense some contentiousness with INPO or your regulators. Ops and engineering standards is BB. These don't -- if you go into the INPO report it doesn't say that these were what's in our -- you go in here. So those are the things that came out. And this is just part of the warning flags.

MEMBER SIEBER: Thank you.

MR. O'CONNOR: Now for my assessment which was finished up several weeks ago, I just included a couple items that just to show you what comes out in the written parts of this, so in one area it says management oversight of nuclear safety over-production. That was one of the major bullets. And the examples were business plan, incentive program and our management involvement. The team saw those three attributes were pretty good. As an example, our incentive program, there's a zero payout for any of the managers or employees if we don't make our nuclear safety items. You can get all of the production in the world, all the other items, but if you don't hit the nuclear safety goals which include things like your performance indicators on risk, your performance indicators around safety system availability, you can do great on everything else, but you get zero payout.

So again, it's putting that emphasis up there. Our business plant starts right out with all the safety policies and why it's important. So again, they thought that was very positive.

There was no reluctance to raise issues and a very strong partnership between management and the craft. So these are the three areas that turned out as strengths in my report. I had some other ones. I just listed some examples.

They also pointed out some areas that we weren't doing as well as we should. Our work control process. We've got a very antiquated computer system work control process that's quite cumbersome and what it leads to is there's some fragmentation of some of our reliability improvements, so they pointed out to us that yeah, you've got the stuff there, but it's tough for the troops to figure out what's the next most important item from the work control system. So I'm not going to go through all of these, but again, they gave us very detailed comments about what they saw that was less than fully competent.

This is a roll up that would go to the executives at the board. So in other words, of the five plants that we've done so far, we're going to finish the two up by July. On the INPO warning flag and this is one warning flag, there's a roll up for each one of these and each attribute that we, the executives get, and you can see, two of the plants, pretty positive.

In other words, this is the variance from 3.0. So Plant A had -- you know, basically, they were running about 3.4 on this one. Plant B was 3.5, so well above the average. Plant C and D were competent, a little bit low, but here's Plant D. And this particular plant on this warning flag said the orbit site organizations demonstrated an unbiased view and delivered tough messages. Self-assessments, high in problems and addressed. This plant was well below what would be considered fully competent.

So, we, the executives on USA, will challenge each other and say what do you need, Plant D, here? What can we do to help, but more importantly, what are you doing to bring us up because we as a fleet don't want to be pointing on the bottom side of this. So it's this peer challenging among the executives to boost each other up and help the other stations that need it.

This is a roll up right now of the five stations that we finished and the scores. So we've got a couple of stations at 3.2, 3.25, one at 3.08 and one at 2.94 and one 2.96. I didn't put the station names down there. The other execs said they'd rather talk to you personally, if you want to know who's who. But mine was a 3.2, so I will tell you mine.

(Laughter.)

And on average is 3.09 for the five stations. On average, we feel confident, but on average doesn't count. You still have got to dive into those various rooms for improvement and find out what do I need to with the station in these particular areas. Much like you do with your INPO eval. INPO comes in and gives you a score, but they also tell you areas for improvement and strength. You need to really dive through the areas for improvement and work on that.

Where do we go from here? This assessment is clearly a spot check. We think it's a really good way to do it. It was very intensive, very labor intensive, very resource intensive, but we think we got a really good check on where our stations sit. Me as a site VP, the things that I got out of this assessment will really help me to continue my improvement efforts at Fermi. And what we're looking at now as USA, (1) how can we do a -- rather than this round robin spot check every year or 18 months or 6 months or whatever it is, we've got to find a way to make this into our day to day activities in our QA assessments, our ISRG Assessments and things like that to figure how we can keep pulsing this day to day, our management observations. So that's the next step. We're going to start working on that.

And again, that's the last slide on -- it is an SOER. You heard George say this. It will be done that they keep assessing. Again, it's how do we continue to do that as a group of plants and as an industry. But again, this was one method. I just thought it good to share with the ACRS, one way of doing it. We've been kind of bouncing around it today and I think it was pretty effective.

MEMBER APOSTOLAKIS: How long have you been doing this?

MR. O'CONNOR: We have five plants done. We started the first plant in January, so we've been basically doing one a month.

MEMBER APOSTOLAKIS: Okay.

MR. O'CONNOR: And we will finish the last plant in July. So all of the plants will have been through their INPO 02-04 assessment recommendation B. That's what we're using this as the recommendation B assessment.

MEMBER APOSTOLAKIS: And you plan to go back then?

MR. O'CONNOR: That's the slide here. What frequency do we think we need to do this? How can -- I don't want to just wait for another round robin, we want to build it into our day to day and routine QA assessments and management observations, but I also think it's important every now and then to have that team come around and do assessment against what's considered.

MEMBER LEITCH: How about the third recommendation on the INPO SOER? What are you doing about that? That seems to me it would be more difficult --

MR. O'CONNOR: The third one is probably the most difficult and that's the one where you have to go back and try and pick at what are those things that are just kind of nagging out there. As I look at my station, particularly, we've got some issues around out heater drains where whenever we test our turbine bypass valves quarterly and Fermi is probably unique.

We've got two huge turbine bypass valves instead of a bank of six. The operator has to be just perfect on the hand auto station to keep that valve open. Otherwise, a trip, the pressure drops, it messes up my heaters. I trip my heater drains and I get a recirc. run back at 65 percent. That's not a good thing to do to your plant.

We've kind of lived with it. We've gone through it, but we've got to find a better way to do that, you know. Half the time I do one of these tests I end up at 65 percent power and I shouldn't do that.

That's one of those things that we've lived with too long. One thing, maybe we don't need to test the valves every quarter. Maybe it's one of those things, the valves always work. It's just maybe there's a design issue that we can do it different. So --

MEMBER LEITCH: The difficult thing, it seems to me is many plants have these issues, but over the years you get used to them or you compensate for them procedurally. They may even be entered into your training program. Hey, this is how you got to kick it here to make it work. And those kinds of things become institutionalized.

MR. O'CONNOR: Right, and again this is

the -- we've gone back into our hard databases and looked for gee, is there some component that's had more than a couple of failures? We interviewed all the system engineers.

We're interviewing all the operators. Just dump on us everything you think might be out there that you think you're having to live with and so again, this one is a difficult one. You just have to get out there and talk to a lot of people. You have to think about what have we changed in our procedures.

There's a wealth of knowledge in your training instructors. There's a wealth of knowledge in your operators about how they have to do things and believe me, they're not bashful to tell us about it. We have lists of things now that we're going back and taking another look at. Some of them we may decide it's still okay. But others, it probably isn't.

MEMBER LEITCH: The results that you got here, would you expect that that would be significantly different than you get on an INPO plant evaluation?

