DEFENSE NUCLEAR FACILITIES SAFETY BOARD

SAFETY CULTURE PUBLIC MEETING AND HEARING

AUGUST 27, 2014

DEFENSE NUCLEAR FACILITIES SAFETY BOARD
625 INDIANA AVENUE
ROOM 352
WASHINGTON, D.C. 20004

Before: LINDA D. METCALF, CER, REPORTER
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Closing Remarks
DR. WINOKUR: Good morning. My name is Peter Winokur, and I am the Chairman of the Defense Nuclear Facilities Safety Board. I'll preside over this public meeting and hearing.

I would like to introduce my colleagues on the Safety Board. To my immediate right is Ms. Jessie Roberson. Ms. Jessie Roberson is the Board's Vice Chairman. To my immediate left is Sean Sullivan. We three constitute the Board.

Mr. John Batherson, representing the Board's Office of the General Counsel, is seated to my far left. Mr. Steven Stokes, the Board's Technical Director, is seated to my far right.

Several members of the Board's staff closely involved with the 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 August 14th, 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, associated documents, public
notice and video recording will be available for viewing
in the public reading room here at our headquarters in
Washington, D.C. 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 11:30 a.m.
following this morning's session, and 4:00 p.m.
following this afternoon's session.

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 wish 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 subject 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 September 27, 2014.

I would like to reiterate that the Board reserves its right to further schedule or 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 second of a series of hearings the Board will convene to address safety culture at Department of Energy Defense Nuclear
Facilities and to address the Board's Recommendation 2011-1, Safety Culture at the Waste Treatment and Immobilization Plant. Later hearings will be announced by separate notices.

In this hearing, the Board will hold two sessions. In this morning's session, the Board will receive testimony from current and former Navy officers where they focus on safety practices and tools that the Navy uses to improve and sustain a robust culture of safety, both in operations and in the design and construction of nuclear submarines.

The Board will also explore the applicability of the Navy's safety practices and tools to other organizations such as the National Aeronautics and Space Administration, and the Department of Energy.

In the afternoon session, the Board will hear testimony from a panel composed of a member of the United States Chemical, Safety and Hazard Investigation Board and two experts in human organizational factors and management of high reliability organizations. This panel will discuss the role of the organizational leaders in establishing and sustaining a robust culture of safety within organizations conducting complex and high hazard operations.

In a follow-on session later this fall, we will
discuss with 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 of Energy'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.

DR. WINOKUR: Mr. Sullivan?


Yes, good morning. The first of these hearings we had seemed to focus to me a lot on assessments of safety culture, which I wasn't particularly interested in, quite frankly, so my participation was limited, and I said then I thought safety culture was mostly about leadership, and so today's focus seems to me to be a lot on leadership, so I will be quite interested in that, and I do not intend to limit my participation, and I look forward to the testimony that we will receive.

I'm still not exactly clear how as an oversight organization we will use that information to try to apply it to the Department of Energy, but nevertheless, I'll be very interested in the information that we do.
receive. Thank you.

DR. WINOKUR: Thank you, Mr. Sullivan. This concludes the Board's opening remarks. At this time I would like to invite our two Navy officers to the witness table. Each officer will be provided 30 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.

Gentlemen, please.

Our first witness is Rear Admiral Kenneth J. Norton. Admiral Norton has been the commander of the Navy Safety Center since January 2013. The Navy Safety Center reports to the Chief of Naval Operations, and its mission is to prevent mishaps, to save lives and to preserve resources by providing advice, policies, services and risk management information and tools that enhance command structure, combat readiness and global warfighting capabilities.

The Navy Safety Center addresses the safety of essentially all aspects of Navy Operations, whether afloat, ashore, in aviation or occupational in nature. Among his previous command tours, Admiral Norton commanded the nuclear powered aircraft carrier, the USS Ronald Reagan, and was the executive officer of the
nuclear powered aircraft carrier USS Carl Vinson.

Under his command, the USS Ronald Reagan was awarded the 2008 and 2009 battle effectiveness award, as well as the 2009 Chief of Naval Operations Afloat Safety Award.

