DEFENSE NUCLEAR FACILITIES SAFETY BOARD

SAFETY CULTURE PUBLIC MEETING AND HEARING

MAY 28, 2014

DEFENSE NUCLEAR FACILITIES SAFETY BOARD
625 INDIANA AVENUE, NW
ROOM 352
WASHINGTON, DC 20004

INDEX

PUBLIC MEETING AND HEARING

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(8:59 a.m.)

DR. WINOKUR: Good morning. My name is Peter Winokur, and I am the Chairman of the Defense Nuclear Facilities Safety Board. I will preside over this public meeting and hearing. I'd like to introduce my colleagues on the Safety Board. To my immediate right is Ms. Jessie Roberson, the Board's Vice Chairman. To my immediate left is Mr. Sean Sullivan. Mr. Joseph Bader will not be attending today. We four constitute the Board.

The Board's Acting General Counsel, Mr. Richard Reback, is seated to my far left. The Board's Technical Director, Mr. Steven Stokes, is seated to my far right. Several members of the Board staff closely involved with safety culture oversight at the Department of Energy's Defense Nuclear Facilities are also here.

Today's meeting and hearing was publicly noticed in the Federal Register on May 2nd, 2014. The meeting and hearing are held open to the public per the provisions of the Government in the Sunshine Act. In order to provide timely and accurate information concerning the Board's public and worker health and safety mission throughout the Department of Energy's Defense Nuclear Complex, the Board is recording this

proceeding through a verbatim transcript, video recording, and live video streaming. The transcript and associated documents, public notice, and video recording will be available for viewing in the public reading room here at our headquarters in Washington, DC. In addition, an archive copy of the video recording will be available through our website for at least 60 days.

Per the Board's practice and as stated in the Federal Register notice, we will welcome comments from interested members of the public at the conclusion of testimony, which will be at approximately 11:45 a.m. A list of those speakers who have contacted the Board is posted at the entrance to this room. We have generally listed the speakers in the order in which they have contacted us or, if possible, when they wished to speak. I will call the speakers in this order and ask that speakers state their name and title at the beginning of their presentation.

There is also a table at the entrance to this room with a sign-up sheet for members of the public who wish to make a presentation but did not have an opportunity to notify us ahead of time. They will follow those who have already registered with us in the order in which they have signed up. To give everyone wishing to make a presentation an equal opportunity, we ask speakers

to limit their original presentations to five minutes. I will then give consideration for additional comments should time permit.

Presentations should be limited to comments, technical information, or data concerning the subjects of this public meeting and hearing. The Board members may question anyone making a presentation to the extent deemed appropriate. The record of this proceeding will remain open until June 28th, 2014.

I'd like to reiterate that the Board reserves its right to further schedule and regulate the course of this meeting and hearing, to recess, reconvene, postpone, or adjourn this meeting and hearing, and to otherwise exercise its authority under the Atomic Energy Act of 1954 as amended.

This public meeting and hearing is the first of two hearings the Board will convene to address safety culture at the Department of Energy's defense nuclear facilities and the Board's Recommendation 2011-1, Safety Culture at the Waste Treatment and Immobilization Plant. The second hearing will be announced via a separate notice at a future date.

In this first hearing, the Board will receive testimony from a recognized industry expert in the field of safety culture, with a focus on the tools used for

assessing safety culture, the approaches for interpreting the assessment results, and how the results can be used for improving safety culture.

The Board will then hear testimony from safety culture experts from the Federal Government, including senior staff of the Nuclear Regulatory Commission, also known as the NRC, and the National Aeronautics and Space Administration, also known as NASA.

NRC staff will discuss the NRC's approach to identifying safety culture concerns at licensed facilities and how the NRC expects those concerns to be evaluated and corrected.

The hearing will conclude with a discussion from NASA staff concerning NASA's policy for safety and mission success, tools the agency uses to improve safety culture, and NASA's experience in improving and sustaining a robust safety culture.

In a follow-on session later this summer, we will discuss with the officials from the Department of Energy how these approaches and lessons learned might be used to guide their efforts in continuing to assess and improve safety culture at the Department's defense nuclear facilities.

This concludes my opening remarks. I will now turn to the Board members for their opening remarks.

Ms. Roberson?

MS. ROBERSON: None at this time, Mr. Chairman.

MR. WINOKUR: Mr. Sullivan?

MR. SULLIVAN: Yes. Good morning. And at the outset, I just wanted to take a moment to say that I don't actually plan to ask any questions of our panelists this morning, and I wanted to briefly explain why.

As I understand the purpose of this hearing, we're supposed to be gathering information that may be used in a subsequent hearing with the Department of Energy to enlighten them on ways to improve their safety culture. And to be honest, I don't believe that anyone can say anything, myself included in this room in the next few hours, that will actually fulfill that purpose.

I've been wrong before, so maybe I'll be wrong here, and maybe I'll learn something. But -- and depending on what is said, maybe I'll have some more to say on the topic at the end. But in the meantime, I plan to sit here and listen respectfully. The panelists certainly are experts in their field, but since I haven't been able to figure out for myself what points we should be making on the subject today, I don't plan to engage any -- engage in the questioning.

This concludes my remarks.

MR. WINOKUR: And this concludes the Board's opening remarks. At this time, I'd like to invite our three organizational culture experts to the witness table. Each expert will be provided 25 minutes to make a presentation that addresses some initial lines of inquiry provided by the Board in advance of this hearing. The Board will then question each witness.

Our first expert with us is Dr. Sonja Haber. Dr. Haber is an organizational psychologist and President of Human Performance Analysis Corporation. She will speak about her company's techniques and experiences in conducting safety culture assessments. Dr. Haber has developed a methodology to evaluate organization and management influences on organizational safety culture used in over 60 organizations across different industries and in different countries around the world.

Dr. Haber was a member of the International Atomic Energy Agency team working on the human and organizational factors section of its report on the Fukushima accident. Dr. Haber served as the lead on an independent safety culture assessment team investigating the Davis-Besse nuclear power station vessel head corrosion event.

In support of DOE's implementation of Board Recommendation 2011-1, Safety Culture at the Waste

Treatment and Immobilization Plant, Dr. Haber has conducted safety culture assessments at DOE's major design and construction projects, the Pantex plant, and the headquarters offices of the National Nuclear Security Administration, DOE's Environmental and Management Organization, and DOE's Health, Safety, and Security Organization.

Our second expert witness is Dr. Stephanie Morrow. Dr. Morrow is an organizational psychologist and safety culture program manager at the Nuclear Regulatory Commission. She will speak about the processes that the NRC uses to determine when there is a need to assess safety culture at commercial nuclear plants and what their expectations are when one is conducted.

Dr. Morrow has performed assessments of safety culture at nuclear power plants and vendor sites; conducted studies on the relationship between safety culture and safety performance; consulted with the International Atomic Energy Agency to develop a global safety culture assessment survey; and served as a panelist on a series of workshops to develop a safety culture common language for the U.S. nuclear power industry.

Our final witness is Dr. Tracy Dillinger. Dr. Dillinger is an organizational psychologist and program

manager at the National Aeronautics and Space Administration. She will speak about approaches in assessing and managing organizational culture within NASA. Dr. Dillinger is the manager for three programs: safety culture, human factors in mishap investigations, and human reliability assessment at NASA headquarters. She presently chairs a safety culture working group at NASA.

Prior to joining NASA, Dr. Dillinger was the Chief of Aviation Psychology for the U.S. Air Force from 1998 to 2008. During her service in the Air Force, she developed and instituted the organizational safety assessment program and the Air Force culture assessment safety tool.

Finally, she was a member of the Columbia Accident Investigation Board and the Space Shuttle Independent Assessment Team.

Let me add that I, for one, believe there is a great deal that can be learned from each of the panel members about how to assess and improve safety culture at DOE's defense nuclear facilities. I hope you'll be patient with us. We'll begin the presentations with Dr. Haber.

DR. HABER: Thank you. Good morning, Chairman Winokur, members of the Board, colleagues, and interested

parties. I'm very pleased and honored to be asked to present to you today my perspective and experience in working in the area of safety culture for almost 30 years. Over those years, safety culture has been labeled many different ways. It's been defined in several different ways, but the essence of the concept has not changed and nor should it be changed.

Safety culture really refers to the characteristics of the work environment: the values, the rules, and common and shared understandings that influence perceptions and attitudes about the importance that the organization places on safety. Most important are the words that are italicized: the perceptions and the attitudes, because it's often a notion that we forget when we think about safety culture.

I've been asked this morning to talk about, among other things, the assessment of safety culture, how can we understand it, how can we evaluate it, how can we measure it, and, most important, how can we manage it and change it if we need to.

All of my remarks are based on some methodological premises when thinking about safety culture. The first is that a safe working environment is really impossible without an effective organizational safety culture. Organizational culture consists of the

context in which behaviors occur and the expectations and values that are perceived to be reinforced by the organization are exhibited. So, what we see is really what people think is expected of them in the organization. This is our descriptive framework for thinking about safety culture.

Having a method that allows us an objective and systematic way to measure these behaviors that we observe has an impact on how safety performance can be changed, and that can be a useful tool. It then becomes a normative way for us to look at safety culture.

There are many models of organizational culture, but by and large they all talk about behaviors as the observables of the values and beliefs that underlie the behaviors we observe. So, when we see things, we're really seeing a reflection of the underlying attitudes and perceptions that people have, and that's why they behave in the way that they do, and that's why we have differences across individuals and across human behavior, because we have different perceptions sometimes about the same thing.

Understanding these behaviors and having reliable and valid tools to assess them is not just the most effective way to understand and assess organizational safety culture; it's the only way.

Without really having reliable and valid tools, we run the risk of making very wrong assumptions.

Too often we find, and I have found over 30 years, that organizations just look at processes or performance indicators, which are only outcome measures and can be obtained by several different behaviors. For example, you can obtain the same result using two different routes to get there. One route might exhibit some very positive behaviors that might give you a good safety culture and a good outcome. Another route might not have the best behaviors but still give you the same outcome. If you only measure the outcome, you don't know how you got there. And it's those behaviors that are what you really need to understand in terms of the culture of the organization. So, it's very important not to look just at processes and indicators.

The other aspect that we don't often think about or look at is the complexity of relationships that go on to form an organizational culture. And that means that we cannot just look at individuals or human performance. We cannot just look at the technology. And we cannot just look at the organizational infrastructure. We need to look at the interrelationships of all of those things because they each influence one another and determine how people behave in the organization. So, it

is a very complex situation that cannot be analyzed by single variables alone.

I'm not going to go through these, but there's been a lot of literature and we did a lot of work to identify the organizational behaviors that could impact safety. And if you look at these, they're the same behaviors that can impact a lot of performance in an organization. They're not always unique to safety. There might be certain outcomes that you look at that are unique to safety, but by and large the behaviors that people will exhibit are not that different. It's just how they apply them in the context of safe performance.

More importantly is how are we going to measure and assess these behaviors. We often think that we're all human beings so we can look at behavior and understand it and know it and label it and evaluate it. But in reality, as we know, there's a lot of variability in behavior. We don't all behave the same. We don't even all behave the same ourselves over the course of time.

We are not components and technical systems that we can run a thousand times to get a reliability coefficient. We are human beings. And we have a lot of variability in what we do. So, to do that, the best way

we can understand the behavior is to use multiple tools to look at those behaviors and to use valid and reliable tools. And if we use those tools independently of each other, then we know if we come to some conclusions that are similar we may, in fact, be getting at some of those beliefs and values that are underlying that behavior, which is really where we want to be if we're talking about culture.

So, some of the types of methods that are used are not new. There are various forms of them, but you must be careful in the ones that you choose and how you choose them. A functional analysis is a description of an organization. It's a static representation. It's the organizational charts; it's the procedures; it's the policies, those things that we can read and look at. They are observables, as well.

We do interviews. We do focus groups, which are basically putting groups of people together and doing interviews with multiple persons. We have behavioral anchored rating scales, another way to get at people's perceptions about behavior. We do behavioral observations, which may be one of the more important tools that we have. And we also have done surveys. And all of you are familiar with these with perhaps the exception of the behavioral anchored rating scales, which

is a little unique to our methodology.

But the point is that multiple methods are used to assess each organizational behavior and to provide convergent validity. What does that mean? It means that if I'm looking at communication in an organization, I'm going to look at it independently through my interviews, through my focus groups, through my behavioral anchored rating scales, through my observations, and through my survey.

And only when all those results independently come together and give me similar conclusions will I say this is what I think is going on about communication in this organization. And that's a key point, because too many people rely on one tool or one method, which may in itself not be the most reliable or valid method, and they have no other way to confirm or deny the results that they see.

So, it's very critical to use multiple tools when we're talking about such a variable thing as human behavior, which is a reflection of those values and attitudes and perceptions. Think of the complexity that you're trying to get at with one of these tools. So, I really cannot stress the importance of that enough if you're talking about assessing or measuring safety culture.

Okay, so, what about the characteristics of the assessment? What are the types? Well, you can do an independent assessment. Independent assessment is what we call an external or third-party assessment, where somebody who is not affiliated with the organization comes in and does a safety culture assessment.

We could probably have another panel discussion about the definition of independent. Is the industry looking at itself independent? Is a contractor paid by the corporation independent? These are good questions, but I think the point is that as independent as we can get, there's somebody who really has no vested interest in the day-to-day activities of the organization and can look at it with a different set of eyes.

There is self-assessment. A lot of questions go on about how good can self-assessment be. Clearly, self-assessment may not be the most critical way to look at yourself or your organization, but it's an important one. And if it's done right with the right tools, it's an excellent learning process for the organization to try to understand where it is and where it needs perhaps to improve. But it probably shouldn't be done in absence of an independent assessment at some point in time to make sure that there is that different perspective.

And, so, we also like the hybrid model. And

the hybrid model consists of using some independent experts, as well as some members of the organization that would constitute a self-assessment portion. It gives those members an opportunity to learn from the independent members as well as to share their knowledge of the organization with the independent members. So, we think that can be a very useful model.

The scope of an assessment, it can be broad or it can be focused. If it's going to be broad, we often forget that the corporate function of an organization is critical in determining culture. It often drives the values; it dictates the resource allocation; it drives the decision-making; and sometimes we just don't look at it because we get too focused on the facility that may have had an event, but we need to consider the corporate in a broad scope.

A focused scope, maybe we just have a particular part of the organization, a division, a department, that we might be more concerned about. But, ultimately, we're probably going to have to look at a broader scope to really understand the culture of that organization, even for the piece embedded in that bigger picture.