MR. O'CONNOR: I think we did a lot deeper dive than you would get on an INPO plant eval. One reason is we had 8 or 10 people specifically focused around only these attributes, this group of 60 or 70 attributes. The INPO team comes in. They've got a couple of week window. They have to look basically a quick snapshot across a lot of higher level things and while they do walk down the plant and do things like that, I don't think that without a whole lot more people and more time that they could dive through it at this level. Now we may find better ways to help. They may not have to in the new INPO evaluation process. They're going to look at how we're assessing ourselves and they will judge are we doing a good job or not.

MEMBER LEITCH: Yes.

MEMBER APOSTOLAKIS: So let's say the Agency decides that this is a great program or some variation of this program, where -- at which step would you say the Agency should be informed of what results you're getting or what's happening so that they will have this warm feeling that, yes, the industry is self-assessing itself?

MR. O'CONNOR: And we have thought through that and here's what I intend to do with my report and I'm sure the other stations are similarly doing this. I'm going to sit down with my residents to begin with. I'm going to sit down with my branch chief, Mark Ring, and go through here's what we did. They already know what we did because they saw us talking about this at our morning meetings and all that. But then here's the areas that we found at Fermi and here's how we entered it into our Corrective Action Program and here's what we're doing about it.

Now if you go into the Reactor Oversight Process, one of the areas in the cross cutting is your problem identification resolution. That's not limited to hardware problem identification. These are problems. Did we identify them ourselves and are we working on them, are they in our corrective action process? So again, I think the door is already open there for the regulators to look at are we identifying our safety culture problems as well as we identify our hardware problems. Safety conscious work environment, another cross cutting area. How are we looking at that? Are we taking it serious? Are we entering into the corrective action process.

So again, I feel that getting there, especially to the folks that are directly overseeing us, our resident inspectors, our branch chief and our project manager, that's the first step. And if they're convinced that we're continuing to work on it, I think that's okay. If Jack and his team sees -- I blew this thing off and didn't do anything with it, then I think he has a right to say gee, you told us about this stuff. You entered it into your Corrective Action Program, but you didn't do anything with it. That's probably the doors open plenty far enough to say, ineffective problem identification resolution.

MEMBER APOSTOLAKIS: But also -- I think it's great that you are sharing the results with appropriate NRC people, but a methodology like this or again, maybe two or three similar methodologies, is to be blessed by the Agency, shouldn't it have a chance to review it and maybe make some comments? I mean you're relying now on INPO documents and so on. I mean there may be a perspective from the staff that is not there. I would hate to say they should treat it like a draft regulatory guide, but I mean something that will also take the NRC staff's input. Would you be amenable to that?

MR. O'CONNOR: Yes. I'll speak for me personally. I've got my USA Board Member hat on. I would have no objection to have the NRC take a look at this. We can leave it here. If they've got some areas that they think, gee, here's a better way to think about this, that's another input. Just like INPO looked at it with us and we took input from them. We brainstorm as best we could and this is round 1.

In the spirit of continuous improvement round 2 will be a better one because we'll find -- we've already found ways that we want to change some of the things as we got through the first five stations. We changed some things from station to station a little bit, but we think round 2 will even be better. So me, personally, I would have no objection to Jack or Sam or anybody's -- pass it out to their team and say what do you guys think? Is there some other ways you might want to look at it?

MEMBER APOSTOLAKIS: Very good.

MEMBER POWERS: Suppose NRC looked at it, George, and said it's the greatest thing since they started putting beer in bottles and what are they measuring?

MEMBER APOSTOLAKIS: What are they measuring?

MEMBER POWERS: Yes.

MEMBER APOSTOLAKIS: I think the scales that have been presented are what Sonja would call bars, I think, aren't they bars essentially? It's a schedule 1 to 5, 5 being best.

MS. HABER: There are no behavioral anchors. It's just a question of having rates on them.

MEMBER APOSTOLAKIS: There's lot of behavior.

MS. HABER: It's similar scale. Different concept.

MEMBER APOSTOLAKIS: The idea is that you have a scale where people who are intimately familiar with operations --

MEMBER POWERS: I heard the words. I know the questions they ask and what not. But are they questions that the Agency wants answers to? I understand how it can be used to infer things that the Agency professes to want to know, but if you're looking for safety culture as a leading indicator and degrading performance that can lead to an event, it's not clear to me that this does that.

MEMBER APOSTOLAKIS: That's why I asked whether the staff would have a chance to review it, because --

MEMBER POWERS: If the staff reviewed it, they could review it until they're blind in the face.

MEMBER APOSTOLAKIS: Why?

MEMBER POWERS: There is no proof that having a 3.2 shields you from having events or even reduces your vulnerability to events.

MR. O'CONNOR: But at least it points out areas that you have a potential vulnerability. If the station works on it, I think it lessens the possibility event. Will it preclude it, prevent it? I absolutely can't answer -- stars could line up on next Tuesday --

MEMBER POWERS: That's exactly right. And from your perspective I think the biggest problem anybody has running something is knowing what can go wrong. It's hardest thing to find out in the world until it breaks. And that's not when you want to know when something is wrong.

That's not what the NRC needs to know. Now why NRC wants this as an indicator. They want it because they want to protect the public health and safety. And there's no proof that it does that.

MEMBER APOSTOLAKIS: Well, but again, plausibility.

MEMBER POWERS: I will grant you plausibility.

MEMBER APOSTOLAKIS: Aren't you putting nearly an impossible condition here? To me, if you want proof -- well, I don't know what kind of proof one can give you. We can start with someone that is a plausible argument and you agree that these things are good. It's better to do them than not to do them, right?

Now whether they guarantee, whether they are sufficient conditions for a safe operation, I don't think anybody would claim that.

MEMBER POWERS: I think if you could sit here and show me.

MEMBER APOSTOLAKIS: Pardon?

MEMBER POWERS: If you could show me that a 2.6 plant has a 50 percent more probability of having an undesirable event and you can define undesirable event any way you want to, whereas a 3.2 plant only has a 10 percent probability of having an undesirable event over the next 18 months, then I'd say fair enough, you've got something here. I can -- I'm willing to -- but in the absence of that kind of information, then I think these guys have got a hell o fa good management tool and as a regulator I applaud you. But I'm not going to use it --

MEMBER APOSTOLAKIS: Do you have such a proof for special treatment requirements?

We are demanding them. Do you have proof that the probability of failure goes down by 10 percent or 20 percent?

MEMBER POWERS: I'm not asking to add in special treatment requirements --

MEMBER APOSTOLAKIS: What I'm saying is that there is already a precedent where the experts within the Agency decided --

MEMBER POWERS: That's not a criterion for adding something in.

MEMBER APOSTOLAKIS: What?

MEMBER POWERS: That's not a criterion for adding burden.

MEMBER APOSTOLAKIS: No. It's not a burden. They're doing it. We are not adding anything.

MEMBER POWERS: It is a burden as soon as we ask them to share it with us.

MEMBER APOSTOLAKIS: No. We're trying to avoid imposing burden by saying okay, you guys are doing great, but on the other hand, I cannot, if somebody asks me, how do you know they're doing great?