Admiral Norton also has accumulated over 4,500 hours in rotary wing aircraft and has nine overseas deployments.

Admiral Norton will speak to the Navy's efforts to monitor, improve and sustain a robust culture of safety within its wide range of operations, and speak to the role that the Navy Safety Center provides in supporting those efforts.

Our second witness is Rear Admiral Thomas Eccles, who retired from the Navy in 2013. At the time of his retirement, Admiral Eccles was the chief engineer and deputy commander for Naval Systems Engineering in the Navy Sea Systems Command. During previous assignments, Admiral Eccles was the Seawolf program manager for the USS Jimmy Carter, and he was the program manager for advanced undersea systems.

Admiral Eccles has also served onboard two nuclear submarines and is a qualified deep sea diver and salvage officer. In 2010, Admiral Eccles was appointed to the National Academy of Engineering Committee.
examining the Deepwater Horizon explosion and fire and the subsequent oil spill in the Gulf of Mexico. He also led the U.S. technical team in a joint international investigation with the Republic of Korea on the loss of the warship Cheonan. I hope I pronounced that correctly.

He is a fellow of the Society of Naval Architects and Marine Engineers, and was the recipient of the 2012 Gold Medal of the American Society of Naval Engineers. One of the programs that many organizations view as the benchmark for excellence for ensuring the safety of the nation's submarine fleet is the Navy's SUBSAFE program. As the Navy's chief engineer, Admiral Eccles played a key role in that program.

In this session, we've asked the Admiral to discuss the SUBSAFE program and how it is used to create a culture of safety within the Navy's submarine forces and those responsible for designing and constructing submarines.

Let me add that I, for one, am appreciative of the willingness of Admiral Norton and Admiral Eccles to testify today on a topic that I think is vitally important to this nation. I believe there is a great deal that can be learned from each of the panel members about how to manage and improve safety culture at DOE's...
Defense Nuclear Facilities.

I look forward to these presentations and discussions. We will begin the presentations with Admiral Norton. Welcome, Admiral.

REAR ADMIRAL NORTON: Thank you, Dr. Winokur, and Mr. Sullivan, Ms. Roberson and everybody else on the panel there. Welcome for those out in the audience.

As said, I was honored to be asked to come up here and testify concerning the Naval Safety Center. I want to emphasize the word naval there meaning United States Navy and the United States Marine Corps, so we actually work in both services there.

This is the agenda that I have today. I'm going to talk a little bit about the background information from the command, our safety practices and procedures, tools, metrics and current initiatives and the way ahead, because the one thing we found about when you apply safety best practices, you can't stand still. There's always innovation going on. There's always ways to improve to make sure that you have a strong safety culture.

This is the background. Back in 1951, for most of us that can remember back there, and certainly those that were into the '60s, we were having just a horrendous safety record when it came to aviation, so we
stood up the Naval Aviation Safety Activity with a group of about 30 folks and tried to get out this mishap rate that was going on in naval flight activities. And as we've progressed through the years, we've added more and more what I would call exacting procedures and techniques to the organization.

In 1992 we included the United States Marine Corps. We added the Navy Safety Environmental Training Center back in 2003. We became the operational risk management model manager in 2010, and then just last year, I assumed the responsibility to take control of the Naval School of Aviation Safety.

This is what Secretary Mabus has to say on safety. This was his vision statement, and it still holds true today. His goal for the department is to become the best military safety organization in the world. Investments in safety have shown great payback. We must aggressively fund safety research, implement proven safety technology. Mishaps, hazards, near-miss events, must be quickly identified, analyzed and openly communicated so that those lessons learned will prevent reoccurrence.

And then the Department of Navy objectives for this past year: Maintain war fighter readiness, safety will continue to be a focus as the Department strives to
reduce accidents and mishaps. So that's what Secretary Mabus has to say about safety. This is our ETHOS.

The mission at the Naval Safety Center: Prevent mishaps, save lives, preserve resources. The advice, policy services and risk management information and the tools that the Naval Safety Center provides enhance command culture, combat readiness and global warfighting capabilities. Let me just repeat that: enhances command culture, combat readiness and global warfighting capabilities. That's the mission.