How do we do it? What is the team composition? Go back to the issue of complexity. You need to have a

diverse team, and that means you need people who have expertise, education, training, not just experience, but people that really know what it means to look at human behavior. But you also need people that understand the technology of the organization. And you may need some people from an organizational psychology perspective or human performance perspective because we're looking at those interrelationships that are so critical.

We do believe that since the ultimate goal here is to understand behavior, to get at the values and the perceptions, that probably an individual with a behavioral or social science degree would serve the interests of the team best to lead that team.

People need to be trained on the methodology, even if they are experts in the field, because you're going out as a team and you want everybody to be working on the same page. People need to understand those tools and how they're going to be implemented in the particular assessment. Everybody has a different way to do an interview. Everybody has a different way to do an observation. You need to have some reliability in the way you're going to collect that information. And, so, you need people to be trained together to work as a team.

As we said, the tools have to be reliable and

valid. And for those of you who are not familiar with that, reliability is the ability to take a tool and to administer it and to get a similar result within a reasonable time frame so that you know it is reliable from point one to point two.

Valid means that you're actually assessing the constructs or the attributes of the behavior or the concept that you're interested in. And there is face validity; there's construct validity; there's all types of validity that you need to be sure your tool can measure, so, when we talk about communication we know we're measuring communication.

And, finally, the information collected. As much as we all like to look at pretty pictures with quantitative data in different colors and different charts, and that's helpful, qualitative information has to be obtained, too. The only way the organization is going to understand what you're trying to explain to it is by anecdote and example of its own behavior. So, we really recommend that you must have quantitative as well as qualitative information.

Evaluation of the data, what we've described so far is collecting descriptive, objective data through multiple tools, trying to get at those behaviors which represent the underlying values and attitudes by

objective and hopefully reliable and valid tools. Then we need to evaluate it, because ultimately we're trying to determine whether or not we have a positive safety culture or one that needs some improvement.

The choice of normative framework is yours. And what I mean by that is there are multiple in the nuclear industry, for example. We have INPO and NRC that have now come together for the 10 traits. During my 30 years, that wasn't always the case, and we had different models. We have the International Atomic Energy Agency that has their framework; WANO, which has a slightly different framework with the world association. And then in different industries we see different models.

But let's remember, we're talking about the same behaviors. So, if we go in and collect the data on the behaviors, then we can apply it to almost any normative framework that we want. And I can tell you from my experience, I've worked with organizations that where I've collected data and then they've asked me to put in two different frameworks. So, in one case I might have put it in the INPO framework; and in another case, I put it in the IAEA, the International Atomic Energy, framework, because I'm collecting the same underlying data, I'm just now looking at a different normative model.

As Dr. Winokur mentioned, we've applied our methodology and done this work in over 60 different organizations, different industries, different countries, and we have found that it discriminates between organizations in terms of those that have a more positive safety culture and those that do not. And that can be a very useful tool. It can also help the organization itself when looking at itself at time one versus time two.

So, what have we learned? What are the discriminating behaviors that we have found across all these organizations over time? They won't come as any surprise, I'm sure. Leadership is key. Leadership in an organization may not be a particular behavior but a conglomerate of several of the behaviors that we look at. But it is key. How it is implemented, who it's implemented, how it's respected, how it's valued by the organization are key.

Communication. Everyone shakes their head and says, yeah, communication is a problem. It is a problem, but it's not a problem sometimes for the reasons that you think. Communication is not somebody telling somebody else what to do. It's a dialogue. It's listening to what other people have to say. And, so, you could have communication strategies that will never work because the

only idea is for people to tell other people what to do. And that's not going to get you results when you're talking about trying to change behavior.

Organizational learning. An organization has to learn not just from others, from operating experience, but from its own performance. It has to use its own mistakes and its own successes to move forward and to be prepared and have a better performance in the future. And too often we forget how to learn from success. It's only the proactive organization that can actually take a success and understand why it worked and then use it for its next opportunity.

Problem identification and resolution. I think in most industries we've worked pretty well on the front end of that, namely the identification of problems. We have corrective action programs. We have wonderful problem identification systems. We're very good at trying to get people, encourage them to put problems into a system and to identify them.

We're not always so good at the back end, of resolving the problems and making people understand and feel that they're important problems to solve or at least to address. And if you don't do that, then soon the front end, or the problem identification, goes away because people become apathetic. And, so, it's the

positive, proactive organization that can make both ends of that process work.

How do you address the gaps that you find? Well, I'm pretty passionate about some of these things over the years. We talked a little bit about communication already, and I said it's not a one-way process. It's a feedback loop. And we too often forget that we need to listen and to give feedback and to confirm and then to send messages over and over again.

We need to have engagement. What does engagement mean? Engagement doesn't mean some senior manager telling some people to sit on a committee and to be involved. That's not engagement. Engagement is for everybody in the organization to be involved, as many senior managers as you need, to include as many people and representatives of the organization as you can, and to make them feel that they're valued, to listen to them, and to actually use some of the ideas. It sounds very simple, but we don't do it. We don't do it enough.

Internalization. This really relates to some of the other ones on the list. Too often we just think that we can fix something, a gap in an identified safety culture weakness, by creating a new process, a new procedure. Now we have a whole list of new corrective actions based on our assessment that we did, and we can

create a wonderful checklist, and we can go through the checklist and tick off each thing that we've done and say, oh, look, we're going to improve our safety culture.

That is not sustainable behavioral change. That's only meeting compliance for regulator or meeting a corrective action milestone for a program in an organization. It's not internalizing the change and it won't be sustainable over time. So, while it may be important to identify what you have to change, you need to think about the communication, the engagement, and the internalization when you're going to change it. And that's the hard part. It's a lot easier to tick off the mark on the checklist and say that we've closed this corrective action out.

And, again, we need to think about metrics. Often we look at how we've addressed a gap through metrics. How many corrective actions have I effectively closed out? Okay, 90 percent this week, I guess I'm green, I guess we're good to go. Are metrics going to really change our behavior in the organization? Are they going to change the shared values and understanding and attitude in the organization? Probably not. It might help, but only along with other things.

And in light of all of that, we need to think

about the complexity, because if we're really going to address these gaps, we can't address them at a single variable level. We need to look at that interrelationship between when I change a process, have I thought about the behavior that I have to change with it to make the process work and to internalize it? Or am I just going to change the process?

When I talk about changing individual performance, am I just going to play the blame game and try to change people's behavior by a rewards and sanction program? Or am I going to think about the complexity of what I do in my organization that's going to sustain that kind of reward and sanction program? Too often we're just doing it at the single variable level and it won't work.

So, have we seen any organizations that can do this? Yes, we have. And they are proactive organizations. They like to get out a step ahead. When we worked with the High Reliability Organization group out at the University of California in Berkeley, they had identified three things that any key high reliability organization would have.

And one of those things has never left me because I think it's so true and it really does reflect a proactive organization. Those organizations aggressively

seek to know what they don't know. Think about that, okay. How many of us can really say we work in organizations like that? It's a really wonderful expression. And I think that that really exemplifies what a proactive organization is.

They think about things for longer term investment. They're not looking for the immediate short-term consequence. It becomes a way of doing business for them, and they think about behaviors in parallel with process. So, if they're going to change something, if they're going to make that change, they use an integrative approach, which means they think about what behaviors have to change and how they can integrate that and internalize that into the process.

Their solutions are that they can be more focused on strategies for key behaviors, because they don't have to necessarily turn everything upside down. They know where they have to focus. And what they get is long-term cost reduction -- not short-term, but long-term cost reduction. They get a better return on their investment for doing that. And they really are a performance and process-based culture.

Compare that to the reactive organization, which unfortunately too many of our organizations are, especially those that get into trouble and have to get

out. And, unfortunately, that's where we spend most of our time. They do short-term investment. Okay, we're going to change safety culture. We can train everybody in a four-hour session over the next six weeks. That's a big investment, right? Think about what the return on that investment is.

They are driven by outcome measures, right? They only care about those performance indicators. I've got 75 percent of my organization now believing they should identify problems. I must be green. They don't think about the other 25 percent that aren't identifying problems that could bite them in the back.

Their behaviors follow process, so they change the process first and then they worry about the behavior. So, consequently, they're not going to get that internalization. They're going to take the diagnostic approach, which is they're going to take their assessment results and then they're going to change things around, but they're not really going to think about the behaviors that need to change with that process.

These organizations typically require significant behavioral change because they haven't thought about that up front. They have longer term costs, and they have a poorer return on their investment. They're often a compliance-based culture. They're just

doing it because they have to.

So, what are the challenges to the organization because of our external stakeholder involvement? If we go back to the idea of complexity, remember that whatever organizations do is not independent of the outside world. And I think at DOE you probably know that better than anybody else. It's dependent up on all kinds of other stakeholders that control a lot of variables. How does that impact, how does that challenge our organizations in terms of safety culture?

In the past, and maybe even in the present for many organizations, we've just focused on process and outcome, not behaviors, because many of our external stakeholders have forced us to do that. Okay? They want to see the results. They don't care sometimes how you get there. The standards in safety culture have not been clearly defined, so there's a lot of ambiguity about how we get there and what it means. So, it's allowed people to drive to their individual ways of doing things.

A regulator, whether it's self-regulator or external regulator, cannot really require excellence. They require compliance. How do we meet the requirements? That's not going to drive what we're looking for in a positive safety culture. So, a proactive safety culture requires continuous improvement

in proactive behavior, sometimes things that external stakeholders don't always understand. So, it becomes a challenge for the organization that's really surrounded by all of these stakeholders.

The impact of that is that external stakeholder involvement, while it has facilitated the importance of safety culture, unfortunately it's become kind of a fad term for us or the flavor of the month, if you will. The external stakeholder requirements also can inhibit positive safety culture change because they're forcing that reactive type of behavior. They're forcing the outcome type of behavior rather than the behavioral change.

And reactive organizations are more likely to sustain those behaviors in response to their stakeholders. It becomes a vicious cycle, and it's very hard for them to get out of it. So, organizations have to move beyond their stakeholder guidance to develop and maintain their own positive approach to trying to change safety culture.

In summary, I hope what I've been able to tell you is that there are methods to assess and to effect safety culture. We don't have time to discuss all of those in detail. An integrative approach that looks at the behavior, as well as the process, is more likely to

effect a positive safety culture change than behavioral change.

Discriminating behaviors can facilitate effective positive safety culture change, the discriminating behaviors being leadership, communication, organizational learning, problem identification, and resolution. And external stakeholder guidance on safety culture will not by itself effect positive behavioral change.

What I'm really trying to tell you is organizations have to want to change. They have to want to understand the behaviors that underlie their values and their beliefs, and they have to want to change that, not just because some stakeholders have told them that they have to change that.

Thank you.

DR. WINOKUR: Thank you, Dr. Haber.

We're going to continue with questions from the Board now, and the questioning will begin with Ms. Roberson.

MS. ROBERSON: Good morning, and first of all I want to say thank you to the entire panel for taking the time to talk to us. Dr. Haber, thank you so much for your comments. I definitely learned some things in your presentation.

I want to explore a few things with you. One is your organization has done assessments for over 60 organizations. And I'm sure out of that you talked about the -- kind of the -- I won't call them generic, but the common weaknesses you see: organizational learning, leadership. But out of those 60 organizations, I'm sure you've seen the range of leadership competency. You've seen good leaders and you've seen poor leaders -- my words, not yours.

So, why does it often take external force for an organization to start to look at themselves in a way to understand this culture? Why does it take either a significant failing, process failing or outcry from an external party or stakeholder? Why do leaders not see that their expectations are not being reflected in the norms of the organization?

DR. HABER: Okay. The best analogy I can think of is how often do we like to look at ourselves in the mirror? It's a difficult thing to do. It's very hard to be that self-critical and to say, oh, maybe I need to change something or maybe I need to do something differently. So, I think part of it is just a general nature of our own that we don't like to be self-critical, it's hard.

In another vein, I think that often depending

upon the organization and the situation, many leaders and many managers have a lot of other priorities, okay? And they are concerned with meeting those outcomes, whether it be measured or not, that those become their priority. And, so, whatever they need to do to get there is what they're going to do, and they often don't think about the consequence of that in some of these other ways like behavioral change of culture change.

MS. ROBERSON: Mm-hmm. So, one of the things that we're very interested in and to see, and I'm sure you've seen it throughout your career, is the difference between the perceptions of managers and those of workers. And when I'm talking workers, I'm talking managers from first-line supervisor up or down, but the workers on the floor versus the senior leadership.

Can you discuss why this is normal, why you think it occurs, and how its significance can be interpreted and effecting of the safety culture of an organization?

DR. HABER: That is not an unusual observation. Again, I think they have some different goals and priorities, but what we have seen that is probably of more interest is the differences between levels of managers. So, it's not only differences that you observe between managers and non-managers, but within an

organization you can have significant differences between senior managers, middle managers, first-line supervisors. So, that's telling us something about perhaps the nonalignment or lack of alignment in how people understand what the shared values of that organization are. If they have a mixed message, how do you suppose the non-management or the workforce feels? They're not quite sure what the values are if their own management can't really agree on the same values.

So, while that is not uncommon, we also have seen -- there are not a lot, but there are some where there are no differences across the entire organization in values and beliefs, between managers or non-managers or within managers. And very homogenous organizations like that can exist for several reasons. They can exist, one, because they really do all understand what the common values and goals of the organization are. Two, they could be in a high state of change, so that people might not be clear yet on what the priorities or the values in the organization are. But they do exist, and by and large, in a proactive organization, you tend to see more alignment there than in a reactive organization.

MS. ROBERSON: So, how does an organization balance mission and safety?

DR. HABER: You know, we often pose that

question to organizations, right, whether mission safety or production safety, however you want to think about it. But I think if you think about what I've said and you think about looking at behaviors, the behaviors are not mutually exclusive to mission or to safety or to production or to safety. It's the same behaviors, and they clearly -- you would want, you know, your mission-directed behaviors not to intervene with your safety-directed behaviors. They really are not independent or mutually exclusive. And you often need some of those same behaviors just perhaps focused in a different way.

I think you can focus on mission for a short term, but ultimately, you know, I think they're really the same behaviors and that you're going to have to resolve that to have safety and mission.

MS. ROBERSON: Thank you.

DR. WINOKUR: Well, let me thank you for your presentation. That's very illuminating and I certainly want to spend more time studying it. But I want to follow up from the question of Ms. Roberson in terms of this behavioral change.

I mean, this is a tough thing, behavioral change. And when I look at the definition of safety culture, and I've talked on it a few times, not as eloquently as you, I note that the definition of the

International Atomic Energy Agency and the Institute of Nuclear Power Operations say that safety is an overriding priority, but the Department of Energy's definition is more balanced, it's more in terms of a balanced mission and safety.