MEMBER POWERS: George, if he turns it into the NRC, he signs something that says if I happen to make a mistake here, knowingly, you can send me to jail. That's burden.

MEMBER APOSTOLAKIS: I don't know about that.

MEMBER POWERS: You create burden --

MEMBER APOSTOLAKIS: I --

MEMBER ROSEN: You're making arguments that don't really go to the issue here, Dana. I think what we're --

MEMBER POWERS: It certainly goes to my issue.

MEMBER ROSEN: Well, okay, the -- to me, what you're suggesting -- the excellent here is the enemy of the good and I think that we shouldn't allow that. I think what's been described here as you even agree is a useful exercise for the USA Alliance and the suggestion that George Felgate of INPO made and may ultimately be useful for us, that neither of those attributes are perfect, but they're better than doing nothing and that's the alternative. We're sitting here --

MEMBER POWERS: That's absolutely not true.

MEMBER ROSEN: With nothing.

MEMBER POWERS: As soon as you do something, you're consuming resources that could be better spent on other things.

MEMBER ROSEN: It's a logical argument.

MEMBER POWERS: You're consuming a little bit of resources that do something that's much better than what we've got which is next to nothing. We have no insight to the safety culture of the utilities.

MEMBER ROSEN: We have all the pieces, but have no integration. This is an offer of integration. We'll debate this some more obviously.

MEMBER APOSTOLAKIS: I'm sure when the time comes to think about the letter, this issue will come up again. But it's 5:30, so maybe we should let Sonja --

MS. HABER: We can say last, but not least. We can say --

MEMBER POWERS: Sonja has the answer to one of my questions.

MS. HABER: Well, I hope. We could say I'm at a disadvantage because you've heard so much and a lot of everything, but I can say I'm at an advantage, because I think I can provide you with a couple of different things, having had the benefit of having heard everything.

I think that -- next slide, please?

(Slide change.)

MS. HABER: Rather than introduce myself and my background, I want to tell you about my involvement in this area which really defines who I am and why I'm here. As Tom Murley said this morning, back in the late 1980s we were not allowed to use the word safety culture when we did work for the NRC. And Tom, in fact, was an instigator for a project called the Influence of Organization and Management on Safety Performance. And that's how I really got involved at this. I was at Brookhaven National Laboratory and ended up being the project integrator for many years. That project, as George can tell you, involved many different groups from academia, from industry, from the National Laboratories, from other industries, to really look at what is the influence of organization and management on safety performance and really, I think what we're calling it now is a/k/a safety culture to really a large extent.

What I do want to say is that at the time of the NRC work, we did pilot method that came out of that project and the method I will talk about some of the methods and some of the behaviors that we used to look at organization and management. We piloted at three facilities. One was a fossil facility of PG&E and the other was Diablo Canyon and then we also piloted at Graham Leitch's plant at the time, at the Limerick Station. So there was some precedent and then, of course, various regulatory decisions were made not to pursue that work in about the mid-1990s.

Subsequent to that time, and while we

still had that data, we did start an initial project to answer some of the questions about correlation to other types of indicators. And we did try to look at the data that we obtained from this assessment of organization and management to other performance indicators that the NRC was collecting at the time.

We started to find some interesting relationships with human errors, from the OER database. But again, that work was basically discontinued. So there was an attempt to try to correlate the data we collected with other indicators.

We worked on the front end of the work trying to define the organization and management behaviors and George and his colleagues really worked on the back end because Tom Murley's question was how can we incorporate the influence of organization and management into -- at that time we called it probabilistic risk assessment. So in fact, was there a way to quantify these things to actually then tie it to risk. That was the initial question of that research project.

And I think we came interestingly close at some point with some very good work between the behavioral sciences and the engineering discipline.

Subsequent -- well, during that same time, actually, I was involved in some Department of Energy work. If you remember, they had Tiger Team appraisals and we supported the management subteam of those appraisals by conducting the survey, a paper and pencil questionnaire, the same one that we had decided to use in the NRC organization and management work.

In 1995, after the NRC decided not to continue the work, at that time, the Atomic Energy Control Board of Canada approached us and said well, we'd be interested in pursuing this. We think it's important and we'd like you to help us adapt it or work on it or update for purposes of using it at our Canadian facilities.

I'm still working on that project and I'll tell you just a little bit about it because I think it's interesting from a regulatory perspective. They have -- we piloted it. We updated some of the work that we had done for the NRC and the R&D program. We piloted it at one of their stations and then we went ahead and implemented it across the major licensees. Now, of course, you know they are a much smaller industry, but we did conduct nine evaluations, using basically the methodology that had been developed through the R & D project for the U.S. NRC, with some modifications which I'm not going to go into now, but primarily the same type of tools and the same types of behaviors that we were looking at.

They are now going to do something very interesting which might be of interest to you, is they have decided to go back and re-evaluate the first plant that we did which was the pilot plant and we're going to conduct that evaluation using the same methodology as we did before. And independently, they're going to have their -- what they call project officers, your resident inspectors, as well as other people that conduct inspections at those facilities in health physics and quality assurance and other types of areas and put their inspection findings from the work that they've done within a period of time at that site, the same site, into the similar type of framework that I'm going to talk to you about in a minute. So they're going to have their inspection findings in the framework. We're going to have our evaluation data in the framework.

And then there's going to be a comparison made between what in the inspection process is not being captured that perhaps is captured in our evaluation methodology, what could we do to enhance that inspection process to capture those safety culture attributes or characteristics or, in fact, are there some things that we just have to get using independent methods that cannot be captured by our regular inspection activities. So that project will take place in the fall. So that should be of interest from a regulatory perspective.

From 1995 to 1998, I also had the opportunity to do a lot of work in Soviet design reactors as part of a U.S. technical assistance program through DOE and the reason I mention that is that we had an opportunity to collect again similar types of organization management data at three Soviet design plants, an opportunity now to really look at cultural differences within the industry across countries.

MEMBER APOSTOLAKIS: Soviet design or Soviet operate.

MS. HABER: Soviet design because one was in Bulgaria. And one was in Ukraine and one was in Russia.

Starting in 1998, I had an opportunity start working with the IAEA in the safety culture arena. I've done some of their safety culture evaluations with them. Also conducted some work trials with them and consultancies. And in particular, the reason I mention that is when I talk about the framework, some of the most recent work came out of the consultancy in December where they're now moving beyond the INSAG 15 into a guideline for how to assess safety culture. So I think that will be of interest.

From 2000, the Spanish regulatory body was interested in looking at organization and management and they started a project as well and I was working with them and got to implement the methodology in two plants in Spain, a BWR and a PWR and just coming out of a workshop a couple of weeks ago with the regulators in Spain. They are now taking forth an action plan that will basically ask their licensees to have some type of assessment of safety culture, safety management systems, but they're really talking about safety culture characteristics.

So they intend to ask their licensees to do that as well.

And then, of course, as many of you know, I was involved this past year in the Davis-Besse safety culture evaluation.