This is basically the Venn diagram showing where I am at the Naval Safety Center. You can see all the folks there, but I just want to kind of outline here in the lower left, we have about 100 military persons onboard, we have about 100 civilians, you can see including 21 Marines, and then we have the schools, et cetera, but I just wanted to show you our command and control structure there.

This is the environmental school. What's important to note there is we conduct 458 classes at 74 worldwide locations. We do a lot of global online classes. We have close to 9,200 students a year that are graduating from those classes.

Down at the school of Naval Aviation Safety, which is in Pensacola, Florida, you can see that also we
put the throughput there, the customers include the Navy, Marine Corps, Coast Guard. We have foreign students, the Naval Postgraduate School, flight schools, allied nations and other agencies, including the Department of Homeland Security.

This is our safety culture. This is from Mr. Ron McKinnon, Changing the Workplace Safety Culture, and this is what I think the Department of Defense, certainly the Department of Energy are trying to get at, an organization safety personality, and here's that word, leadership, and Mr. Sullivan mentioned that.

Leadership has to commit to the integrating the practices of safety in the culture of the organization. All day, all night, it's a 24/7 way of looking at the way we conduct our work.

Leadership and safety culture, from McKinnon: "Management's Commitment in Involvement in Leadership," and that's the key. Many of us talk about leadership or management by walking about. When I was the captain over the USS Ronald Reagan or as the executive officer of the Carl Vinson, that was a lot of my daytime was considered walking about.

I didn't trap myself up in the pilot house, I had people up there who know how to drive the ship, so I would walk around through the ship, as big as it is,
through all the different levels, through the propulsion plant area, on up to the fo'c'sle hole, wherever it happened to be. See what people are doing, talking to my sailors and making sure that I had an exacting eye to make sure that things were being done, but they were being done safely.

Any attempt to change or improve the safety culture at any workplace will fail if there is not total commitment by leadership. So that, I think, is key right there.

Military: Here's some of our challenges that we've found in the Department of the Navy. We have this can-do and we have this high-risk mentality. Think of the young men and women that we are recruiting to come into the military, especially coming into the Marines or coming into the Navy. These are people who are generally involved with some of the X Games type of affairs. They like to go out on their off-duty hours. They like to take risks, whether it's snowboarding or bungee jumping, whatever it happens to be, and we want those men and women in our service.

Do more with less mindset. Well, I don't have to remind anybody here that we all went under sequestration last year. We had a hiring freeze. We had less O&M, which is the operational management and
operational funds, and yet nowhere was there a reduction in the demand signal for our services, so we were asked to do more with less, and the reality is we were trying to make sure that we could answer the combatant commander's requirements, but we had less training hours to do it, to prepare our forces, and in some cases we had less manpower to put at the problems.

We have distinctly different subcultures in the United States Navy and the Marine Corps. I know that sounds kind of unusual, but we have aviation, we have submarine forces, and we have the afloat forces, the surface warfare officers and the surface warfare sailors. So, they had varying approaches to hazard management and reporting.

When I came into the job a year and a half ago, I decided I was going to homogenize all the best practices through all what we call our tribes: Aviation, submarine forces, surface forces, and then our Navy expeditionary forces, including divers.

Part of trying to meld these different communities or cultures together was the fear of reporting. Many times people would fear that if they had a near miss, it would be like a bad mark on like a report card to their higher reporting seniors.

The concept of privilege of information versus
need-to-know in web-enabled safety system shortfalls, so we couldn’t necessarily share all the near misses that we had out there. So, these were some of the challenges I had when I came into the job.

Here are some of the leadership examples right now. We have two Echelon II commanders that are fully onboard with making sure we operationalize safety. We have Admiral Harris, who is the commander of the Pacific Fleet. He came through the Naval Safety Center en route to taking over the job. This was his brief when he took over the job: Professional execution, safety, it underpins all we do, and also at Fleet Forces Command, Admiral Gortney, basically you see right there the lines of operation that he has: Warfighting, sailors, partnerships, management and operations. Underpins all that is safety.