So, I'm going to make behavioral change in the organization, is that a meaningful difference, the message coming that safety is an overriding priority versus let's balance mission and safety? Is that a meaningful difference if you're trying to change behavior?

DR. HABER: In terms of that changing behavior equates with overriding priority?

DR. WINOKUR: Well, you're trying to change the behavior of your workforce to hopefully improve your safety culture, right?

DR. HABER: Mm-hmm.

DR. WINOKUR: And you're hearing the message from up high, from management, and one message from the NRC may be that safety is an overriding priority. That's clearly stated in the definition of safety culture.

DR. HABER: Mm-hmm.

DR. WINOKUR: In another organization, your core value, DOE, it's integrated safety management is -- says you balance mission and safety. Is it meaningfully

different to the workers to hear those two different messages?

DR. HABER: I don't think so if the leadership implements the model for safety and behavior change in the appropriate way. I think what happens is is that often we take that overriding priority to an extreme on either side. I think there has to be a balance to some extent, and I think that, again, think about -- I mean, overriding priority for safety. We're not talking just nuclear safety, right? We're talking occupational safety; we're talking radiation safety; we're talking about fire safety, all aspects of safety which are going to permeate all aspects of our mission, our production, or whatever we do.

So, if we're not using safety as a value in meeting our mission or our production, then we're not bound to succeed in either way. So, I think there is -- by definition, there has to be a balance to get the result that you want, whether it be on the mission side or the safety side.

DR. WINOKUR: Okay, thank you. Let me ask about this behavioral change. I mean, it's just -- when you say this to people, it sounds so -- so ill-defined, so nondescript in some ways. Where is the real driver for this behavioral change? Is it really just purely

leadership that has to drive it in the end? Or is there a bottom-up drive to it, also? I mean, where are you going to look to -- let's say you have a safety culture that's not what you want it to be. Where are you going to look to start the process to improve it?

DR. HABER: Okay. It's a very good question. There are several models for this that I've seen over the years. And I think the one that I would recommend is the one that's going to sustain it the longest and not all of them do. One model is that you bring in -- you've had an event or you've identified some gaps in safety culture that are fairly significant. You bring in a crisis manager. You bring in somebody who's going to turn everything upside down and create a very chaotic environment and organization. It's basically the shock and awe, if you will, model of changing safety culture.

Does that sustain itself? No. It might get the organization through that period of time, and if they have the right leadership after that, you might be able to then create those sustainable changes.

The second model is the one where you do the engagement factor. Behavior change can't just come from the top down. And it doesn't come from the bottom up just. You have to have the leadership and managers that are going to model the right behaviors that really, I

hate to say it, but walk the talk. You have to have those, but you also have to have a workforce that's motivated and wants to change.

And an organization can do that in different ways, but there has to be the motivation of people to want to change. Just for me to tell you you have to change doesn't work. It's a behavioral theory, you know, of behavior that says you've got to have some motivation, some reinforcement. There has to be something driving the change and then a good leadership that's going to help manage that change.

DR. WINOKUR: So, what are these behaviors? What do they look like? I mean, you've been using this term.

DR. HABER: Okay, we've talked about some of them. We've talked about wanting --

DR. WINOKUR: Let me help a little bit. Let's say I just -- I'm performing oversight and I walk into a DOE defense nuclear facility. What am I looking at? What would I want to see?

DR. HABER: Okay, you would do observations of work environment, of meetings. You would look at how people are communicating. Are people at all levels initiating communication? Are they asking questions? Are they challenging? Are they using their procedures

and processes if that's an expectation? Do they have expectation? Is it clear what their roles and responsibilities are? Are they just doing what they think they need to do without regard to the organizational infrastructure and values?

There are a lot of different things that you can look at: how are decisions made, are people involved in it, are different groups involved, is it a top-down decision-making, is it -- are there committees that involve people from all levels of the organization. I mean, it's not a simple -- remember the complexity issue, it's not a simple one-to-one. You can't just go in and make an observation and say, okay, I get it now. You know, there has to be a lot of understanding of what's driving all the behavior in that organization. And that's the key. I think the problem is too often we think we can do this very simplistically, and it really doesn't help. It doesn't help our understanding; and it doesn't help the organization change.

DR. WINOKUR: So, how do I measure that? I mean, you've also used the word "measuring behaviors," and you've been very clear about what some of the behaviors are. How does one measure them?

DR. HABER: Well, we gave you some examples. I think the key is the behavioral observations. And the

reason I say that is that you can do interviews, you can ask people about the behavior. Let's take a particular behavior. Let's talk about communication. We can go and have an interview and ask people about communication in the organization. We can ask them about different elements of it, you know, does it happen often, do you understand the message, things like that, to see how the process works.

We can also do that in a focus group environment, right? We can ask a group of people, how does it work in your level, how does it work in your department. Okay, so, now we have people's perceptions of what they think about communication.

We can look at their organization's procedures about communication. Some organizations have very specific procedures about how they're going to communicate, their strategy for communication. Then we can also use our rating scales to get another way for people to give us their perception about communication in a behavioral context. We can have a survey and ask them about communication.

But ultimately, after they've told us what they think, after they may have filled out a survey about what they think, after they may have filled out a scale about what they think, the only way we're really going to

understand what they think is by watching their behavior and what they do. And, so, we need to be able to go in and observe, does that communication occur the way people perceive it to occur.

DR. WINOKUR: Right.

DR. HABER: That is really key, and I think too often we don't do that. But we also need the right people to do that. We need people that are trained to observing that behavior and understand what they see.

DR. WINOKUR: Thank you for that point. I appreciate it.

You've had a lot of experience over the years. You've worked with a lot of organizations. Hopefully you've seen some of them take their safety culture and improve it dramatically. And, so, based on this experience, what did you see? What was the thing that kick-started it that started to make a change and move in the right direction and build momentum to improve the safety culture?

DR. HABER: Again, I've seen some of the different models. I saw the Davis-Besse model that used a crisis management model to start to get their change going. And I think they did make some improvement over the years. I don't know where they are right now. I haven't seen them in a while, but they did.

But I really think the ones that stick with me the most that I try to encourage people to think about is the engagement of the organization. When people can rally around the fact that, hey, we've got a need here, we've got an issue, we want to make it better, we want to improve, then I think that really works. And there are many organizations out there where people really want to succeed. I mean, they really want their organizations to work. They don't like working in dysfunctional organizations. They don't like working in potentially unsafe organizations. They want it to work.

And, so, you need the right -- the right management team, and I don't just mean one leader, you need a team, because you can have a good leader and if his or her direct reports are not on the same page, you're not going to be able to succeed. So, you need a team of people, and you need to get those people in the workforce really engaged.

And I can think back on one example where at the time it was very unique, but a team was put together with a lot of people from different levels in the organization, and they really guided that organization to change because they could bring their perspective on how it was going to impact their level, their department in the organization. And they wouldn't succeed unless they

had all kind of agreed that this was the way they were going to go.

And, now, that takes a huge commitment. It takes managers that understand that maybe they don't have all the answers and that they don't have all the power, that they need to get other people involved. And not everybody can do that.

DR. WINOKUR: Thank you.

MS. ROBERSON: Dr. Haber, along the lines that you were just speaking of, you know, I've always believed that the workforce responds to the signals demonstrated by its leader. But I guess I have to ask you is, you know, and I've never really worked anywhere, whether it was public or private, where I wasn't convinced that the workforce was committed to the mission, no matter what that mission was. It's their livelihood; they were committed to the mission.

But I do have to ask you, could this strong commitment to the mission become an enabler for poor leadership? In other words, are the workers successfully accomplishing their tasks in spite of their managers, the way they're comfortable doing so, rather than because of their leadership and can that success seriously mask management problems or poor cultural problems?

DR. HABER: That's a great question. It can

sometimes mask, but I think it will only be short-term. I think that at some point you can be very mission-focused, and you can succeed, but day in and day out, you know, people may not be happy in the organization. They may not respond well to certain things because they don't have that appropriate leadership, so they may succeed in spite of their leadership or their management, but that's not necessarily going to create the right culture, if you will, in terms of the values and beliefs. That becomes a very outcome-oriented organization, and in my experience, it's not necessarily equated with a positive safety culture. It's different.

And what I worry about in those organizations is that often there's a complacency that develops, that they can do it, you know, we've managed it, we're meeting our mission, we can do it. And that complacency can result in perhaps a low-level event that could have very high consequence. So, you're into the low probability, you know, significant consequence event because they didn't have management to think about that and they became a little complacent in being able to manage their mission without some of these other aspects.

MS. ROBERSON: You said something during your presentation which I thought was very interesting when you talked about, you know, train, make an announcement,

do some training, change the processes.

DR. HABER: Mm-hmm.

MS. ROBERSON: And I think one of the challenges, and I'm going to ask you as an expert in assessing safety culture and I'm going to ask Dr. Dillinger later as a practitioner, when you have an organization who -- that has very rigid procedural requirements because of the potential consequences, yet you also have a necessity for innovation, which means less procedure, what have you -- how have you seen organizations struggle with where they have both the need for very tight and specific procedural process controls, as well as room to innovate because they're not working from blueprints, they're creating stuff as they operate?

DR. HABER: Yeah. We used to call that routinization. There was like a routine that people had to develop. Sometimes you see that in nuclear also with operators and highly proceduralized tasks. But the key to routinization is, while it's important, you have to be able to question and to challenge. And you have to be able to create an environment -- management has to create an environment, the work -- the organization has to create the infrastructure so that people can challenge and question without it compromising the procedure or the process or the mission and yet be respected by the

organization, not be seen as making problems, being a troublemaker.

Those are very key. You have to create the right work environment for people to feel comfortable to do that and not for people to believe that they're compromising anything else in the organization. And there are organizations that do that very well.

I know back in the days when the higher liability organization work or Todd LaPorte and Karlene Roberts, you know, and they went out and looked at the aircraft carriers, and you could have a mechanic that was working on the deck of that carrier basically stop a plane from landing because he didn't think the situation was right or because something was on the deck. And that -- and he was able, you know, to do that, and nobody questioned it. Everybody understood the importance of that, and that was something outside of the procedure. So, I think it -- you know, it can be done in the right environment.

MS. ROBERSON: Okay. And then, you know, I've already talked to you a little bit about self-assessment, so I have to admit I'm not a true believer that when it comes to behaviors and culture that self-assessment is a reliable tool. You talked a bit about that in your presentation and combining it. But, you know, I just

want to ask you, can members of an organization be expected to reliably recognize the significance of weaknesses in their own patterns of behavior?

DR. HABER: I think it goes back to that it's hard to look in the mirror. But I think that there are ways that they can. And in the interest of continuous improvement for the organization, they need to try. And I think if they are presented, if they're trained, if they get the right methodology, I think they can start. And I think then it becomes a process over time and they can develop those tools. There are people that have been trained that understand the methodology and they can do that.

As I said, I think that a good thing to do, you can do self-assessments over a periodic time, but at some point down the road it might be good to do an independent assessment just to calibrate those results and make sure that they are being critical enough. And if not, then pick up on the independent assessment and move on from there. But I think it's a good reality check to have an independent assessment but not in place of a self-assessment. I think self-assessment is important for the organization. It's part of creating that more proactive environment and learning environment.

DR. WINOKUR: Thank you. Let me ask you about

a particular issue that you can see at the Department of Energy as well as NASA. These are what people have told me are called virtual organizations. You may know the term better than me, but basically you've got a department, it's contracting out most of its work and it's got a series of contractors that are performing the work.

I mean, the challenges of building a safety culture in that organization, to me, seem to be very complex because not only do you have the department and the federal function, but you've got all these independent companies and contractors. I mean, where would you begin the process of improving the safety culture if I said improve the safety culture at the Department of Energy? I mean, what would that even mean?

DR. HABER: Is that a challenge?

DR. WINOKUR: Well, I don't have the resources to pay you to fix it up, but I mean improve it is the right word, improve it.

DR. HABER: Yeah. That is a huge challenge in my experience for the Department of Energy as well as other organizations. And I think that one of the first steps, which I don't see, is a similarity across the complex, if you will, across the Department, of expectations, of some of the values, some of the

standards. I see organizations that are that large often working in silos, and they work each within their own office in this case or within their own department or division in a larger corporation. And there's something missing in the direction from the top.

And in the standardization of processes that manage those contractors, that can create at least a framework in which the contractors can try in their own organizations to meet those expectations and standards. And I think that that's -- there has to be a set of expectations from the top to create some of those shared values and expectations for all of the organizations. So, across the complex and then within the managing of the contractors, I just don't think that's very clear.

DR. WINOKUR: I'm not defending anybody here, but of course we're talking about a department where we have great research and development labs and production labs. I mean, it's very diverse, the different functions that are taking place, and each of those ventures has their own culture. I mean, a researcher's culture is a little bit different than somebody on a production line, right? So, it's -- I'm not defending or saying anything's right or wrong; I'm just saying that it does seem to me to be especially complex.

DR. HABER: Nobody is telling -- I'm not

suggesting that you prescribe what the culture within those different organizations be. I'm not prescribing that a defense facility is going to have the same culture as a research laboratory. What I am suggesting is that there needs to be some consistency of the expectation and how the organization meets it is up to the type of the organization. But that consistency and expectation is sometimes missing. So, the way a defense facility is going to meet that expectation and a research laboratory is going to meet it may be very different. But somewhere there has to come to a convergent point at the top if you're all working in the same organization.

DR. WINOKUR: Okay, thank you. Let me get back to things that you measure again. And this is something that we actually dealt with. Obviously, you're looking at trends. You want to see the trends improve to see safety culture or anything improve over time, right?

DR. HABER: Mm-hmm.

DR. WINOKUR: And when we talk about safety culture, there were surveys done, and those surveys said that 95 percent of the people felt they could raise safety concerns; and 5 percent said they couldn't. And the question was, was that a good -- was that good or bad. So, obviously, if I told you that 95 percent of the people in this room would get home safely tonight, no one

would agree with that, right? And we don't permit 95 percent of the jets to make it safely to the airports they're going to. But we would permit 95 percent to land -- maybe land on time.

So, what do these numbers really mean to us? What are we looking for in terms of establishing this culture? Are there any goals or things like that you think we should keep in mind?

DR. HABER: I think for me the goal is to see continuous improvement. I think the goal for me is not the numbers so much as the desire or the behavior to want to continue to improve. One of the leading indicators of a safety culture that will start declining is complacency. It's the idea that, okay, I'm at 95 percent, that's as good as it gets, so I can just kind of coast along now. It's that attitude. It's not getting the 100 percent. It's not having the attitude that I need to continuously improve and to keep it there.