The evolution of safety culture, I think, I just want to mention this because I'm going to go into more detail in a minute, really has three phases. I think the first is from the R & D work from the NRC, identifying the behaviors that impact safety performance and the methods and how to assess them and then there was another phase in terms of high reliability organizations and I'll talk about that in a minute and finally, the one that we're working with today, if you read the Davis-Besse report, you'll see the safety culture characteristics in there.

Out of the first phrase which were the organizational behaviors from the NRC work, we identified 17 organizational behaviors and it occurred to me that one of the behaviors, one of the things that I've been hearing about today, George, was David Oakwin's * (5:39:54-need correct spelling) concept of technical knowledge where -- and he also participated in this project as part of George's group, the notion again of having that information, that big picture of the systems and the operation of the plant.

But there are several behaviors in there. I did not bring the list with me, but some of them are the ones we've been talking about today, communication and decision making and gold setting and problem identification and resolution. And these were -- they're not new. We all know about them, but I think in that project we went through a lot of peer review, a lot of workshops, a lot of input and I think we all felt pretty comfortable with that list of behaviors.

As I mentioned, we had data collection tools then to develop, that we developed for the assessment of behaviors, but we didn't develop them from scratch. The NRC's requirement was they have to have gone under peer review and scrutiny. They didn't want us to do R & D. They wanted methods that existed, that had demonstrated reliability and validity, a very important concept. It's very easy to write questions and ask people questions. It's not difficult to write rating scales and have people put marks on a piece of paper. And a lot of people just put surveys together. But they don't look at it psychometrically to know whether or not are they measuring what they really think they're measuring in a validity sense and will their results be consistent in a reliability sense. If I measure you today and I measure you next week, will I get similar results? So we wanted tools that had undergone that kind of peer review and scrutiny. And we did. We came up with four of those tools, plus we use, as Bill described, not dissimilar, a functional analysis where we get documentation from the stations and information to help us understand what they're doing. But aside from that, we have a database of interview questions which we do from top to down, like you talk about, and also across the organization, across different departments. And the reason we do that is, as we've heard today, it's important to know where the differences are in the organization; the operations group answering in one way, the maintenance in another, senior management one way, the working level in another. So we use that same type of notion.

We have behavioral anchored rating scales that George mentioned. The difference here is a rating scale, but the person identifies their perception of that behavior, based on an example, so you actually give them an example of how a plant might deal with communication and you give them the attributes of very good communication in the first example. There are five examples and the last one has the absence of all of those attributes. They get to put an X next to the one that they think represents their perception of that behavior.

These were developed with industry experts. They were not done by us. They were done by people from the nuclear industry to actually make those attributes meaningful to people when they complete them.

We also have observational checklists so that we can actually, when we go and look at a meeting at a plant or a work process, we look at attributes of the same 17 behaviors that we've been talking about.

Finally, we have a survey which is a paper and pencil questionnaire. And the reason I'm telling you about this is that one of the things that we provide, I think, that I haven't heard a lot about and I'll talk about in a minute more, is we really ask people for their perceptions about things. Now, we get a lot of criticism about that because people say well that's just somebody's perception. But I think I don't have to tell you that perception is reality to most people and if you really believe something, that's how you're going to behave. If you really believe that management does not value safety in the organization, then you're going to exemplify that in your behavior in that organization. So we really do try to get at some of the attitudes and values as well as some of the other types of things that we've heard about today.

In addition, by having multiple methods, multiple tools, the bars, the survey, the interviews, the checklists, to asses the same behavior, we have something that we call convergent validity. And what that means is when we are doing an interview and asking questions about communication, we're not just going to use that information. We're also going to see if it's consistent with the data that we get from the survey, from the rating scales and from the checklists.

So in that sense now we have a multiple way to say communication is an issue for X, Y and Z reason baaed on multiple methods of assessment. So I think those are the two things that we look at a little bit differently from what I've heard. The convergent validity and the fact that we're looking at attitudes and values and perception in addition to some of the other types of information.

The tools allow for quantitative and qualitative. A survey will give you numerical values. Managers find it very useful to look at differences between departments or between levels in the organization, between management and non-management. But it also gives you qualitative data because I think we all know that the case studies and the examples are often very rich sources of information for these types of cultural characteristics.

Next slide, please.

(Slide change.)

MS. HABER: I just want to mention briefly

High Reliability organizations because it's a concept that is maybe not familiar to everybody, but when we were working on the USNRC research project, we worked with the University of California at Berkeley, Todd LaPorte, Gene Rocklin and Karlene Roberts. And many of you may know of their work. It's been published in popular as well as scientific journals. And really they talked about organizations that depend on human performance to avoid incidence involving significant adverse consequences in terms of employee and public health and safety. These organizations cannot afford to make a mistake because the consequence is too high if they make is. So that's what a high reliability organization is.

Just recently, last summer, Roberts and Bea came out in an Academy of Management article with an excellent framework for thinking about what makes a successful High Reliability organization. And I just want to give you the characteristics. I think they'll sound very familiar to you.

First one, please.

(Slide change.)

MS. HABER: The first is getting employees to buy into the big picture through consistent communication and teamwork to arrive at a common path forward. People have to know what the vision is. They have to communicate by it. They have to talk about it amongst themselves and then you have to get them to work on a common path to achieve that mission.

Second, please. Next slide.

(Slide change.)

MS. HABER: Being a learning organization. And basically I heard a little bit discussion about what does that mean and why is that important. It's aggressively seeking to know what you don't know. Otherwise, you will never move and you never will be anticipating the next step or the next event.

And finally, the last one is using measurement to manage. We all know the term that whatever gets measured gets managed, but now you can build a reward and incentive system around it that recognizes that not only the cost of failure which we're often good at doing, but the benefit of reliability. And it's not just a compensation system, it's a whole social system that really recognized that reward. After all of their years of research from case study and analysis, they came up with these characteristics that they felt executives in these types of organizations would find very useful to think about.

Culture is really the umbrella over these characteristics and really influences the implementation of how they are carried out. And high reliability organization, successful ones that do it well, place a very heavy emphasis on promoting a positive safety culture.

Next slide, please.

(Slide change.)

MEMBER APOSTOLAKIS: So is there an implication here that if I do these three bullets well, I will be a High Reliability organization? Or is it that if I am already an HRO, then these are three of my characteristics?

MS. HABER: They argue that to help promote being a successful HRO, this is what you should aim for.

MEMBER APOSTOLAKIS: But they don't provide any proof.

MS. HABER: Well, they provide some examples. And we'll talk about some of the behaviors.

MEMBER APOSTOLAKIS: Okay.

MS. HABER: Okay, we've heard a lot about the IAEA documents. Let me just quickly put it in perspective for how we've used it. The first, of course, is the INSAG-4 and I'm not going to go through that again.

The second is that we also think about this in terms of safety culture existing in an organizational context. We heard this morning a lot about management and leadership and that's very important. And safety culture is very important on an individual level too, but it has to exist within the right organizational context. You can have an excellent leader and they're going to have a very tough time if there isn't the appropriate infrastructure and organizational processes for them to actually implement the visions and what they want to carry out. So we need to think about this, not only at the leadership issue, but also in the organizational context.