Bottom line, we have the leadership driving the organizational climate. The organizational climate drives the long-term cultural change.

Human Factors: This is what we’re trying to tackle. Seventy-five percent of the mishaps have human factors. You can call that human error as a causal factor. So we, at down to the unit level -- and when I talk to the unit level, I mean squadrons, I mean ships, including submarines. They need to understand and
1 acknowledge that people at the sharp end are not usually
2 the instigator of the incidents, but are more likely to
3 inherit bad situations that have been developing over a
4 long period, and Admiral Reason made that comment back
5 in 1997.

6 So let's talk about practices, procedures, tools
7 and metrics. This is how we're getting at it. This is
8 what the Naval Safety Center does annually. We go out
9 and conduct between 350 and 400 safety surveys at the
10 unit level. I'll repeat myself. The unit level is at
11 the squadron level, the ship level or the submarine.
12
13 Unfortunately, we also have to send our
14 investigators out in the field or out in a float
15 situation to help conduct the mishap investigations. We
16 do assist visits, engagements. I consider this an
17 engagement, obviously. We do cultural workshops where
18 we go in and we talk to the command, and we view their
19 culture, their command climate and view their current
20 culture.

21 Now, let me just pause here a second to talk a
22 little bit about the way that I view culture and
23 climate. Climate is you talk to a sailor and you ask
24 him does he like being there, and I'll give you a great
25 example. We had a ship, the USS Cowpens. The sailors
26 loved being there, and that was the climate. The
sailors loved being there. Why? Because the culture was so poor, they didn't have to do zone inspections. They didn't have to do what's called 3M, a preventative maintenance program.

The commanding officer of that ship decided that he wasn't going to enforce those preventative programs. They had no safety program onboard. So the climate was the sailors loved it. When they were done with their watches, they could go back to their berthing areas, play video games, et cetera.

But the climate was very, very poor, so what eventually happened was that -- and it was in the news a couple, three weeks ago. That commanding officer was eventually relieved for cause, all right? So that's how important we view to have the culture right. When you have the climate right, sailors want to be there, and the culture right, that's when you have your great ships.

We also put out some media things in four magazines, the schoolhouses we talked about, and the 200 personnel that are working day in and day out to prevent mishaps, save our resources and save lives.

Safety survey, it's not an inspection. We're kind of way ahead. We go in and we look at how a command is operating, and we look to see if safety
underpins everything they do. We adjust our focus for the problem areas. We'll do basically mentoring and tutoring while we're there, and we do a comprehensive debrief to the commanding officer, the executive officer, and the senior enlisted advisor, normally the command master chief or the chief of the boat. It helps the units achieve and maintain more fighting readiness via the on-spot training and advice.

Typical Year: 106 units, 30 discrepancies per survey. It seems like a lot. Most of those are pretty minor. A lot of them have to do with things like having personal electronic equipment safety checked, so when someone brings aboard that video game or perhaps something that they have, their computer that they want to be able to recharge the batteries, et cetera, we make sure that those things get safety checked so when they're plugging it into the system onboard the ship, that it's safe to operate.

We publish the results. We aggregate the top 10 survey results through all these similar units, and we put that out, so they have safety system working groups to address those.

Cultural Workshop: We rely heavily on the United States Navy Reservists for this. Candid meetings, small groups. It allows the commanding
officers to identify the human factors and concerns before they become problems. Once again, we look at the culture, and we look at the climate.

The Department of Defense human factors analysis and classification system. When we have to go out and review everything from what we call class A mishaps, which is any sort of mishap that is $2 million or more, all the way down to hazardous reports. Hazardous reports can -- would be called, let's say, a near miss or maybe something below the cost of about $50,000. We go out there and see, using human factors, what it was that was caused. We don't want to know what happened, we want to know why it happened, and that's the key right there.

Down at the Naval School of Aviation Safety, one of the things we have in every aviation unit is a safety officer. He goes through a rigorous school, so he can be at the squadron. His primary duty is to run all the safety programs there. This is something that is migrating to the surface and subsurface communities, and I'll talk about that a little bit later.