That's the key. That's the sustainability piece because the numbers -- you know, even the 5 percent, in my mind, it only takes one or two people who are not going to identify something that can create a situation that can really hurt you or hurt the organization. So, I think it's the idea that, hey, I have to continuously keep up my desire to improve.

DR. WINOKUR: Thank you. My final question is do you have any suggestions about how an oversight organization like the Board could adjust its oversight efforts associated with trying to identify and make helpful suggestions about improving safety culture? What would we do from our perspective?

DR. HABER: Well, I think we've touched on it a little bit already. I think there needs to be that idea that from the Defense Board's point of view that the expectations are pretty clear at the top and that the standards and those expectations are consistent. How each organization gets to it may be different.

I also think that they have to be small steps recognized. I think too often we're just looking for the big change, the big picture. We don't recognize the small steps of success, so the Board might be very interested in looking at a way of reinforcing the small successes, if you will, or recommending the use of those types of activities to help the continuous improvement and to help look -- to move performance forward in the future.

The Department of Energy is difficult. It's a self-regulated organization. It's not the commercial nuclear industry. And that has a lot of challenges with it. I think sometimes maybe some other external reviews,

some outside reviews, might be important to help the Board in its oversight.

DR. WINOKUR: Okay. Thank you very much. Do you have any additional questions?

MS. ROBERSON: I do have one additional question. We haven't really talked much, and in your experience I think it would be very helpful about the impact of external forces, not like, okay, we're an external organization, not in the formal roles, but external factors that I would characterize as maybe funding, facility age and condition, things that not necessarily are easily resolved and how those get factored into a scenario where leadership is trying to change the expectations and character of an organization.

DR. HABER: I think that's a great question, especially for this department. There are a lot of external factors that the organizations have no control over: political, funding, whatever it might be. And the recommendation there is that the organizations try to manage change within their control. We've seen organizations in the complex that didn't put the priorities on the simple things that they could have changed. It didn't take a new bill or a new act of Congress to change them. It was a function of management making the decision and having the leadership to do that.

So, I think if organizations would just manage what they can manage and what they can control and make that clear to the people in the organization, that would go a long way to getting people to do what they need to do.

MS. ROBERSON: Okay. Thank you.

DR. HABER: Mm-hmm.

DR. WINOKUR: All right, with that, we want to thank you very much for that presentation, Dr. Haber, and for answering the Board's questions.

I think we're going to move on to the next presentation by Dr. Morrow. Welcome.

DR. MORROW: All right, good morning. Thank you, Chairman Winokur and members of the Board. I'd like to also acknowledge my NRC colleagues who have joined me at the meeting today: Catherine Thompson from the Office of Enforcement and Molly Keefe and Dan Merzke from the Office of Nuclear Reactor Regulation. Whereas Dr. Thompson and I are responsible for safety culture policy, Ms. Keefe and Mr. Merzke are responsible for the implementation of safety culture and the NRC's Reactor Oversight Process, and some of which I will be talking about today.

In this presentation, I'll give a brief overview of the NRC and the history of safety culture at

the NRC. Then I'll talk about the NRC's safety culture policy statement and how safety culture is considered in the NRC oversight process, including cross-cutting aspects and substantive cross-cutting issues, our graded approach to safety culture assessments, and allegation trends and chilling effect letters. And then I'll talk -- briefly outline how safety culture concerns are followed up on at the NRC.

The Nuclear Regulatory Commission was established as an independent regulatory agency in 1974, with the mission to ensure the safe use of radioactive materials for civilian purposes. That is accomplished through licensing, inspection, and enforcement.

The concept of safety culture was first introduced to NRC policy documents in 1989, following reports of operator inattentiveness and unprofessional behavior while on duty at a nuclear power plant. This prompted the Commission to release a Conduct of Nuclear Power Plant Operations policy statement, which addressed expectations for behaviors of nuclear power plant operators in the control room and managers of nuclear power plants.

In 1996, following reports of workers being retaliated against for whistleblowing, the Commission released a policy statement on the freedom to raise

safety concerns without fear of retaliation. You'll also see the term safety-conscious work environment I know you're familiar with. And that was directed at all licensees and certificate holders and really focused on making sure there was an environment where workers felt comfortable raising safety concerns without fear of retaliation.

In 2002, the Davis-Besse reactor head degradation event. As a result of that event, there were a lot of changes made to the oversight process that the NRC used, including revisions to the ROP to more fully incorporate safety culture. And I'll talk about some of those changes and what it looks like now coming up in the presentation.

Then in 2008, our Commission directed the NRC staff to develop a policy statement that focused more -- on safety culture more broadly than just safety-conscious work environment that applied to all licensees and certificate holders -- the 1989 policy statement only applied to nuclear power -- and that also considered both safety and security. And that began an effort to develop a safety culture policy statement. We worked with our stakeholders and our different regulated communities to really get ownership for the contents of the policy statement.

That policy statement was finalized in 2011, and the policy statement basically sets forth the Commission's expectation that individuals and organizations maintain a positive safety culture that's commensurate with the safety and security significance of their actions. So, there's flexibility there in terms of the different types of functions that our regulated communities have.

Within the policy statement, we also included a definition of safety culture, as you can see on this slide. It focuses on safety culture as being about core values and behaviors and a collective commitment to emphasize safety over competing goals.

Also included in that policy statement was a list of nine traits that are -- in talking with our stakeholders seemed to be important in a positive safety culture. So, traits like leadership safety values and actions; continuous learning; questioning attitude. This is basically the framework that was adopted as part of the policy statement as Dr. Haber talked about different frameworks.

Also, I'll note that there are nine traits included in the policy statement, but when we undertook the Common Language Initiative in the nuclear power industry, which was to basically align the nuclear

industry safety culture terminology with the NRC's terminology, decision-making was added as an unofficial tenth trait. So, that is also included as part of the common language.

The NRC's approach to safety culture is founded on the philosophy that licensees bear the primary responsibility for safety. So, therefore, they bear the primary responsibility for their safety culture. As a result, the NRC's Safety Culture Policy Statement is an expectation; it's not a regulatory requirement.

The NRC does consider safety culture within the Reactor Oversight Process for nuclear power reactors, and the NRC also assesses safety culture, but it's primarily as a result of some event or decline in safety performance. The NRC has different levels of inspections activity based on our overall assessment of licensee performance.

The Reactor Oversight Process is the NRC's performance assessment program for operating nuclear power reactors, and the inputs for that process are derived from licensee performance indicators -- these are submitted by the licensee to the NRC -- and NRC inspection findings. Licensee performance is evaluated continuously through our resident inspector program and ongoing baseline inspections. It's also evaluated

systematically through planned inspections and also at midyear and end-of-year assessment meetings.

The NRC assigns each licensee to a column in the ROP action matrix just based on their performance, so based on those inputs from the performance indicators and the inspection findings. And it's the action matrix placement that determines the level of NRC oversight for each licensee facility.

This is a depiction of the Reactor Oversight Process. As you can see, it's founded on the NRC safety mission with three strategic performance areas and then seven cornerstones of safety. For each of these cornerstones, there are performance indicators and inspection procedures associated with these cornerstones. And then at the bottom you'll see the cross-cutting areas of human performance, safety-conscious work environment, and problem identification and resolution. It's there that safety culture comes into play within the Reactor Oversight Process.

And part of the revisions made to the ROP in 2006 following Davis-Besse was to further kind of flesh out the cross-cutting aspects that are underneath and embedded in those cross-cutting areas. So, things like problem identification, problem resolution, resources, work processes, communication, things of that nature are

the cross-cutting aspects that appear under the cross-cutting areas.

And the way they're used in our inspection process is when there is an inspection finding, some performance deficiency associated with a regulatory requirement or a licensing condition, then our inspectors will evaluate that inspection finding to see if there are cross-cutting causal factors that may have related to that finding. Those they then assign a cross-cutting aspect to. For example, a cross-cutting aspect in resources, that that was some underlying finding -- underlying causal factor associated with the finding.

Now, I mentioned before the Common Language Initiative. So, in 2006 when the ROP was revised and those cross-cutting aspects were fully developed within the ROP framework, at the same time, the nuclear industry had their own framework for talking about safety culture: impose guidance for a strong nuclear safety culture, principles for a strong nuclear safety culture. And for the most part, the way the NRC talked about safety culture and the way INPO and NEI and the nuclear industry talked about safety culture, they were compatible, but we were using different terminology. And, so, that created a lot of confusion when it came to talking about safety culture concerns. And Dr. Haber would go into an

organization; she would have to use two frameworks to talk about the results. And, you know, it just added to confusion that wasn't necessary.

So, from 2011 to 2013, the NRC had a joint effort with the Nuclear Energy Institute and the Institute for Nuclear Power Operations to develop a common language around safety culture. And the results of that were 10 traits of a healthy safety culture, the nine traits that appear in the policy statement plus decision-making, 40 cross-cutting -- 40 aspects that are embedded within those traits, and those are the performance characteristics representing those traits. And then numerous examples underneath those aspects.

Now, INPO and NRC have different goals. INPO focuses on excellence; NRC is a regulatory agency focusing on adequate protection. So, if you look at NRC documents with the common language incorporated, you'll see that INPO has a few more aspects than what is included in the Reactor Oversight Process. And that's because we realize that, you know, there are some things that are important in a safety culture that really kind of focus on that excellence and so they might not be appropriate for inspection purposes. They might not be appropriate for adequate protection. They're still important.

We want to emphasize that they're important. They're included in our common language document, but they are not necessarily part of the Reactor Oversight Process. So, as of January 2014, that common language has been implemented and those cross-cutting aspects are what you'll see as part of the Reactor Oversight Process.

So, as I mentioned previously, the cross-cutting aspects are assigned to NRC inspection findings when there are performance deficiencies that have potential cross-cutting factors. In addition to just assigning these cross-cutting aspects to inspection findings, the NRC also considers the accumulation of cross-cutting aspects.

And the way that works is basically if there are four or more cross-cutting aspects within a set time period, and there are different -- some different criteria for that that I won't necessarily get into right now, the NRC calls that a cross-cutting theme, four or more. And if during a mid-cycle or end-of-cycle assessment meeting the NRC has concerns about the licensee's progress in addressing the issue, then they may assign what's called a substantive cross-cutting issue (SCCI).

Now, cross-cutting aspects and SCCIs may indicate a potential degraded safety culture and warrant

further evaluation, but I do want to stress here that the NRC does not make evaluative statements based on cross-cutting aspects or substantive cross-cutting issues. That's only done as a result of safety culture assessments performed by qualified staff. So, these are just what we use as indicators, potential cracks that really need to be paid attention to before larger issues develop.

The NRC's approach to safety culture assessment is graded. And basically the extent of an NRC safety culture assessment is based on a licensee's placement in the ROP action matrix. There are some exceptions to this. For example, assessments can also be performed to address longstanding substantive cross-cutting issues or to follow up on specific allegations or allegation trends.

But within the Reactor Oversight Process, the scope and complexity of the assessment increases with increased oversight. And the assessment focus may be tailored to whatever was the initial identified performance deficiency. So, for example, the assessment focus may be tailored to specific departments or perhaps more heavily focused on specific areas of safety culture like safety-conscious work environment. So, that flexibility is given in terms of developing the

assessment process.

This is a depiction of the Reactor Oversight Process Action Matrix, so this is what I was talking about with the different columns of regulatory response, basically. So, a licensee is evaluated and placed into one of these columns in the ROP Action Matrix, and the NRC's response, the level of NRC oversight, is based on their placement in this action matrix.

So, in Column 1, that's just our baseline inspection program. And it's depicted in green. If a licensee were to have some performance deficiency, a performance indicator that's below a threshold or particular inspection findings, they may go to Column 2 of the action matrix. And at that -- in Column 2, we have an Inspection Procedure 95001 that includes aspects of safety culture in terms of having inspectors verify that the licensee's root cause appropriately considered safety culture.

Now, if the licensee were to go into Column 3, the Degraded Cornerstone column, then the next inspection procedure would have us independently determine whether there were weaknesses in safety culture, safety culture was a root or contributing cause. At the same time, depending on the performance deficiency, we may ask the licensee to conduct an independent assessment of safety

culture.

In Column 4 of the ROP Action Matrix, we would definitely request the licensee conduct an independent safety culture assessment, and the NRC would also conduct its own independent graded safety culture assessment based on the results of the review of the licensee's independent assessment.

So, what that looks like is there are four basic steps to an NRC independent safety culture assessment. First step, and this is per our Inspection Procedure 95003, we would evaluate the licensee's third-party safety culture assessment. We would do that by reviewing the methodology, reviewing the results, and making sure that the conclusions drawn accurately reflect the results that we see from the data presented and also look at how is the licensee responding, what kind of corrective actions are they developing based on how they're reading the results of the assessment.

We would then determine the scope of our NRC assessment based on those results. So, this could range from a limited focus to a full-scope assessment. It's partially based on our confidence in the reliability and validity of the safety culture assessment that was performed and also our evaluation of how the licensee is responding.

What can also be factored in is how much time has passed since they were asked to do the assessment and when we're going onsite for the inspection.

Our NRC assessment includes multiple methods, document reviews, behavioral observations, interviews, focus groups. And the assessment plan is tailored to the site, so we look at how large is the site, what would be an appropriate sample size. Those things are all very focused on the site and their performance deficiencies.

Then we would conduct the assessment; identify and document safety culture themes in the inspection report; and also evaluate whether the licensee's planned and completed corrective actions seem to address the themes that we saw in our safety culture assessment. And that's where we would then, through the inspection report and conversations and dialogue with the licensee, talk about are there areas that still need to be addressed, are there safety culture themes that we've seen, are there concerns that we have that don't seem to be addressed by the existing corrective action plans.

Another area where safety culture comes into play in the NRC's oversight process is through allegations and what we call chilling effect letters. A chilling effect is basically when something happens that results in a perception that raising safety concerns is

being suppressed or discouraged. This could be a specific event of discrimination, so someone is discriminated against for raising a safety concern; as a result, everyone in their department is afraid to raise a concern for fear of the same response.

It can also be from a culture perspective more about smaller patterns in behavior. So, there are cues that the people in this department are picking up on that if they were to raise a safety concern to their management then they would not receive a very positive response. And these can be low-level things. And the NRC might pick up on them through allegation trends. So, we might see particular trends in the types of allegations we're receiving from a particular licensee that tells us that we need to investigate further.

If through investigations and follow-ups we are concerned about the licensee's safety-conscious work environment, then we may issue what is called a chilling effect letter. And what this does it's a very public notification to the licensee, to the licensee's employees, to members of the public that there is a concern that we would like to know how the licensee is going to address it. So, it's -- the objective of a chilling effect letter is to say very publicly that we're aware that something is happening; we are concerned; and

we'd like the licensee to respond, also in a public manner to talk about how they're going to address this concern.