The IAEA uses Schein, and we heard Edgar Schein's model of culture and this is where we think that we're providing some information on the last bullet. The first two bullets we've heard about all day. Artifacts in Schein's model are the observables, the things that we can see; mission, a vision statement, a poster that's on the wall that we've talked about. Those are the observables, the artifacts.

The claimed values are what do we espouse as an organization? Well, we hear safety first. That's a good one. We hear that safety is our top priority. These are all claimed values. I think all of us would agree that we're pretty successful at looking at these things and defining what they are. What we're least successful about, but probably the most important thing for culture are the basic assumptions. These are the attitudes and values that we all bring into work, to our families, to our societies, to our groups that really determine our behavior and in a working environment, those basic assumptions are going to impact performance, particularly safety performance. So when I think about it, we think about basic assumptions like safety can always be improved. In other words, if you come to work and you think that everything is okay and safety level in the organization is fine, then you're going to behave in a certain way. But if you're going to be on the lookout because you believe you can always make it a little bit better, then you're going to behave in a different way.

If we believe as human beings that all people are good, that's a basic assumption and we behave in a way, assuming that people are good. If we didn't believe that, we would behave differently. So basic assumptions are really the values and attitudes that comprise a lot of culture. And it's the hardest thing to assess.

The IAEA also talks about the stages of safety culture development and I think from a regulatory spectrum, these are important. Compliance is a regulation-based safety culture. If the NRC says thou shalt have a positive safety culture, then the utility is going to go out and comply with that requirement. It's going to a compliance-based type of approach.

When they move into performance, what the organization is doing is now measuring, providing indicators or ways to look at safety culture. And I think we've heard some of that today. But the final one is when it becomes a process and it becomes a way of life or a way of working and it really is this notion that it can be improved and that it's always a continuous process.

Next slide.

(Slide change.)

MS. HABER: In December of this year, there was a consultancy in Vienna to try to take all of the information from the different INSAG documents that we've heard about. And by the way, George, I did want to mention that there has been, I think this month, and there will be in the fall, meetings with regulators on these characteristics as well, to get that input.

We had a consultancy. We took together all these INSAG documents for 1315, 1329 tech doc., all of them and said is there a way because the goal of the consultancy was how are we going to assess safety culture? If the IAEA wants to send out a safety culture assessment review team, SCWERT, then how are we going to do it. And one thing was we had to categorize these into something that made sense. And so what came out of that meeting were these five safety culture characteristics. They're now calling them dimensions. I've been calling them characteristics.

The first one, safety is a clearly recognized value in the organization. Now beneath each of these, I'm going to show you on the next chart are performance objectives and criteria that go with each of these characteristics and we still have to understand how we're going to measure them. Let's just go through these for a minute.

Accountability of safety in the organization is clear. Safety is integrated into all activities. It's kind of the notion that it's all safety. It's not just nuclear safety and it's everywhere. A safety leadership process exists. Something we've heard a lot about today. And finally, that safety culture is learning driven, that the organization will use their own past performance and the experience of others to improve their own performance in the future.

Next slide.

(Slide change.)

MS. HABER: This is very busy. I'm not going to go through the whole thing, but I just want to show you how this framework is used in the methodology that we use to look at safety culture evaluation.

For those of you who have read the Davis-Besse report, some of this should be familiar to you.

Down the middle are the safety culture characteristics that we just spoke about, the five. Safety is a clearly recognized value, for example. Along here, are the performance objectives or if you want, the attributes of that characteristic. So you would look for documentation that describes the importance and role of safety, the value of safety is clearly transmitted and understood. Decision making is conservative or reflects the value, etcetera and so forth. I'm not going to go through all of them.

We're still at the point of how do we get to the basic assumptions? I can show you the artifacts and the claimed values for these, the observables, but what about those values and attitudes? Well, along the right side you're going to see what we're calling organizational behaviors and these are the same organizational behaviors for the most part that we had identified back in the late 1980s and early 1990s from the USNRC research that are used to assess those types of influences. And by using the different tools, we can get at not only the artifacts and the claimed values for those characteristics, but some of the basic assumptions, not all. I mean because that's very difficult.

But as an example, if we look at attention to safety, we have scales on our survey that have 40 items that look at what is -- are these behaviors helping you to be successful in terms of performing safely in the plant? Okay? And so now you're getting at not whether or not it just exists or not, but what are employees', workers' perceptions about the importance of those particular behaviors. And you can compare between groups. So you can look at what operations people feel, what maintenance people perceive, what engineering people perceive, what do senior managers perceive. They think it's there, but what about the maintenance technician who says no, it's not there. We don't have it and it's not helping me on my job. So you can look at those kinds of differences in a very quantitative and pretty graphic kind of way.

So I won't go through all of these, but basically we use these behaviors in assessing the characteristics, collecting them from the different tools and then being able to aggregate it up to make some statement about the absence or presence of these characteristics.

Last slide, please.

(Slide change.)

MS. HABER: I think from the experience that we've had and the work that we've done, we can say right now that safety culture attributes are definable and accessible. And we think and we believe and I think we've demonstrated that there are tools available for the diagnosis of the absence or presence of these attributes that are important to safety culture.

We found in some of our work that some of the behaviors that I showed you are more successful at differentiating between organizations. So we're attempting to look at what some behavioral indicators might be that would differentiate or discriminate between organizations.

We have a database now of over 20,000 people that have responded to these tools and particularly the survey and we can delineate nuclear and non-nuclear. We can show differences there and even within nuclear, which I believe is probably not a wide, as wide a distribution as you might think, you can discriminate between different nuclear organizations as well.

And based on this kind of information, strategies can be implemented to really ensure alignment in an organization on these types of behaviors. I think something else that we heard a little bit about is what's the common mode and is there a common mode or is there a common mode failure? Well, when I think about our results and I see a lot of inconsistency or non-alignment in an organization, what we're really looking at in some sense is a common mode failure because the value of that organization have become really discrepant or not similar across the organization on behaviors that are all important to safety culture.

And finally, I think that we talk a little bit about this, but I think that whatever the ACRS is going to recommend to the Commission, some criteria is going to have to be defined in terms of what the regulator expects from the licensee on safety culture and I think it might be better defined with a larger empirically generated database to look at the continuum of these characteristics across the industry.

Thank you. Any questions?

MEMBER APOSTOLAKIS: A quick one. As a regulator, why should I care about the basic assumptions? Shouldn't the artifacts be good enough for me?

MS. HABER: Because often the artifacts, in an organization that will not have a consistent or necessarily positive safety culture, the artifacts are not aligned with the basic assumption.

MEMBER APOSTOLAKIS: Yes, but my understanding of the artifacts is they are observable.

MS. HABER: Uh-huh.