Strengthening the Culture. The aviation safety command course required for every prospective commanding officer, and I might add that I go up to Newport, Rhode Island to talk to all the prospective commanding
officers for the surface forces. I also go to Groton, Connecticut, to talk to all the prospective commanding officers for submarines, emphasizing safety and the safety programs that they will be required to administer.

Concept of Privilege. Once again, we want to have an open forum where people are willing and able to come forward. Nothing is worse than having a situation where a commanding officer is in a pilot house and is about ready to do something with his ship, and there's people on the pilot house who are assisting him in the operations of the ship, and they don't have the courage to ask that they don't understand or they feel uncomfortable because the command climate is such that they're afraid that the commanding officer won't listen to their specific concerns.

So we talk about that, and we talk about a culture that allows that most junior sailor who is at helm or lee helm to be able to say I don't understand or I don't know or I'm uncomfortable.

Strengthening the Culture. We have safety stand-downs quarterly. We have an anymouse program. It's an anymouse, anonymous. A person can say, you know, I saw the commander write a note, put it in the anymouse box, the safety officer, the aviation safety
officer and the command gets it, and it will say, I saw the executive officer manning up an aircraft today, his sleeves were rolled up, he didn't have his visor down, he didn't have his chin strap on his helmet snapped, and yet he expects all of us on the flightline to have our sleeves rolled down, our goggles on, and our helmets snapped, those type of things.

And so it gets at it to make sure that everyone has an opportunity when they see an unsafe condition, if they feel uncomfortable coming forward with it, they do have a venue to report it.

And these are some of the other things we have at the unit level, aviation safety council, enlisted safety council, ORM stands for operational risk management, we'll talk about that a little bit later. HAZREPS, as we talked about, those are presents. Those are near misses. We have a critique. What nearly happened? It could have been catastrophic, if we dodged a bullet, whatever it happens to be, and we'll talk about those things to prevent those from happening again.

Assessing Safety Culture. This is where we come in as a group, and we have the United States Marine Corps helping us out there for ground climate assessment as well. We talk about the lead-in about this, but we
do the data analysis to identify trends and leading indicators. What we want to try and do is get left of the kill chain. We don't -- if the mishap is the kill, we want to get to the left of that. We want to prevent the things that would lead us up to that point where we have a mishap.

This is how we assess the Naval aviation safety culture. This is how we assess the command climate. Well, the takeaways there -- excuse me, team debriefs. Every time you go flying, every time you go about executing a flight schedule, you plan. It seems very, very simple. You plan the event, you brief the event, you execute the event, and probably the most important thing is you debrief the event, and you talk as a flight crew, and you talk to maintenance control, and you say, this is how we planned it. This is what we planned to do. This is during the brief. This is what was executed, and when we got done with the execution, did we accomplish what we set out to do?

And that, I think, is one of the -- it seems so simple, but so often people don't do the debrief part, and I think that's where you get your lessons learned, that's where you can pass along some of the most critical information to make sure that things didn't go quite right or quite as expected that you would be able
to plan for that the next time you are in a similar situation.

Afloat Community. I talked about the tribes, the different cultures. This is what's going on with surface, submarine and diving communities. This is where we're going with it, where they're going to start putting a full-time safety officer with safety training and operational expertise. We're taking that from the aviation sort of blueprint, and we're putting that in the afloat community.

We're going to have a process existing for people to come forward and, without retribution, be able to say, you know, the bless me Father for I have sinned, this is what occurred, it didn't go right, we tried to cut a corner, and we ended up putting ourselves in extremis, and because of that, we're here today to talk about that.

Current initiatives are the way ahead, and this is what I am very, very excited about. We just initiated the Safety Campaign Plan. This was my commander's intent. You can see at U.S. Pacific Fleet and Fleet Forces Command as well. Our desired end straight, a proactive, predictive risk management culture exists fleetwide that operates a comprehensive safety management system. Our model has the four
components, which is safety policy, which I'm responsible for; safety risk management, I'm also the model manager for operational risk management; safety assurance; and then safety promotion.

We are going to formalize into all lines of operations, integrated at all chain of command levels, all the way down to the unit level, all the way down to the single sailor, all the way down to the single Marine.