In terms of follow-up on safety culture concerns, whatever process is being used, whether it's the substantive cross-cutting issues process, our supplemental inspections, our safety culture assessments, or our allegations program, the NRC is going to document those concerns publicly through a request for information, through inspection reports, mid-cycle or annual assessment letters. And the licensee responds to those communications with planned corrective actions.

And this is not necessarily a set procedure for how safety culture concerns are handled but how all concerns are handled. And it really depends on what is the issue that is being addressed. The NRC and the licensee may then enter into agreements for specific actions, and this could be in the form of confirmatory orders, which actually modify the licensing agreement with the NRC, so now it becomes part of the licensing condition; also in the form of confirmatory action letters. So, in a confirmatory action letter, there may be actions that the licensee has to take and we must evaluate those actions before the licensee moves back to Column 1 in the action matrix and goes back to a baseline

inspection status.

The NRC then conducts follow-up reviews and inspections. The criteria for verifying the proper implementation is developed based on those agreed-upon actions. So, it's through dialogue with the licensee that we develop, okay, the licensee develops the actions and we formulate our criteria for closing those actions. And we follow up with reviews, additional inspections, other sorts of things to evaluate the actions.

So, to summarize, the NRC communicates safety culture expectations through the Safety Culture Policy Statement. And that's kind of the overarching framework, but it's an expectation. Safety culture considerations are incorporated into the Reactor Oversight Process, through our cross-cutting areas, and the cross-cutting aspects embedded within them, and our supplemental inspection activities.

NRC may also address safety-conscious work environment concerns through our chilling effect letters. And licensees respond to those specific concerns with planned actions, and the NRC reviews those actions and conducts follow-up to close the concerns or verify that those actions were implemented.

And I'll just encourage you, for more information on safety culture, the NRC has a safety

culture website. And there's also an email that we use to contact safety culture staff in the Office of Enforcement. And thank you for your time today.

DR. WINOKUR: Well, thank you, Dr. Morrow, for that presentation. Both excellent presentations so far.

I guess I have the first question. Is it fair to say that Davis-Besse, the accident there or the near-miss there, was really the wake-up call in terms of safety culture at the NRC?

DR. MORROW: Having not been at the NRC at the time, I will just speak from my impressions. And I think that was definitely a time when safety culture finally appeared more directly in the oversight process. So, before that, maybe there was talk of management issues. It was more talking around the issue. And I think since Davis-Besse we've been a lot more comfortable with approaching safety culture and using that term safety culture.

DR. WINOKUR: Can you put Slide 14 back up? This was your slide about the Reactor Oversight Action Matrix. How much do events in Column 4 impact your thinking about safety culture, I mean, and can you give us an example of a couple of things that might appear in Column 4 that you've been concerned about recently? What kinds of events have occurred?

DR. MORROW: I can't think of the specific events. We have had a number of plants in Column 4 recently, and they do impact our thinking on safety culture. When we go into the plant to conduct a safety culture assessment, we are constantly finding different ways to look at safety culture. So, it's never the same with every inspection, so we end up tailoring our questions to that site where the root problem was.

For example, the most recent one was Brown's Ferry Nuclear Power Plant. They had a fire that resulted in a red inspection finding, a number of issues that got them into Column 4. And we would -- we find different things going on, different kind of root causes of whatever that deficiency was.

You know, sometimes it's leadership; other times it's -- what we'll talk about is as a clay layer in management where, okay, when we get there, the leadership seems to understand safety culture and understand the kinds of changes that they want to see, but it hasn't fully trickled down to the line level. And, so, I think with each inspection that we do we have to tailor what we're doing to the circumstances of that site.

DR. WINOKUR: So, when you implement the process IP 95003, do you often find a strong linkage between the event that occurred and a problem in safety

culture? Do you see that linkage?

DR. MORROW: We see safety culture having contributed to the event. I think there are -- there's not a situation that I can think of personally where we don't see some safety culture weaknesses, and we can, you know, indirectly tie to them, oh, well, you know, because of communication, because of a lack of effective work processes, that that contributed to the event. So, yes, I would say so.

DR. WINOKUR: What's your sense of the overall state of safety culture in the licensees -- for your licensees? Do you think they're at a pretty good level right now, pretty high level?

DR. MORROW: I think even my personal experience looking at the normative data that exists across different industries that the nuclear industry is -- tends to rate higher on safety culture. Having not had personal experience in every plant in the U.S., I can't say. I think we address the safety culture issues as we see them.

DR. WINOKUR: Tell me a little bit about your thinking with respect to the fact that NRC doesn't really get involved until there is a problem. So, you're really trusting your licensees to do the job, to build the safety culture, to obviously perform safe operations. I

mean, it's a very important thing to them, too. They want to make sure that they are successful in their mission, producing their power. But NRC doesn't really, you know, have any central role where they're going to proactively go around the complex and look at safety culture.

Is there a thought why NRC doesn't more specifically devote some resources to just trying to integrate at its level and have a team that goes around the complex and just from time to time tries to evaluate what the safety culture of the licensees is?

DR. MORROW: Yeah, and that is purposeful, and it's part of the reason why we chose to have a Safety Culture Policy Statement. It's not a regulation. And that is because of the philosophy that safety is the licensee's priority -- safety is the responsibility of the licensee.

And, so, I think we acknowledge that as a regulatory agency if we are too invasive, we can do more harm than good, and that especially with safety culture there's a strong element of ownership for that culture. And if we were to go and mandate specific requirements, go in and mandate, you know, expectations for culture in more of a prescriptive way, then we would be doing more harm than good.

DR. WINOKUR: All right. Well, let me ask, do you -- do your licensees, in your opinion, share their safety culture experiences with each other? I mean, do they all benefit from each other? Is there, through INPO or what other organizations, do you think they have a pretty good process in place whereby they share their collective knowledge and improve safety culture?

DR. MORROW: Yes, I do think so, mostly through the Institute of Nuclear Power Operations (INPO). They have even just recently engaged in a voluntary effort to institute a continuous monitoring process in safety culture where they have monitoring panels. They do regular self-assessments. They've also committed to the Institute for Nuclear Power Operations to do biennial safety culture assessments.

So, I think in terms of the nuclear industry in particular there is a strong framework through the industry organizations where they're sharing information, they have resources to do independent assessments, and they have guidance and frameworks to perform more ongoing monitoring.

DR. WINOKUR: Yeah, I think that's obviously a very valuable thing. Let me ask you the question I asked before to Dr. Haber about it says in your definition of safety culture that you emphasize safety over competing

goals. What does that mean?

DR. MORROW: You know, and I think that's somewhat of a recognition that safety using the term "overriding priority" was somewhat problematic, and emphasizing safety over competing goals is maybe a more balanced way to say it. But still, the definition we're using for safety culture is a normative definition. It's, you know, this is the ideal that we're trying to promote in safety culture. So, it is more of an emphasis on safety over the competing goals.

But I'd also echo what Dr. Haber said, that it may seem that safety and production are competing goals, safety and mission are competing goals, but a lot of times the way those goals are competing is through the short-term gains at the expense of long-term gains. Makes sense.

DR. WINOKUR: Yeah. Actually, you know, I raised the question -- I mean, I'm sure that safety and mission don't have to be competing goals and they could be integrated together, but the nuclear industry is the one that has coined the phrase "overriding priority."

DR. MORROW: Mm-hmm.

DR. WINOKUR: I mean, it's coming from your industry group, so obviously that's their perspective, right?

DR. MORROW: Oh, I would agree. Yes.

DR. WINOKUR: And NRC, when they use their statement here, emphasizes safety over competing goals, is that NRC's desire to support that statement, or -- just trying to see if you agree with the industry that it's an overriding priority.

DR. MORROW: I would definitely agree that it is an overriding priority. I was speaking more towards the actual words used in the definition, because when we developed that definition, it was with quite a bit of stakeholder input from our different communities. But particularly for the NRC, we are a regulatory agency, so safety is our overriding priority when it comes to nuclear power.

DR. WINOKUR: Right. And you share all the concerns, I guess, that the Department of Energy does. I mean, you've got the public, which is very nervous about nuclear and obviously not accepting of any kind of accident at a nuclear power plant.

DR. MORROW: Mm-hmm.

DR. WINOKUR: So, is it easy to see the strong linkage between that priority and obviously the mission at any time.

DR. MORROW: Right. And we hear that message. Partially for me I think it's promising that we hear that

recognition from our licensees in the industry that they recognize safety as the overriding priority, because without safety, they won't exist.

DR. WINOKUR: Thank you. Thank you for sharing that.

Ms. Roberson?

MS. ROBERSON: Thank you, Dr. Morrow. Thank you for being here and thank you for your comments. My mother, who is a very wise woman, like the three of you are, often told me that she who judges must be prepared to be judged. So, I'd just like for you to talk to me a few minutes. After Davis-Besse, NRC itself undertook a very significant effort to try to understand why it did not see the indicators that led to the circumstances.

So, can you just spend a few minutes telling us what were the weaknesses identified out of that, what actions were taken, and which of those have you guys concluded were the most effective or positive actions taken?

DR. MORROW: Sure. So, after Davis-Besse, the NRC also convened an internal safety culture task force to look at our safety culture internally. And there were a number of recommendations that came out of that task force, including improving communications about safety culture. There wasn't a really good understanding even

within the agency of what safety culture means. Also, looking at incorporating safety culture more into our strategic framework, into our mission and values, and also making our different avenues of raising concerns more prevalent in terms of helping our employees know where to go in terms of raising different concerns.

And many of those have been addressed, although I think for us internal safety culture is -- you know, it's always going to be a work in progress. It's always something that we have to check and adjust. We have a number of resources now available, including a matrix to look at, okay, if you have this kind of concern, here are your different options for raising it.

And also more training. We have behavior matters cafes, which are sponsored by our executive director, looking at what kinds of behaviors help us support our organizational culture. What are the behaviors that are expected in our agency?

Also, we have a self-assessment process. We have -- since 1998, our Office of the Inspector General has sponsored a Safety Culture and Climate Survey every three years. And we also participate in -- as with other government agencies -- the Federal Employee Viewpoint Survey. And we use both of those surveys to -- most recently in 2012 to develop action plans for our

different offices and also at the agency level to look at, well, where are our weaknesses internally and what can we do, what actions can we take to address them. And we're using the most recent Federal Employee Viewpoint Survey, when we get those results, we'll use those as a check and adjust. And then, you know, it's basically a continuous process for us now.

And I think in terms of, you know, what's had the most high impact, what I've seen from my experience is those action plans, those are new that we started, you know, publicizing them more within the agency so that employees can see, oh, for my office, here are the different actions that are being taken. And it makes what is done to make changes in the agency more visible, so that people don't think that, oh, we take this survey and the results go into a black box. So, it makes it more visible what actions are being taken.

MS. ROBERSON: Does NRC have a program or process for monitoring its safety culture?

DR. MORROW: It would be through those two surveys that I mentioned.

MS. ROBERSON: Okay.

DR. MORROW: That's our self-assessment process. The Safety Culture and Climate Survey is very specific to safety culture. And then, as you know, the

Federal Employee Viewpoint Survey is more general about organizational functioning, engagement, those sorts of things.

MS. ROBERSON: Did you guys make changes to your resident inspector program as a result of that evaluation after Davis-Besse? Do you recall?

DR. MORROW: I don't recall.

MS. ROBERSON: Okay, okay.

DR. WINOKUR: I want to go back to this Column 4 again. When you go in and you actually look at the independent safety culture assessment, and I'm assuming Dr. Haber didn't do it, of your licensees, are you often confident when you look at it, do they typically do a very good job? Does your team feel that they're doing a good job in terms of that assessment?

DR. MORROW: Right now there's not standardization in terms of for each licensee what process they're using to perform that independent assessment. So, at this point in time, when we go in for every NRC safety culture assessment, we are doing a thorough review of what's been done.

For the most part, in my experience, I would say that there are more strengths than weaknesses, but what we do in our review is we look at, okay, for the most part we would expect that there would be multiple

methods used to gather data. So, if we see a safety culture assessment, particularly if the plant's in Column 4, and it's only a survey, then that right there is a red flag because they're not using multiple methods to collect the data. And, so, that, then, feeds back into our plan for how we're going to conduct the assessment.

So, I think there are still weaknesses in terms of using the multiple methods and what they look like. And we're just very aware of those and try to supplement when we go in to do our independent assessment.

DR. WINOKUR: So, let's say that there were three licensees in Column 4, and each time NRC went in there you found that same result, that they only used one method to assess the culture and they were falling short. When does NRC or when would NRC make a decision that we need, from our perspective, to be more proactive in terms of making sure that our licensees have safety culture -- and have the safety culture that they need or have improved it to the point that they need, acknowledging -- this is the discussion we had before -- all the pressures that these plants are experiencing, they're old, they're aging, the workplace is very competitive, even for nuclear with gas and things of that nature.

I mean, when would NRC make a decision that they need to be more integrating, more in charge of

what's going on in terms of the licensees when it comes to safety culture? Is that possible for you to think about that?

DR. MORROW: I can't speculate what it would take for the NRC to make that decision. I don't think personally it would be, you know, just from my judgment. I don't know -- one thing that we do whenever we go into a safety culture assessment for Column 4 plants is it's documented in our inspection report, the basis that we use to develop our inspection plan.

So, if we were going into plants and there were three plants in Column 4 and we were seeing the same deficiencies in whatever they were using for their independent assessment, that would be documented in the inspection report. And that would be something that we would communicate is we are having to do more in-depth, integrated assessments when we go in because of these deficiencies. And that's the way we would communicate with the licensee is, you know, when you're doing an independent assessment, you need to address these deficiencies because they are factoring in to how much we need to go in and do our inspection.

DR. WINOKUR: Yeah, I'm just trying to get at the challenge for NASA, for NRC, for DOE. I mean, you're all similar in some ways that you have a large faction of

your workforce that really isn't the federal component of what's taking place. I mean, it's not really what's at headquarters; it's taking place out in the field with a lot of different companies and a lot of different contracts and a lot of different agencies. And I'm just trying to get a sense of how you view that.

I don't think it was a question there. Let me ask you something about the Employee Viewpoint Survey.

DR. MORROW: Sure.

DR. WINOKUR: I read the Trade Press. I mean, we all do every morning, and there's been recently a lot of discussion after Fukushima that the staff at the NRC, which I know is incredibly capable, right, and at the Department of Energy, too, and the commissioners of the NRC haven't accepted all of their findings on Fukushima. Is that a safety -- is that a problem, I mean, between -- that NRC is experiencing? Is that something that makes you worry?