MEMBER APOSTOLAKIS: If they are fine, I don't care. I don't care about the guy who has bad intentions, as long as he is doing the right thing.

Because all I want to do is protect the public health and safety and that's what matters.

MS. HABER: But then you're looking -- you're looking just at the outcome.

MEMBER APOSTOLAKIS: Yes.

MS. HABER: But often that is not a consistent outcome in an organization either.

MEMBER APOSTOLAKIS: So there may be another outcome later that may get me into trouble?

MS. HABER: Right, and part of that could be, if you want to understand why, then you need to understand the basic assumptions of why you might have had the discrepancy.

MEMBER POWERS: George doesn't care about understanding why.

MS. HABER: Well, you do care.

MEMBER APOSTOLAKIS: No, why? Don't take everything Dr. Powers says very seriously.

(Laughter.)

MR. GROBE: The artifact is the poster on the wall.

MEMBER ROSEN: Is that right or is that an outcome of an activity? I need a definition here. The artifact if it's just the poster we want, nuclear safety is our top priority and everybody has that and you can find a nice colored poster, is that all you have to do?

MEMBER APOSTOLAKIS: I thought that thing on the wall is a claimed value.

MS. HABER: No, no, no. The artifact is a visible, observable -- it can be a behavior. Okay?

You might also have, George, a difference within the artifact. So you could see that you have the poster on the wall, but then the behavior in the organization doesn't match the poster on the wall.

MEMBER APOSTOLAKIS: Then I am interested.

MS. HABER: The artifact is a visible, observable, either behavior or -- concrete thing.

MEMBER APOSTOLAKIS: I dare say that most -- most plants have the same policy statements. They have the same -- all of them. So therefore, I would say those kind of artifacts right now are commonly used by everybody and yet, the behaviors are different from plant to plant.

MS. HABER: Well, you might think they're everywhere, but I think they're not always everywhere consistently and they're not always -- they're not always as obvious as you would think. I mean they might be on the wall. They might be outdated with the policy of the organization. So you might have an artifact on the wall that describes some guiding principles, and if you read their actual procedures or their operating documentation, there's inconsistency between two artifacts.

MEMBER APOSTOLAKIS: What -- I mean, this particular model, it seems to me -- I agree, well, I agree. You just told me that artifacts may include actual behavior and also these things.

As a regulator, I'm really interested in the behavior. Now it seems to me that the one who should be interested in the assumptions is the utility. If the behavior is not appropriate or up to standards and so on, and they want to change it, they go and do this. But the NRC, we don't care. As long as your outcome is okay, because the trend now is to go to performance-based regulation. So if your performance is acceptable, I don't care how you got there.

MS. HABER: But if you're looking at -- I think I believe that the safety -- to understand the cultural aspects, you cannot just look at the artifacts and the claimed values. You're not really getting at --

MEMBER APOSTOLAKIS: And that's perfectly true.

MS. HABER: And what we're doing is trying to assess safety culture. As a regulator, if all you want to do is look at outcome --

MEMBER APOSTOLAKIS: Unless I have a big problem with the outcomes and then I want to go deeper. Use your other example. I mean you had plants where the artifacts and the claimed values were fine.

MEMBER APOSTOLAKIS: But the behavior may not be good.

MS. HABER: No.

CHAIRMAN BONACA: What is the consistency between the artifacts, the paper artifacts and the messages that management is sending to the people. For example, you may have all kinds of posters that says safety is number one. But then there are project meetings that last all day long and the first statement is safety is the most important thing. And then you don't talk about that any more. You talk about for eight hours about schedule and who's going to do what.

MS. HABER: That's right. Those are the inconsistencies that you would want to look for.

CHAIRMAN BONACA: Yes. And then, of course, the communications that are not artifacts.

They are
-- well, actually they are --
MS. HABER: Performance objectives.
CHAIRMAN BONACA: Yes, there are the claimed values.
MS. HABER: Yes.
CHAIRMAN BONACA: And those will affect behavior ultimately.
MS. HABER: Yes, and that's all from what we find. And if you read the report that we wrote, there were many inconsistencies like that where the claimed value was one, but the observables were something else.
MEMBER APOSTOLAKIS: Are there any other questions or observations?
MEMBER POWERS: Just one question that I struggled with in looking at your report on Davis-Besse. In the course of reading -- well, it's going to turn out to be two questions, George, I'm sorry.
MEMBER APOSTOLAKIS: That's okay. As long as there are not three.
MEMBER POWERS: In the course of reading the report, you indicated that there was variability in the safety culture from organization to

organization. But when you came to the conclusions, you refer to condemning of the safety culture. And I was -- the question then came up, how do you characterize an institution with lots of sub-organizations within it and there's variability in their safety cultures? Did you take -- it didn't appear you were taking a mean. It looked as though perhaps you were emphasizing the worst of the safety cultures within the various organizations.

MS. HABER: The results that led to that really did come about from a lot of the survey data and differences between groups in the organization. Statistically significant differences at a very low probability level. So we were very convinced that they were real differences in combination with the interview results which also indicated those types of differences.

MEMBER POWERS: I'm operating a little bit from memory here, but when I read your conclusions you basically said they have a poor safety culture here. When I read the text, there are obviously some organizations within Davis-Besse that you thought had a pretty good safety culture and some that you thought had a bad one.

But when you came to the conclusion for

the institution as a whole you said it's bad. And I'm wondering is the appropriate way -- and maybe you were marching * (6:05:21) and say look, tell me what the minimum is here or the mean or the mode. What are you telling me about it?

MS. HABER: What that report indicated was that there was a lot of, as you say, inconsistency or differences. Some groups, in fact, were much poorer than others.

Safety culture, one of the things we're talking about is a value that you want fairly homogeneously, maybe represented or exhibited differently by different departments because of the nature of their work. But you want people to be on the same page working towards that same goal of safety. And so in many cases we could not say the presence of one of those safety culture characteristics out of the five was clearly evident to us because of this consistency or inconsistency.

And so then we had to say that, in fact, those characteristics were not homogeneous or perhaps uniform throughout the organization.

MEMBER POWERS: The problem I have with that is they will never be uniform unless they're scripted. Now if I go through and say when she asked you about this question on this, this is the right answer and if you don't give that answer you get fired. That's the only way I can get uniformity. So I --

MS. HABER: That's not true.

MEMBER POWERS: I will always have non-uniformity.

MS. HABER: We have data that demonstrates otherwise. We have data --

MEMBER POWERS: How can you possibly?

MS. HABER: We're talking about uniformity. We're talking in some statistical sense that we have groups that have significantly different scores on surveys or bars or whatever from each other.

We have other organizations, not Davis-Besse, where you don't see that type of inconsistency on those types of values and attitudes across your operations, maintenance or engineering groups.

MEMBER POWERS: I'm sure you do.

MS. HABER: They're not uniform, but they're not as different or as inconsistent.

MEMBER POWERS: I'm sure of that.

MS. HABER: Okay.