Preventable Mishaps are Eliminated. That is our goal. There is a safety management system model. You can see safety promotion basically is the outer ring. Policy, safety assurance evaluates the continued effectiveness of implemented risk control strategies.

By the way, we didn't develop this, we stole this from the FAA, from the Federal Aviation Administration. This is one of those things, though, that the Secretary of Defense said all services will go to this model, and this is why we have jumped on this waiting to be told in 2015, we decided to implement it early.

Safety Risk Management. Determines the need for and the adequacy of new or revised risk controls based on the assessment of acceptable risk. You cannot eliminate all risk. Let's be frank, this is the
Department of Defense, but you can mitigate risk that
perhaps to a tolerable level so you can execute mission.

We have a saying in the Department of Defense
and the Department of Navy, operational necessity.
Well, quite frankly, even as a one-star admiral or a
two-star Admiral as the Carrier Strike Group Commander,
you don't have the authority to invoke Operational
Necessity. It has to be done much higher in the Chain
of Command. What operational necessity means
essentially is that the risk to crew outweighs risk to
mission.

In other words, risk -- I have to get the
mission complete, and so I'm willing to put the crew,
the ship, that air crew, that aircraft, into harm's way
in order for mission accomplishment. That really rarely
gets invoked.

We have implied operational necessity, and
that's where we get in trouble for folks to believe that
the mission has to be done at all costs, when, in fact,
if the aircraft isn't ready to be launched or the ship
doesn't have the weapon system working at full mission
capability, perhaps we have to pause and tell our Chain
of Command, it's time to come back and do it another
day, but right now, as you know, we've been winding down
from two long wars, and we tend to see in the Fleet that
there's this implied operational necessity being applied out in the Fleet.

That's operationalizing safety culture. This is where we're at today. The safety outboard has been released. The objectives and tasks are being worked on right now. We essentially gave the entire Fleet an operational order, and this is to implement the Safety Management System through the Safety Campaign Plan for us to do best practices, which include putting safety officers at all our operational units.

The campaign, plan way ahead, we'll start seeing the frag, that's the fragmentary orders, so these are spinoffs from the operational orders. We'll publish the Joint U.S. Fleet Forces, U.S. Pacific Fleet Safety Management System Instruction, and I've got folks there, we're building that instruction now, to develop and refine Mature Safety Analytics, and we do that via software programs.

Bottom Line. Our Navy safety culture is strong, but continues to evolve and improve, campaign plans, surveys, workshops. Getting back to what Mr. Sullivan said, effective leadership in a healthy command organizational climate set the stage for a strong safety culture.

I can't emphasize this, this is the foot
Senior Leadership is critical. Establishing the culture cannot be the safety officer's job. It's the Commanding Officer's job. It's the Executive Officer's job. It's the Senior Enlisted Advisor's job. It's the Admiral's job. You can see our Chief of Naval Operations said as recently as a couple of years ago, Safety Programs do not replace leadership, they are the tools for the leaders. We need the foundation of proper practices to ensure the safety of our military and the Department of Navy civilian personnel.

So, I know I kind of blew through that kind of quick, but I wanted to give time for questions and answers, and so with that, I'll open the floor.

DR. WINOKUR: Thank you, Admiral Norton, for your very excellent and insightful presentation, and the Board would like to follow up that information with some questions. We have a series of questions for you, but I want to be flexible on this panel. I know that we have Admiral Eccles with us, so if there is some additional insight or information you would like to provide during the questioning, we will have plenty of questions for you later, but if during Admiral Norton's questions you want to chime in, please just seek the recognition of the Chair, I'll be happy to do that.