DR. MORROW: You know what, I'm not involved in the Fukushima activity, so that is something that I can't really speculate on.

MS. ROBERSON: Good answer.

DR. WINOKUR: All right.

So, the last question I have for your is -- and we asked this question of Dr. Haber before -- do you have

any suggestions for the Board, the Defense Nuclear Facilities Safety Board, about how we might improve our oversight of the Department of Energy Defense Nuclear Facilities with respect to safety culture?

DR. MORROW: I don't know if it's a suggestion, but I guess what I would just kind of put out there is one of the struggles that we have at the NRC and I think that all oversight organizations have, and it kind of goes back to our philosophy and our use of a policy statement, and that's the factor of ownership for safety culture.

And I think that I would caution that as an oversight agency there is kind of a balance that needs to be struck between mandating and prescribing a safety culture, because at that point, what you may be enforcing is a minimum compliance situation. And that completely takes away from the essence of safety culture and that it is an emergent property of the organization, it's embedded in the organization, and if there's going to be sustainable change, then the organization has to be the one to really initiate and drive that change.

DR. WINOKUR: Thank you. Thank you.

Do you have any other questions?

MS. ROBERSON: Uh -- no.

DR. WINOKUR: All right, we want to thank you

very much. And I think we'll move on to our last presentation of the morning, Dr. Dillinger.

DR. DILLINGER: I think I'm on. Thank you very much, Dr. Chairman and the Board, for inviting me, and thanks for the audience for listening. And I'm learning a lot from my fellow panelists. I'm very happy to be here. I work at NASA, and I came from DOD, where I was in the Air Force.

NASA, as you know, has about 17,000 employees. It has 10 centers with other subcomponents, but basically the headquarters is here in Washington, DC. There are 10 centers that operate through the United States. Of the 17,000 employees, those are government workers, and there's about twice as many contractors as there are government GSs.

And, so, that percentage or that proportion used to be a little bit different. Probably 10 years ago, 20 years ago, that proportion would have been about three or four times as many contractors. Now it's about two to one, just as a sort of picture of the workforce.

We've been talking about how do you build safety into the organization, and the way NASA has looked at building safety into the organization is starting at the very top with, oh, what's called the NPR 1000.1, and this is where from the very beginning NASA says this is

how we do business and this is the top-level document. And, so, what the directive says is that there are four core values. Those four core values are safety, excellence, teamwork, and integrity. And those four things all come together towards mission success. So, the way we've looked at this -- and this is post-Columbia. Before Columbia, there were three core values and safety was not one of them. Safety was an add-in after Columbia. It is part of the four core values, so that's in all of the documentation and the training and the things that go on within the employee workforce.

Those -- and, so, when we talk about safety, it always goes back to it's one of the core values. And the safety programs are built on that. It's not an either/or thing. It's not mission or safety. Safety is part of the mission. Safety is how we do the mission. It's how we are more successful. It's a verb; it's an adverb. We do; we turn the key safely; we launch safely; we go to work and we come home safely. And it's part of how we do business. It's not competing for parts of the business.

For the safety culture program, there's a number of ways that we decided to go about focusing then specifically on safety culture, so starting very big picture in terms of the core values and 1000.1, going into the safety area. We focused then on multiple

pathways. The idea was to attack this in as many different ways as we could in terms of assessments, in terms of educating the workforce, and that includes the contractors when we can, that includes an engagement and having multiple ways to engage with the workforce.

That includes guidance, and so not depending on just 1000.1 but getting into the other guidance within the agency, the expectations for people's behaviors. That includes, then, communicating and having resources that we can offer as tools to people at those 10 centers that will explain those expectations through media, in other words, posters, websites, checklists, handouts, brochures, all those kinds of things. We wanted to develop a whole section that would provide those.

And then in terms of the logistics, and that's the people and the resources and coming together on a regular basis and determining what that basis was -- and telecons -- monthly telecons, quarterly meetings, biannual -- determining what those are and who was going to be there and who's going to sit at the table when those decisions are made. So, those are the logistics of the programming.

The idea was to have multiple aspects of that, multiple choices, and to create a toolkit, so if you're the chief of safety, you would have resources to go to.

If you were the center director, you would have resources to go to. If you sat on the ASAP panel, which is equivalent for NASA the Aerospace Safety and Advisory Panel, is who provides insight into NASA's safe way of conducting operations. So, ASAP can look at our resources; employees can look at our resources, our toolkit; our safety people can look at our toolkit. And we wanted to provide those at different levels.

And we wanted to focus on all of those levels. In other words, we have targeted interventions for leadership, targeted ways of working with managers, and targeted ways of interacting with employees, different than, you know, a manager person who is a custodian, a person who is an engineer, someone who is really the touch labor, a little bit different than the management expectations and a little bit different than the leadership expectations.

One of the first things we did -- when I came on in 2008, and by 2009 we had started working the program. And, so, the program operates from a model. The model is based on James Reason's model. The -- you'll see there that this is sort of visually we wanted to instill in people a sense of this is embedded in our DNA, again, safety as an enhancer of how we do business. So, we want everyone to understand this. We want

everyone to do it, to walk it, to talk it, to teach it, to model it, and we want it instilled in the being of every person there.

So, that means they're going to know how to report. Reporting culture is part of it. That means they're going to know how to administer a just culture in terms of their decision-making, dealing with expectations or poor performers when that happens, and then recognizing outstanding performance also when that happens. That's all part of that. And making sure people understand what a learning culture is and the importance of passing on information and communication.

Looking at a flexible culture, and part of this we've focused on two aspects. There's change management, which is one aspect. There's resilience, which is another. The expectation being that the agency needs to be resilient. The workforce needs to be resilient. There will be bumps in the road. There are external forces that we can't control. The agency and the workforce needs to be resilient. In other words, we know things are going to change. We expect things are going to change. Sometimes we want things to change.

When those changes happen, we want it done at a tempo that people can manage. They're not overwhelmed and they're not complacent. We want the tempo to be

managed in a way where they can adapt to those changes, and we want them to be capable enough and to have capabilities built into what they do, so that when those changes happen, it's not a threat, it doesn't bring operations to a halt. It's maybe a bump in the road. It's an opportunity to learn. And they feel strong enough, the agency, the organization, the leaders, feel strong enough that we take that in stride and press on. So, the idea of resiliency and change management are part of the flexible culture.

Running throughout all of that and connecting all of that is engaged culture, and that is everyone doing their part. That means that a new employee knows how to report things and knows where to go and knows who to talk to and if the person they talk to doesn't respond appropriately they know that's not an appropriate response and they know who they go to next. And if that person doesn't listen, they know who to go to next. And if they feel that there's been retribution, they know what to do about that.

And, so, the idea is that everybody is involved, that new hires are involved, managers are involved, supervisors are involved, leadership is involved. And it takes all of those levels. It can't be completely top-driven; it can't be completely bottom-

driven. All of those levels have to be doing their part to make it all work well.

One of the things we do in the assessment portion of this is to offer a tool. The expectation is that every center will participate in the assessment cycle once on a three-year basis. Basically one center does their survey in a quarter. Right now we're in the second cycle, so we did the first benchmark cycle from 2009 to 2011. We're now in what we affectionately refer to as round two. And, so, round two is about to close out. We have two more centers to go. And of our workforce, we have so far about 8,000, a little bit more now, responses. But we'll probably end up with about 12- or 13,000 responses by the time we're done with round two.

That will allow them, of course, to do the things that we want them to do in looking at a standard, standards of performance. The questions all merge with the five factors, so the yellow bars or those sort of peachy-colored bars about reporting culture. Each one of those bars is tied into the five-factor model. That is how we want people to think. We want them to be trained on that. We want them to be thinking those topics so that we have a common language when there's a mishap, when something's gone wrong. We want to be able to talk

about it using those terms so that we all understand what we're talking about and can try to do something about it.

So, for round one, the questions -- there were 20 questions. In round two, there are also 20 questions, but of those questions, 16 of them are different, but one question from each of the factors has remained the same, so that we can look back from round two to round one and see if there's been differences. Has it gotten better? Has it gotten worse?

And then also each center adds on at the end of where you see bar 20, if you were sitting at the center getting your out-brief or getting your feedback, there would be questions 21, 22, 23, 24. Each center adds on specific questions to their site. Each place is working on its own different unique aspects of things, and so we build that into the surveys.

Once the survey is done, there's a safety culture point of contact at each center. They work in doing the analysis, coming up with their findings, observations, and recommendations. That's work with headquarters. The results are presented to the center director and the senior leadership. The expectation is that they will then brief down through the organization, back through the levels of management and supervision to the employees at like an all-hands or a large employee

gathering or maybe something in their newspaper or their website or one of their publications. We from headquarters don't tell them what they have to do to message it back down, but we do tell them that they need to message it back down.

We've started a second component of the program, and that's the educational component. That process began around in 2009. In 2010, we had drafted up our training. In 2011, we started to test it. And in 2012, it basically went live. This is a web-based training program. NASA uses a program called SATERN. That's where everybody does their training. This is all the computer-based training, is all hosted in SATERN.

So, via SATERN, we have two courses. We have a course that's the Safety Culture Orientation Course. That's for employees. We have a Safety Culture Course for supervisors. So, you don't have to do both. If you want to come to NASA, don't get worried, you don't have to do both of them, but you have to do one of them. If you're a supervisor, the content is the same as the orientation course; however, each course ends with scenarios. The scenarios then have test questions at the end of it. Your supervisor comes in; they're late; they look disheveled; they said they were in a car accident on the way to work. You now do A, B, C, D. You know, I

mean, it's those kinds of things. The scenarios change from supervisor to employee, and so that's how the courses differ.

This year has been the big push to get our employees to take the courses. We've had great success in three of the 10 centers. And what we've actually found is that as each center does its assessment, if they pair doing their training along with their assessment, that's when we can get into the thousands of people actually doing the courses.

When it's up to the safety person or the safety culture POC to get people to take the courses, it's just a lot more work. It is -- at this point, it's not been put out as a requirement that they have to do it. It is up to the center directors. Now, some center directors have made it a requirement, so of the 10 centers, we do have two centers where the center director says I want all my supervisors to take this course. But it's the administrator's belief that that should remain in the decision-making purview of the center director. Right now, we have about 3,000 people who have taken the courses and the training since 2012.

Along with that is the third portion of the program, and this is a more detailed, more specific, more -- very much into-the-weeds kind of look. These are

called the organizational safety assessments. They are done at the request of a top-level decision-maker, so a center director needs to request it or a program manager requests it.

One of the things -- this is not unique, you all deal with this -- but we at NASA are a highly matrixed workforce. So, we have people like engineers who work in engineering. They are also matrixed into a program like SLS or the Space Launch System. So, they have -- they are serving two masters in some ways. You know, they have a program that they are trying to meet the requirements and deadlines and gates associated with the program. They have their profession and they're trying to meet all of those requirements, as well.

So, when we do an OSA, we focus on how -- when we go in, we know that we need to capture the people that are associated with the program, as well as the supporting people who are being matrixed in from safety. For us, the big areas are from safety, from engineering, and from the science areas, like life sciences or the medical people.

So, the OSAs are done by request. Right now, we are in the middle of an OSA for Human Space Flight. That came from Mr. Gerstenmaier, who is the head of Human Space Flight. He asked that we take a look at the big

Human Space Flight programs. This is not because there's anything that he feels is going wrong in those areas. This is very much a preventative, proactive look.

This was originally -- we discussed it because of the 10-year post-Columbia, and there's, you know, within the safety community we are always very concerned about the swinging of the pendulum. Something happens, over time, there's a lot of resources put into safety. People are put into safety. Inspectors are put into safety. Processes grow. And over time, that can become almost burdensome and the agency has to struggle with that. Then you have problems with budgets and things like that, and then the pendulum tends to swing the other way, so by 10 years later your people are saying we've gotten too far away, now what do we do about it.

So, and one of our hopes is to keep an eye on all of that to make sure we are not losing sight, that we're not becoming complacent, that something isn't falling through the cracks. And one of the ways of doing that is to do the OSA. So, that is -- it is a review of all of the historical information. We have continual audits. We have continual assessments. Those are very well embedded in NASA's organizational culture. And, so, everyone is going through that.

So, the team reviews the results of those in a

way to try to put all of that together. We look then at -- and there's a lot of effort in terms of building the team, who are the right people to have on the team, that the team is multidisciplinary, it involves people from all of those areas, engineering, the program, life sciences, safety. It brings all of them together.

We review the historical information. We go in and do interviews, very much what you've seen from the other presenters in terms of one-on-one interviews, focus groups, behavioral observations, looking at how people are actually performing. As we do our interviews, part of the interview people are actually scoring different dimensions of the organization, and as they -- so we look at the data from that, along with the data we've had previously from their safety culture survey, along with the qualitative feedback we're getting from them in the interviews, and then we put all of that together.

Now, the end result of the OSA is different than the survey. So, the general, across-the-board shotgun, you're going to do your survey once every three years. That goes to the center director; it goes to the managers; it trickles down. The OSA is targeted. It goes to the program manager, and it's very much of a crucial conversation discussion between the team leader and the program manager.

There are not very many people there. The original data that is gathered, that is temporary data used only for gathering people's perceptions. All of that is not part of the sit-down discussion. That sit-down discussion is a very frank discussion with the program manager that says we understand on your stoplight charts from people who've come in and looked at you, this is how you look. You're green on this; you're yellow on this; you're good with this; you're okay with this. But this is what we really think is happening in terms of the dynamics going on between your people, in terms of your performance, in terms of how safety is working in your organization, in terms of the safety culture, the whole wrap-up of the safety culture.

So, it ends with a in-depth discussion about here's what we really think is going on and here's our recommendation, your team of experts basically here to advise you, and here's the things we think that you should look at in order to make sure everything's going to be okay. So, we've completed two of those programs. We have three more to go this year for Human Space Flight.

The next thing that we do in terms of the programmatics for safety culture is to look at guidance. It is really important that there be something in the

guidance that uses the words safety culture. If you're in an organization where if you went into your documents and you put a search and you said safety culture and nothing in your documents comes up with even a mention of safety culture, I think, you know, for us, when I saw in NASA guidance that we didn't have that, you know, we decided consciously that needed to be in there.

And, so, 1000.1 talks about safety, but 8700 is the top safety document. That now has a policy statement in there that basically says NASA thinks safety culture is important. And that was important to get that into the safety documentation.

Right now, we're very fortunate, and in terms of safety culture, we're very fortunate as an agency. We have an administrator who walks the talk and really understands this. We have an associate administrator who understands this fully. We have a Human Space Flight administrator who is completely understanding of this and believes in this and have seen how it boosts performance. We have a chief of safety who, same thing, so the lineup organizationally of leadership throughout the agency is very strong, very dedicated, very committed to this.