MEMBER POWERS: My average, if I randomly selected a plant, I will have a possibility of getting one where there's total discordance from organization to organization. I have a possibility of getting there's total concordance, but in general, I will get some where there's a little bit of discrepancy between things.

So now how do I characterize -- I mean how do I add this together? Is it horrible when there's even a little bit of discordance or is it just kind of bad or undesirable? I mean I'm trying to understand the addition process here.

MS. HABER: From a quantitative sense, we've moved away from putting the numbers on it.

MEMBER POWERS: Well, you've definitely moved that. I will give you that. There are page numbers is what you have in your report.

MS. HABER: And I think it really is in that sense when we look in the organization, it's a profile of that organization within itself in terms of whether or not -- I mean it's an oxymoron to me to say that you have very different safety culture values within an organization.

I mean by definition then you don't have -- you may have them, but then you don't have necessarily the positive homogeneous type of culture that you would want to have.

MR. MEYERS: Can I comment on that? We worked hard on operations and engineering. We've really focused on them. There are maintenance guys who are walking around saying life is good. We don't have any problems. You know? We haven't really looked at maintenance too hard, right?

If you look at all the issues, none of them gets into maintenance too much. So we haven't done much in maintenance. What this told us, when we looked at it is, we need to focus on our maintenance groups a little bit, you know?

MEMBER POWERS: I'm sure of that. I'm just asking a mechanics question.

Let me ask another mechanics question. I was struck in your methodologies that you've advanced on the extensive use of interviews. You talk to people.

MEMBER ROSEN: Goodness, you talk to people.

MEMBER POWERS: But you're asking them to get some assessment on their views about something where you're testing their religious fervor on things. And the problem is that people use words in different ways. And you have a set of words that you're looking for and I'm wondering do you run into a problem and as an example, I'm married to this girl from California that is truthfully laid back and the best thing she ever experienced in her life she'll say it's pretty good. Okay? And the worse thing she ever experienced in life she said no, I didn't like that much. In other words, there are no extremes in her response to your questions. Okay?

Whereas, I can also find people who are very excitable like Mr. Shack here who the slightest discrepancy between his aspirations he is convinced it's like the end of the world in the language he uses.

(Laughter.)

Do you run into a problem with that? The words people use are just different.

MS. HABER: What I haven't had time to go into is the integration and the aggregation of the data. When you talk about the interview data, we do a lot of interviews because no result comes forth that isn't heard consistently or repetitively across the organization. So one individual's description or one individual's word, if you will, that might be a little bit different, we're not looking for a particular word, we're looking for the concept and the understanding and the perception of the person.

If we would only get one on that end of the distribution, you didn't see that in the report. So there's a very laborious process that we go through to make sure that they are aggregated from -- and not only the interviews, but then we also have to have consistency from the survey data which is more quantitative and the bars and the checklists. So the conclusions that you read at that point really represent a lot of methods, a lot of data that's gone into that.

MEMBER POWERS: At the risk of incurring Mr. Apostolakis' wrath, I'll ask you a third question.

MEMBER APOSTOLAKIS: I'm not easily excitable like Mr. Shack.

MEMBER POWERS: I know, you're a laid back Californian, transplanted to Boston. I understand, George.

In a misspent youth, I got associated with employee opinion surveys and one of the things that I learned about those surveys is you survey people about the opinion of the organizations and they tell you what you're doing good and what you're doing bad. And people having the survey done will find these things they do bad and they'll work very hard to change them. And having done that they'll give a survey again. And almost universally, their scores will go down. It's called a statement effect. And do we have that problem with surveys?

MS. HABER: No. We've done these again. Not at Davis-Besse right now, but at other organizations and then we've done them because the organization has wanted to do an intervention to try to fix a particular problem maybe in the communication area, asked us to come back in.

The key to that issue which is documented in the literature is how much time you wait between when you do the first assessment and the second assessment.

Typically, depending upon the behavior -- I mean culture becomes something, as we've talked about before, doesn't change very quickly. But things like communication, attributes of communication can change quicker if you're doing some focused intervention.

If we went back about 18 to 24 months later, and then you can assess even degradation or improvement or stability, I mean you can get any combination of those. So I'd still say, I mean, I understand the issue. If it's a well-designed questionnaire, you will minimize that effect. You'll minimize the sabotage effect. You'll minimize the repetitive effect.

And I think the reason that we feel comfortable to use it is because we have the other tools as well, that will either validate or not the results that we get from one tool.

MEMBER POWERS: I've got more questions, but you threatened me at three.

MEMBER APOSTOLAKIS: Three is good enough, Dana, unless you have something that's really burning.

MEMBER POWERS: Well, the next question is suppose that we said okay, we'll require people to assess the safety culture and use that as an indicator and the licensee -- that's done, okay? And the NRC comes in and said gee, your indicator is too damn low. And so we're going to take you and give you fuschia as a color. And we'll take fuschia as bad.

And this goes to the significance determination process. So the licensee then brings in somebody other than Sonja, somebody else as a company who says they can assess safety culture and comes back, will they come up with the same result using presumably different tools?

MEMBER APOSTOLAKIS: There is obviously more than uncertainty here. That's what you're saying.

MEMBER POWERS: Yes.

MEMBER APOSTOLAKIS: And I don't think Sonja denies the fact that there is a lot of subjective evaluation and in fact, what we're hearing from the industry, the way I understand is that they are reluctant to have an overall rating of safety culture. They would rather talk about specific attributes and try to improve them.

Bill O'Connor did not go to any integrated assessment and maybe that's why they are trying to avoid. But there is definitely more than uncertainty here. My goodness.

MEMBER POWERS: In fact, if the greatest difficulty we have right now with the STP is that a finding is made, a color is assigned -- I get my phases wrong here all the time. Phase 2, and it goes into a comparison and you don't get the same results coming out of that, I mean it looks like we're begging for that kind of problem here and there's tremendous modelings here.

MR. MEYERS: Does anything matter? You talk about our report. We were pretty happy with our report. We thought it validated and believed it to be true already. The key is you have management buy in --

MEMBER POWERS: That concern was primarily one of mechanics of doing --

MR. MEYERS: My point is when you get through with one, what you have got to have is the management buy in that you believe those factors are true and you're going to go do something about them. Without that buy in, the survey doesn't do you any good. None of that stuff does you any good. You got to buy in because we said all along is that safety culture is leadership driven, right?

MEMBER POWERS: It has been said all day. If you're asking me to say it, no, I won't say it. Because I don't think it is.

MEMBER APOSTOLAKIS: Any other comments.

MEMBER RANSOM: Just a very quick comments. It seems to me in the last 40 years in this country, we've gone through management by objective, management by commitment, total quality management, six sigma programs, and from my experience in some of these it seems like fatigue sets into an organization where they say well, here's just another program. If we just sort of hang back and it will go away and wait for the next one. And as I've listened to a lot of this Davis-Besse situation, I can imagine the people there feeling somewhat -- oh my God, here's another program. And I don't know, do you, from a psychological perspective, see that?