But that could change. And, so, it's very important to have discussion and philosophy statements and expectations embedded in the organizational guidance,

so that when there's a change of one of those people all of a sudden that kind of just goes away. We don't want that to happen.

So, we're working in terms of looking at the guidance. There is going to be a change. There's going to be an addition into some lower level guidance, that basically will make people doing their survey a requirement once every three years. We're not going to tell them who has to do their survey. We're not going to tell them how they have to score on their survey. But we're going -- but we want them to go through the process of at least asking their work force what do you think about these different dimensions.

We expect it to change and to evolve over time. Our workforce today isn't going to be our workforce five years from now or 10 years from now. They're going to have -- the mission is going to change. And hopefully one day we're going to be on Mars, and those will be different sort of things we need to think about. But, really, that's we are thinking about. So, we want it to be stated as that the agency recognizes it's something important without being too prescriptive. It will be up to the centers, though, to become somewhat prescriptive in how they do that.

Then, again, we work on the tools, and we want

a whole range of tools available for people. And then we work on the logistics. And the logistics include a working group. That's representation from each of our organizations. We expect them to contribute, and they do. We get them together monthly, at least telephonically. We get together face-to-face where we hash out bigger issues. And we want constant communication going back and forth, headquarters to centers, centers to headquarters. I want that to really be a two-way exchange of information.

So, basically, those are -- those are the sort of nuts and bolts of how we have looked at how we want to put together the expectations and the work force from the very top, from the first day in NASA. There are certain expectations. Safety is part of how we do things. There are expectations. Safety culture is important. There are expectations. We expect certain behaviors from you in terms of your safety culture. If you see something, we expect you to speak up. If you're a manager, we expect you to listen. I mean, those kinds of things, we want those embedded from the very beginning. And we know that when there's issues with that, when that's not happening, it's just expected outcome that something's going to go wrong and it's just a matter of time.

And, so, if you were to ask me what things

should you think about and that are really essential, you know, I would say that there are -- there's a couple of things that are really critical. One is that the organizations say it's important. Two is that there are dedicated resources, full-time, that are dedicated to that in some form or fashion. And the third is to expect that that's going to change over time. It's not going to be the same as it is today. The mission is going to change, and there should be some flexibility built into that that we need to be resilient; we need to expect that; we need to welcome that; we should embrace it, right, so that when it changes we get excited and go, oh, good, maybe we can figure out a better way of doing business. And we want it to be that way. And it's a journey; it's not a destination. Safety culture is a mission enhancer to destinations, multiple destinations over time, but it's really the process, and the process itself is never complete. We never know everything.

And I would advise you not to expect that we're going to know everything or you will know everything, but you want to be asking and you want to be paying attention. And, so, those three things I would say critical, with the expectation that we're always going to be working at it.

DR. WINOKUR: Thank you very much for that

presentation. I have an initial question. You mentioned the fact that you finally put your safety culture definition into your standard, right? And I think that happened in Change Notice 2 in 2012. Was that challenging for you to get that actually implemented?

DR. DILLINGER: I love working for the Government. (Laughter.) So, it was -- it was and it wasn't. It was not as challenging as I thought it would be in actually coming to an agreement on the actual words. It was not as challenging as I thought it would be in vetting it through the multiple layers of review. It was a challenge in just getting it through the different layers logistically and through the system of making those changes.

DR. WINOKUR: It's actually surprising. I would have -- when I began to look at your presentation and I was looking at everyone's definition of safety culture, I mean, I would have thought NASA would have had one going back 10 or 15 years because you obviously have a venture that has a lot of risk and a lot of public focus on safety.

DR. DILLINGER: Yes. Yes. You would think, wouldn't -- and so that was like a freebie for me, right? It was like, well, what are the things we need to do, Dr. Dillinger? Well, let's start with -- yeah, I mean, yeah.

Yeah.

DR. WINOKUR: You said something else that was interesting. You said that you wanted to write it down in case your leadership changed.

DR. DILLINGER: Yes.

DR. WINOKUR: But do you think that it would survive if you didn't have the right leadership?

DR. DILLINGER: Yes.

DR. WINOKUR: I mean, would the culture be able to survive without it?

DR. DILLINGER: Well, there would be a culture. The question is what kind of culture would it be. And, so, the quality of the leadership matters. It matters a lot. It matters a lot.

DR. WINOKUR: Okay. Could you put up Slide 5?

DR. DILLINGER: That one.

DR. WINOKUR: This one.

DR. DILLINGER: Yes.

DR. WINOKUR: What did you find? I guess I couldn't -- you know, you talked about the methodologies and --

DR. DILLINGER: Sure.

DR. WINOKUR: -- the approaches you used, which sounded great, but were there any particular things you'd found in round one?

DR. DILLINGER: There are. And these are -- these are results that we've discussed at the agency level, so once we go through the cycle, each center does their -- what they do, and then I present the results to the administrator and to the senior leadership. And, so, we did find some things.

So, you know, earlier you had asked about how people rate things in terms of leadership, management, supervisors, employees and how that perspective changes. What you're actually seeing, if you notice this, how this ticks down, and one bar in the cluster is always higher and one -- and then it ticks down and it gets lower and lower and lower. Any guesses what that might be --

DR. WINOKUR: We had a different interpretation of that. Thanks for sharing that. We thought your culture was just going to hell. No, so basically they're the different levels of management we're looking at there.

DR. DILLINGER: That's exactly right. So, in round one, what I wanted to do to establish -- this was our benchmark year, so to establish sort of where are we starting from with safety culture, we said, okay, reporting culture, we defined it, we said this is what it means. How would you rate this, and then rating one is how does leadership rate it, how does upper-level

managers rate it, how do supervisors rate it, how do you rate it in the worker area.

And, so, what you're seeing in that tick-down is a really common phenomenon that happens when all work forces in the -- when I was in the Air Force and we looked at this kind of stuff, we used to call it it's good to be king. And, so, the world looks very different if you're a general officer. If you're a GO sitting in your office and your computer breaks, you know, it doesn't stay broken for very long. You know, when you go to the meeting and you need all of your documents in a file, somebody's putting that together for you. You know, life is pretty good, and people are telling you constantly how good it is. That's just what happens, right?

DR. WINOKUR: We're all wondering about employment at NASA now. Yeah. (Laughter.)

DR. DILLINGER: Well, what you need to look at, and this is what Dr. Haber is just a marvel at and Dr. Morrow, but people who look at this are -- we're pretty familiar with this, right? So, we actually expect this to happen. And this -- but in a way this is partly how we sort of motivate our workforce, too, right? Like you want people to progress through your agency. You want people to want to become supervisors. You want people to

become top-level GSs, SESs.

I mean, we want -- you know, it is good to move up in the agency and take on the additional work, along with those responsibilities. And, so, yes, there's benefits to that, but you're also going to work hard to make that happen. And, so, but we want to remember what it was like to be an employee who did not have power in the organization basically and who it's harder to get things done, who it's more easy for them to get displaced or dissociated in some sort of way. It's important to remember that.

So, what we would look for in that is what is the delta between those groups. In other words, this is a six-point Likert scale. It goes from about a 5.2 to about a 5.05. You know, or it goes from on the second grouping it goes from 4.99 to 4.8 or something like that. It's not a big difference in -- and there is a difference, but there's not a big difference. I've seen organizations, not NASA, where that difference is strung out like this. And as that -- it doesn't tick down; it jumps down. And now you're looking at a five, you know, versus a two.

And in that kind of an organization, there are issues. There's something going on in there. And there's also times where you might see in an organization

it goes the other way. And sometimes that happens and there are different reasons that would drive that from happening. But what you're -- it's expected to actually see it like that. What I'm really looking for is how large are the differences.

DR. WINOKUR: Is there anything else you learned from the data?

DR. DILLINGER: We could identify what were some of our -- what were the areas, so like just culture, you know, is always a concern.

DR. WINOKUR: Right.

DR. DILLINGER: Each of the questions has people rate on a scale of one to six, but it also has an open dialog box. And, so, every person who took the survey could make a comment, and that was fully encouraged. And, so, we had literally thousands of comments. So, we spent a lot of time -- and what people often do, especially in NASA, which like on the FEVS, we look at the FEVS.

We have other looks that go into different centers. There's a survey called 4-D. There are other kinds of looks that are going on independently as well as our look, but we try to look at all of those together. So, when we look at those open dialog boxes, we're looking for themes in what they're seeing, and we get in

our workforce, because people are generally pretty happy, number one in best places to work, number one on the FEVS, that swept all the categories this year.

You know, so generally people are pretty happy, but we get a lot of the what I call "yes, but." And this is where sort of your 95 percent/5 percent question, what does that mean, right? So, our people are happy. How's your work environment? It's great, but. And so the open dialog boxes were important for us when we did the survey because we want to know what those are. We want to know what -- what is the 5 percent or 1 percent or 2 percent or what is -- for people who see things a little differently or say it's really great, but here's something you could do to make it even better. We want to hear those voices.

And of our surveys, about -- about 15 percent of the people write comments of our respondents, and of those, about half are positive kind of comments and about half are negative kind of comments. So, it's not all that somebody's angry, I'm going to take the survey and tell them how bad it is and then write what I'm upset about. We really get both. And, so, we look at those for areas that we can improve and areas that we need to relook at.

DR. WINOKUR: This is the federal workforce.

DR. DILLINGER: No, no, no. This is -- I'm sorry.

DR. WINOKUR: Is this the federal workforce we're looking at here?

DR. DILLINGER: Yes. These are the GSs.

DR. WINOKUR: These are the GSs, the federal workforce.

DR. DILLINGER: The federal workforce, yes.

DR. WINOKUR: Okay. All right.

MS. ROBERSON: You know, I think Challenger and Columbia were certainly significant events that had an impact in driving the agency to decide to focus on improving the culture.

DR. DILLINGER: Right.

MS. ROBERSON: With safety culture being one element. But it's been over a decade.

DR. DILLINGER: Right.

MS. ROBERSON: Leaders have changed. So, what are those elements that are maintaining the momentum to continue to improve in this area, to make changes to your primary directives to focus on safety culture? What are the things that are driving it?

DR. DILLINGER: I think people have really come to understand that it matters. And when I say people, I mean, I think people at all levels. I think the

leadership understands that. I think the workforce understands that. The workforce understands, you know, if we have a two-man operation going on where this person is supposed to do this and I'm supposed to observe it and sign off on it, it's really important that we do it that way. If we cut corners, it's a risk. It's not just a safety risk; it threatens our existence. I mean, if we perform this poorly and can't execute it, then we threaten what we're really all about.

And people have -- people understand that for the most part in the organization, that it really is not helping us when we do that. And, so, people are stepping up to the plate and are continually focusing, are continually asking. It's not to say that people still aren't tempted to cut corners, because what we also tend to do is to put a lot of tasks on them and a lot of expectations on them and to sometimes overburden them to a point where in order for them to do what they are being asked to do, they're going to all start looking at how can I cut something back. And that's where we really want to work with them on the communication aspects. They need to know when to speak up and say this plate is too full; something's going to fall off; we need to relook at these priorities so that I know better what I really need to focus on; I only have so many hours in the

day.

MS. ROBERSON: So, are there events or activities that you've detected that are kind of -- for us would be below the screen that allow you to see where things are popping out and where adjustments need to be made in how you approach not just your communication in the organization but the assessment? Do you find those? Or do you only find those through the assessment tools?

DR. DILLINGER: We've got a number of things going on. So, for example, and some unfortunate things still happen in NASA just like in every other organization. So, we still have in our institutional safety, we still have people who get hurt, you know, falling, slipping, those kinds of things, twisting their ankle. We continue to look at those metrics. There's whole offices dedicated to looking at those kinds of things.

We also have programmatic issues where once in a while something happens. We have not had anything catastrophic happen, but we pay a lot of attention to areas, especially close calls in this last year. We had a close call that I don't know if you want to know about, but --

MS. ROBERSON: Please do.

DR. DILLINGER: -- it was -- I'll tell you

about it. So, there was a space walk, Luca Parmitano was the astronaut. He was outside of the shuttle. His helmet filled up with water. We expect many things from our astronauts, but we don't expect them to breathe water, and the space suit is not designed for that. It's extremely, extremely dangerous. He was really lucky.

He realized he had a problem. They brought him back in. It takes a while just to get somebody, you know, out of the suit. I mean, this is not a small thing. And it turned out there was a technical flaw, of course, and something had malfunctioned.

But it also turned out that that malfunction had occurred previously. And they hadn't figured it out. And, so, that was a sit-back moment. And that out-brief was an out-brief that got a lot of people's attention, including Mr. Gerstenmaier, including the administrator, including those kind of people who are like, you know, we talk about this a lot, we consider this to be embedded in our culture, and here we are looking at something that almost did it again.

And, so, this is where it's a constant -- we always have to be paying attention to that. Why did that happen? Big look into why that happened, trying to identify it, finding some of the things that we've seen before. And you cannot overcommunicate to a workforce

how important it is for them to speak up.

MS. ROBERSON: So, thank you very much for sharing that. You know, you described in your framework a lot of things. What I heard is it's never good to have to have a meeting with the boss after an assessment. I got that. But what is your process for really holding -- you know, I'm not going to ask you how the centers rack up, but what is the process for holding them accountable for addressing issues that come out of whatever assessment it is?

DR. DILLINGER: The process now is more informal. It's more informal than, for example, the inspection process or the audit process. In the audit process and the inspection process, those have -- they have specific findings. Those findings are weighted in terms of their importance. There's time frames that they have to create fixes and respond back and do those kinds of things.

Now, often those go hand in hand with safety culture kinds of things, but they're not necessarily the same thing. The program by design is not -- at this point anyhow -- it's not part of the program to build in a response and a followup to that. And this was a philosophical discussion that we had at the beginning when we said how are we going to do this. The belief is

that our leaders are there because they're outstanding, because they're highly qualified, because they're motivated, because they care about their workforces. And we believe that given good information they will work their teams, they will work their experts, and they will come up with the best fixes for where they live.

Each one of those 10 center directors is kind of responsible for their own little fiefdom. And, so, they have a number of resources at their disposal and that are responsible for seeing those things through. And we -- our philosophy is that we are going to give them good information and we expect them to do the right things with that. And I have to say, I've been there for five years. What I've seen is that they have.

There have been a couple of times informally where at the beginning there was a little bit of kind of, hmm, why are we really doing this and we're very busy and, oh, we have so many surveys, and those kinds of things. But when it got to the point of where if they weren't going to do anything, leadership rolled in on that. And there were discussions that were had and about how that was important and why. And then that was the end of that line of questioning. And then it was more about, okay, how are we going to do this and when can I get the results.

MS. ROBERSON: Okay. Just one last question now. We've talked about the federal workforce. How do you guys -- or how does your framework accommodate ensuring that your expectations in this area get to your contractors?

DR. DILLINGER: Yeah. That is probably the hardest area right now. I mean, it's the one that I think about the most in terms of wishing I had the perfect answer for that. You know, part of what's happened in NASA is as the mission has changed and as we're going to commercialization, you know, the whole idea of commercialization is less government, less federal, more industry, and going from an oversight to insight model. You know, that is something that within the agency we are all sort of trying to figure out and what is that really going to look like. What -- how is that really going to happen.

I don't have all the answers for that, but it is something that we think about. It's something we care about. There are efforts to go into, for example, Boeing or Lockheed or SpaceX, and to have communication with them through the contracting vehicles, to have safety expectations clearly defined. I mean, those kinds of things are happening, but how it's really going to take shape we're going to see.

MS. ROBERSON: Thank you. We'll be watching.

DR. WINOKUR: So, let me follow up on that. You're saying that in these operational safety assessments those are program assessments, right?

DR. DILLINGER: Yes.

DR. WINOKUR: You would be dealing with a contractor in those, right?

DR. DILLINGER: We don't interview the contractors in those. We are actually not able to interview the contractors because of the contract vehicles. And, so, we only can interview the federal employees.

DR. WINOKUR: That's very interesting.

DR. DILLINGER: Yeah.

DR. WINOKUR: One of the things to me about NASA is that it's in many ways similar to DOE in the sense that you have an incredibly complex mission; everything is one of a kind that you do. And the Board paid a lot of attention to NASA and your constructs because we wrote a recommendation, 2004-1, called Oversight of Complex High-Hazard Nuclear Operations, and in so doing we interviewed many NASA people to gain and to benefit from your experience.

So, I think you're a model that is not, in my opinion, too dissimilar from the Department of Energy in

terms of just incredible challenge that you're trying to undertake in your mission. And your mission, perhaps, is the most dangerous of all because you are putting people on rockets and shooting them into space and things of that nature.

Let me ask you a different question here. Do you think there's any validity to the fact that, you know, after 10 or 15 years people just lose sight of what happened and what went wrong after a terrible accident? That there's a periodicity to -- you talked a little bit about the pendulum swing -- but a periodicity where maybe the people who were part of the accident, they've retired, they've gone away, they've been reassigned, so you don't really have people who in their gut really remember what it was like to have a coworker or somebody seriously hurt.

DR. DILLINGER: Absolutely. There are a lot of reasons for that, but things -- there can be drift, you know, over time in terms of the prioritization of safety. And that happens. People leave; new people come in; they haven't experienced it. But, you know, one of the -- some of the safest places to be, in my experience in the Air Force, were in flying squadrons who'd had a fatal Class A mishap.

You know, if you belong to a group of people

where you all care about each other, you're passionate about the mission, and one of you doesn't come home, it makes a huge difference in how people approach things, not just the operators, but the maintainers, the schedulers, the receptionist. I mean, everybody sees things differently when someone's gotten hurt or especially when someone's gotten killed. And in organizations that have experienced that, their awareness is very, very high. And organizations that have never experienced how painful that really is, that person's not there, cleaning out their locker, seeing their widow come over, their children, those kinds of things. It makes a difference.

DR. WINOKUR: Yeah. Thank you.

I think you've already given us suggestions about oversight, so I wrote those down. I appreciate it very much.

Do you have any more questions?

MS. ROBERSON: Are you going to ask your question about the virtual organization?

DR. WINOKUR: Well, I thought I may have covered parts of it, but let me try it again. I mean, you are -- we talked about a virtual organization. You're an organization that you have the headquarters staff; you have the federal staff; and yet you have a

large contractor workforce, also.

DR. DILLINGER: Right.

DR. WINOKUR: And we were trying just to get at it before, and I think maybe just reemphasize it again, how do you maintain the safety culture in that contractor workforce so that you're assured the mission is going to be successfully accomplished in a safe manner?

DR. DILLINGER: It's something that we look at mostly through procurement, you know, through procurement in contracting. In order -- you know, if our expectation is industry or the contractors are going to take care of this, then we need to write into the contract that that needs to be a requirement. And, so, as we look at people as they vie for those contracts, they need to know that that's an expectation that we're going to look for.

DR. WINOKUR: Okay.

DR. DILLINGER: But, again, I'm not saying that we've got that totally wrapped up and have figured it out 100 percent. I mean, we're working on that. But if we're going to shift the responsibilities into industry, then we need to make sure that industry is covering it.

Now, from some of my experiences looking at our contractors, they're very conscious of this, as well. I mean, they don't want to make a mistake. They understand for them this is -- they're about business. They are

business. And they understand that safety as part of their business is important and that they will lose contracts or future work if they don't perform up to the standards that they said they were going to. But we still as the agency need to make sure that they know that's an expectation.

DR. WINOKUR: Well, would you have a sense of what the safety culture is in different organizations that support NASA: Lockheed Martin, Boeing, anybody? I mean, would you have a sense of that?

DR. DILLINGER: I don't. I've asked about that, and right now, again because of the way the vehicles are set up, we wouldn't go in and do that.

DR. WINOKUR: Okay.

DR. DILLINGER: It's not part of it. If we had created a contract vehicle where that was part of it, then it could go in and do that. But it's just not part of how it's been set up at this point.

DR. WINOKUR: Wow, that surprises me.

Do you have any more?

MS. ROBERSON: Just one final question. On your assessments, so you're about to complete round two.

DR. DILLINGER: Yes.

MS. ROBERSON: And I get this in as you described there is an unspoken truth we know that

management tends to see things differently than the employees. But this kind of normalized, and I guess the question I'd ask you is what did you learn between -- or what are you learning between round one and round two. Are there areas that were emphasized that are being de-emphasized or vice versa? What are you learning that will help you adjust the approach to be even more effective?

DR. DILLINGER: Round two is a little bit different than round one in that the area of concern more than just culture issues is more about change. And more of the concerns are about changes in the mission, changes in the workforce, changes in government, things about stable expectations of the future. Those -- and in some places the workforce is -- would -- is looking for reassurance, I think, about things, sequestration.

You know, we heard for -- you know, you can imagine what the comments look like in our surveys right around that time. You know, and so that -- those issues have become much larger than they were in round one. And, so, we've talked a lot with management about messaging to your workforce, again, communication -- you know, communication takes two parts, a sender and a receiver. So, when I say messaging, I don't mean necessarily communication; I mean just messaging. What

are you, the manager and the leader, telling your people.

And one of the things we've talked with our leaders about is you need to be informing your people and telling your people as much as you can, as much as you know, about where the program is at, where it's going, where you think it's going to go. Tell them what you can so that they know as much as they can, and then work with them about how you are doing these changes, because if you do it too quickly, you know, there's issues. And if you don't do it when you need to, there's issues there, too. So, it's finding the balance of where that is.

MS. ROBERSON: Okay. Thank you very much.

DR. WINOKUR: I want to thank you all. I want to thank you all very much, but before, we have a couple of minutes. Are there any other insights that you could share with us or you feel you might share based upon hearing the other presentations? I just want to afford you that opportunity.

Well, the presentations were outstanding, so we learned a great deal.

MS. ROBERSON: They're going to keep it a secret.

DR. HABER: I think that I've been impressed by the commonality in the threads in all presentations. And I hope that the Board has gained that insight of how

different facets and different industries are thinking about safety culture. So, I just jotted down words that I kept hearing that seemed fairly consistent and I think important for you to think about.

DR. WINOKUR: Thank you.

DR. DILLINGER: I would add on one thing, and I'm struck by this continually by the commonalities. And as you know, there are -- some of us get together fairly regularly at a roundtable, the agency roundtables. And I do think that there may come a time where the Federal Government looks at safety culture at a even higher level, at a 50,000-foot level, in terms of what are we thinking for all of us, for all of the government agencies.

There are fundamental tenets that apply no matter what we're really doing, and there probably are some safety culture standards that we could be looking at throughout the Federal Government that then each of the agencies would address in its own way. And I just throw that out there for I'm sure some lively debate in a future time.

DR. WINOKUR: Thank you. Once again, I want to thank the three panel members. Thanks so much for your time, insights. We really appreciate it very much.

And at this time, per the Board's practice and

as stated in the Federal Register notice, we will welcome comments from interested members of the public, but I'm told we do not have any interested members of the public right now who are going to make a comment. I want to open up the floor to be certain of that. So, is there anybody in the audience who would like to make a comment?

(No response.)

DR. WINOKUR: So, not seeing anybody who wishes to make a comment, I'm going to turn to the Board members for their closing comments, and then I will end with my comments.

So, Ms. Roberson?

MS. ROBERSON: No additional comments, Mr. Chairman.

DR. WINOKUR: Mr. Sullivan?

MR. SULLIVAN: Yes, thank you, Mr. Chairman. So, now I will share my thoughts on this, on this subject. And I wanted to start first of all by thanking all the panelists. I thought those were -- you know, those were well-done presentations. I want to stress that for each of you what you do, my opinion is that you do it very well and in those circumstances where you do it, it's certainly necessary.

But my thoughts on the subject are different than what I think is some of the generally expressed

opinions that I'm just assuming were in this room. My thoughts come from my background. I'm a United States Navy submarine officer by training. The Navy is a very diverse organization. When I start mentioning my thoughts on safety culture, I've heard people say, well, yes, but a submarine is a small crew, it's a military organization, things are different.

No, the Navy is a very large and diverse organization, many different crews. You have a nuclear aspect and a non-nuclear aspect. The Navy's culture has to run through private shipyards that do design and construction of new submarines and public shipyards that do overhauls of submarines and naval bases that have active-duty personnel doing regular maintenance.

We have national laboratories doing research and development. We also have publicly owned naval warfare centers doing research and development. So, it's a very diverse organization, very large, and through it all that has a very strong safety culture, yet we don't have a definition of safety culture. We don't have any action matrices or framework or toolkits.

It just -- it comes down in the Navy to leadership. And I heard today about organizational behaviors. It had leadership; and then it had communication and organizational learning and problem

identification and resolution. But communication, fostering effective two-way communication, is an essential element of leadership, as is fostering an organizational learning desire, problem identification and resolution.

I would add we had discussion on alignment, but alignment is forged by accountability, which is the way a senior leader makes sure subordinate leaders stay in line. It all comes down to leadership. We could have just said leadership and stopped there.

The leadership has other elements which are absolutely necessary. It's management; it's managing risk; it's managing people; it's technical competence; it's accountability; it's integrity. But all of these things are hard work. Okay, there is no magic bullet. When you try to figure out whether or -- how we maximize safety on a submarine, well, the easy answer would be just tie the ships up to the pier, but that doesn't get the mission done.

Similarly, we could maximize safety at Pantex if we simply stopped managing the stockpile, but that won't work either. There's a lot of factors that have to be considered, yet when somebody has to make a decision about whether or not to move forward with production or stop for safety reasons, there are a number of external

factors, just as there always have been in the submarine force, including whether or not you're going to keep Congress happy or whether or not you're going to keep the Pentagon, which is an executive agency 20 times the size of the Department of Energy, whether you're going to keep them happy.

These are difficult decisions. And the answer is not found in a toolkit. It can't be taught in a one-week course. You can't come up with the magic bullet. And I think sometimes when we stress assessments, which are necessary to show -- if you have a good organization, you may need an independent assessment in order to prove to someone external to you that you actually do have a good organization. If you have a bad organization -- a badly run organization, well, then, an external assessment shows you that you have poor leadership. And that's what it shows you, because a good leader should know what the workforce is thinking. And a good leader needs to find its own -- his or her own ways to make sure that they know that.

So, I think we sometimes stress assessments too much. It becomes about the assessment. And I'm not frankly interested when I go through around the complex hearing about how somebody's survey turned out. I also know that if you get perfect scores on a survey you

probably have other problems. I mean, if you want to keep people happy, don't make them do any work. People who don't want to work, and they come to your organization with other behaviors that have been forged outside of your organization.

Sure enough on a submarine people would show up who didn't want to do any work. But if you didn't -- you had to make them work. And then they weren't happy, so they wouldn't give you necessarily great scores on their surveys. It's not about the survey. It's not about the assessment. It's about doing the right thing, and the right thing is hard, and there is no easy answer.

Thank you. This concludes my remarks.

DR. WINOKUR: Thank you, Mr. Sullivan.

And I'll provide my closing comments. I'd like to begin by thanking our witnesses and their organizations for supporting this meeting. And I want to thank all of the members of the public who participated in this meeting. I also want to thank any congressional staffers, elected officials, and other representatives of state and local organizations that participated here today.

The expert witnesses that appeared before us today have demonstrated that there is wide recognition that an organization's culture is the key to its ability

to conduct its operations safely and reliably. The commercial nuclear power industry, the Nuclear Regulatory Commission, and the National Aeronautics and Space Administration have all put significant amount of effort and resources into understanding safety culture and improving their operations based on this understanding.

We also are aware that other industries involved in conducting high-risk activities have taken similar steps. Establishing and maintaining a good safety culture is not easy. It requires dedication and commitment at all levels of the organization. Creating and maintaining a good safety culture is a long, slow process that never ends.

Our goal today has been to learn more about safety culture, how it is assessed, and how it can be improved. Our goal for the next meeting in this series is to discuss with the Department of Energy how these lessons may be applied to improve and sustain the safety of their defense nuclear facilities. I'll look forward to that discussion, and I hope that all of you will join us then.

Once again, I want to thank everyone for their participation at this hearing. The record of this proceeding will remain open until June 28th, 2014. I'd like to reiterate that the Board reserves its right to

further schedule and regulate the course of this public meeting and hearing, to recess, reconvene, postpone, or adjourn this public meeting and hearing and to otherwise exercise its authority under the Atomic Energy Act of 1954 as amended.

This concludes the public meeting and hearing of the Defense Nuclear Facilities Safety Board. We are now adjourned. Thank you all for attending.

(Whereupon, the public meeting/hearing was adjourned at 11:54 a.m.)

CERTIFICATE OF REPORTER

I, LINDA METCALF, CER, the officer before whom the foregoing testimony was taken, do hereby certify that the proceeding was digitally recorded by me and thereafter reduced to typewriting by me or under my direction; that said testimony is a true record of the event; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this proceeding was taken; and, further, that I am not a relative or employee of any of the parties hereto, nor financially or otherwise interested in the outcome of the action.

LINDA METCALF, CER