I know that I've heard that in organizations that change the organization frequently. People after a while say well, okay, I'll just wait for the next organization and see if I can position myself so I'm in a better spot the next time they change the organization. And it really cuts into productivity and actual performance.

MS. HABER: We don't have to go too far to look at it. Doesn't it happen in our own government institutions?

(Laughter.)

MEMBER SIEBER: Yes, but that's not a good example.

(Laughter.)

MS. HABER: It's the flavor of the month and it's the way you see attitude of like what are they going to do now and how is that going to work?

MEMBER RANSOM: In my observation, it seems to me the organizations that have been successful are the ones that have had a history of stable organization, respect for their employees and the employees buy into the organization and become a part of it. They're more fraternal, more or less, or paternal.

MS. HABER: And you're right, but you can manage change successfully and make that transition more successful than uncertain.

MEMBER RANSOM: It seems to me you have to be very careful to make it believable.

MS. HABER: Yes.

MEMBER ROSEN: But Vic, there's a piece that you didn't talk about and that is the new leader, when he comes in, has to provide the incentive for the people in the organization to want to have the change and have it be successful. And that's what -- Lew, you and I saw that. The burning platform speech where the CEO comes in and says imagine you're on a burning oil platform out on the ocean, we're all going to die unless we get together and fight the fire and put it out, pretty soon.

CHAIRMAN BONACA: That's when you have a change in management to deal with the problem. I agree with that. There is one thing to say, however, in favor of the newcomer, if he's given the resources that the previous organization did not spend, that's really a fundamental difference. Before you had an organization that had a mandate form the top down that, for example, you shall not spend the money because this company already spends too much money. Now then the whole organization goes down the drain. The saviors come in and they're given tons of money to fix everything. So now then all this fixing really translates into also behavioral attitudes on the part of management because now they want to have people supporting that and so you have the transformation.

I think a bigger issue is given that you have a stable organization there, like we had at Davis-Besse, how does the organization assess itself? How does it measure, in fact, that maybe there is a degrading culture and is willing to cope with that which means to resolve the issues and to bring it -- that, I think is a fairer assessment of what we have to look at. Also because I think, in general, we have power plants right now that are performing pretty well. What we're trying to do is to prevent degradation, in fact, of performance in the future. So I would really look at that as a model that we have to address.

MR. GROBE: I think there's two parts to that. One is how does it assess itself and how does it benchmark itself such as it's confident, that its self-assessment aren't deceiving.

CHAIRMAN BONACA: Yes, but it seems to me what it comes down to monetary, really that's an industry responsibility and that's why -- this is just a personal opinion. I see a significant role for INPO.

However, it seems to me that the NRC still has the need to recognize the symptoms of poor safety culture, even if we did not regulate anything. There is a need for inspectors to recognize safety culture. Now we can say the inspector is doing his best and I agree with that, but we all recognize that people have to be trained. They have to be able to recognize symptoms, and particularly, I feel that the inspectors, for example, have a huge challenge because they are isolated within the organization. It's very hard to stay isolated, particularly if you become part of the organization, even if you are a regulator.

It's very hard to sit in a place like a power plant and to maintain a judgmental perspective on everybody who is around you. It's almost an impossible thing. So that behaviorally, I think, is a huge challenge. It's very hard for any individual to live that way and how do we -- I know the NRC recognizes that problem, the challenge. But how do we make the inspectors more capable of recognizing symptoms? Can we help them somehow?

MR. GROBE: I think we have to set that expectation, provide training and then to address your other concern of what we call loss of objectivity, we have a number of coping strategies. We assign at least two inspectors per site to ensure that there's somebody that they can benchmark themselves off of. We rotate inspectors on a regular basis. We don't allow people to become permanent fixtures at a facility. The different regions have different frequencies of -- different data regarding how frequent people rotate. Lots of times it depends on promotions and things like that.

But it's frequently on the 3 to 5 year range. There's a limit of 7 years. So these issues are -- we try to deal with these issues. How effective we are is another story. I think we're pretty effective.

MEMBER APOSTOLAKIS: Tom?

MEMBER KRESS: I'm interested in just how intrusive you're making the methodology might be, for example, how many people do you interview, how do you choose people to interview, how much time do you spend with them and what's the overall time that you're at the plant, that sort of thing. Just give me an idea of what --

MS. HABER: Well, at Davis-Besse, it's in the report, but we interviewed -- we requested 96 people.

MEMBER KRESS: Do you decide which people you wanted to talk to?

MS. HABER: We do it by functional positions, not by individual names. So we'll say we want to talk to three or four maintenance technicians or three or four reactor operators.

MEMBER KRESS: And then the management decides which ones to send you?

MS. HABER: They said that they did it randomly through Human Resources by -- every organization has a different way to do it. We surveyed 100 percent of the population and we got close to 80 percent response rate of all the employees took the paper and pencil questionnaire, which is a very acceptable response rate.

We observed over 50 different types of activities. We were at the site for two weeks. actually a little less than two weeks. We were a team of four people.

MEMBER KRESS: That helps me.

MEMBER APOSTOLAKIS: One last question, if you are talking about leadership, which leadership?

Site leadership, corporate leadership, board of directors? Who is the leadership here?

MS. HABER: Well, from our perspective, if you look at the characteristic that says leadership process, it's at all levels and it even includes the informal leaders of the organization. So you have the formal leaders at all your levels of the organization, but you also have informal leaders, perhaps people from bargaining units or people from certain groups and you have to look at them and how they can influence the culture and be into the --

MEMBER APOSTOLAKIS: But you don't interview those guys, do you?

MS. HABER: Sure we do. Absolutely.

MEMBER APOSTOLAKIS: Like who? Who's the highest ranked --

MS. HABER: The president of a local union.

MEMBER APOSTOLAKIS: Oh, the stakeholders.

MS. HABER: No, not a stakeholder. He's a worker. He might be president of the local chapter and he's a maintenance mechanic, absolutely.

MEMBER APOSTOLAKIS: Within the organization, what was the highest ranking person that you interviewed?

MS. HABER: We went to FENOC and we interviewed Peter Berg at First Energy. I don't think we can go any higher than that, in that company.

MEMBER APOSTOLAKIS: Okay, I think we should close this. Thank you very much, all of you. It was very informative.

The idea was to take a break and come back to go around the table, but I think it's getting too late.

MEMBER SIEBER: You could try to give us a break.

MEMBER APOSTOLAKIS: It's up to you, Mr. Chairman.

CHAIRMAN BONACA: I think we can take a little break and then just come back for 15 minutes around the table. Off the record.

MEMBER APOSTOLAKIS: Do you want to do that?

CHAIRMAN BONACA: We're going to go off the record now and certainly we want to thank all of you for your participation. I think it's been great.

(Whereupon, at 6:27 p.m., the meeting was concluded.)

CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on Reactor Safeguards 503rd meeting

Docket Number: n/a

Location: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Debra Wilensky

Debra Wilensky
Official Reporter
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