And I think with that, the questions will begin
Safety Culture Public Meeting & Hearing
Defense Nuclear Facilities Safety Board  8/27/2014

1  with Vice Chairman Roberson.
2    MS. ROBERSON:  Good morning, and thank you for
3  your comments.
4    REAR ADMIRAL NORTON:  Yes, ma'am.
5    MS. ROBERSON:  I enjoyed it greatly.  So, just a
6  few questions, recognize we are looking for what we can
7  gain from your experience and your activities to help us
8  in our interactions with the Department of Energy in
9  this area.
10    So, questions that may seem a foregone
11  conclusion, I am going to ask anyway, just because I'd
12  like for you to elaborate a bit.
13    So, the Navy Safety Center performs, I'm going
14  to call them white hat surveys, because I like that
15  term, I think it's very good, to provide the different
16  platforms with non-mandatory safety evaluations.
17    And how do they use that information to inform
18  and improve their own culture?
19    REAR ADMIRAL NORTON:  What they will see and
20  what my team will do in the field is they will look at a
21  program, and let's say if something is -- something you
22  may not consider, but we have a motorcycles riders
23  safety program, and they will see that, let's say a
24  unit -- let's call it a squadron, had a couple of
25  motorcycle mishaps, not fatalities necessarily, but
mishaps. So we'll say, you know, we've seen other
squadrons or other ships that have a mentorship program,
and they have experienced riders here at the command
that'll take some of these beginner riders, and they
will do weekend rides together or things like that, so
we'll share with them what we have seen as best
practices.

When it comes to motorcycle ridership, for
instance, we have a basic ridership safety course and a
more advanced course that we provide at no charge, and
all the services do this, by the way, to our young men
and women who want to ride motorcycles.

That's great, but we found out from talking with
the insurance companies of the United States that really
the only thing that makes a motorcycle rider safe is
experience. So, that's why we grab the mentorship of
other riders, perhaps in the command or a sister
squadron, or a sister ship, and have them develop a
rider club, let's say, where they can go out on a
Saturday, not during rush hour traffic, and do a ride
and show them some of the safe best practices. And we
apply that also at the deck level or up at the tarmac or
launch and recovery of an aircraft or whatever it
happens to be.

MS. ROBERSON: And I assume, I was especially
interested in your comments about how determinations were made about the command climate, and the fact that you do have different subcultures on the different platforms, and I'm sure the aviation is viewed as an entirely different animal from the divers or submarine.

REAR ADMIRAL NORTON: Yeah, and what we're trying to do, of course, is kind of homogenize that, but when we go in to do a cultural workshop or assess a command climate, we'll actually put together small groups based on demographic, and it's usually based on rank, you know, because you've got a Navy Commander or perhaps a Captain in a major command who may believe that his culture is one way, but when you start talking to the young Sailors or Marines, kind of the ones who are doing the heavy lifting, and you ask them what they believe the culture is, you will find them perhaps having a different perspective than what the commanding officer might have.

And then we're able to -- and it's not attribution, and it's usually anonymous inputs, and so the people feel good about being, I think, truthful, and they'll say, you know, we're working 12-hour shifts, and it's tough, seven days a week when you're under way, and we'll hear things like that. So the Commanding Officer needs to sort of be sensitive to that.
Sometimes if you're off the coast of Pakistan or something like that, it may require that type of hard work or something like that, but the commanding officer needs to be aware of that, needs to be aware of the fatigue factor, and be able then maybe to talk to their Admiral in their Strike Group or whoever it happens to be and say, hey, you know, I'd like to have a day just for captain's day where I can have everyone take a knee over here and have a day off, and we can do that while we're under way usually off in the Middle East or in the South China Sea or something like that.

MS. ROBERSON: You know, the training obviously is always an important element of reinforcing and improving changing and processes and procedures, and I know you've touched on this in your presentation, but I did want you to just comment a little bit more about the sufficiency of training and changes to processes and procedures as it compares to leadership.

REAR ADMIRAL NORTON: Well, that's kind of what's nice about being the model manager for a couple of the training programs when it comes to safety is it evolves over time, and as whether it's software programs or other tools that are out there, for instance for myself in aviation, the safety of flight at night became what I would say incredibly better with the introduction
of night vision goggles, and flying at night no longer
was primarily just on instruments. And, so, we see
technology being added to all the training and software
programs that make, hopefully, jobs easier and whether
it's for navigation or whether it's monitoring systems
in a propulsion plant where sailors would have to
normally go with a clipboard and a pencil and a sheet of
paper and read gauges, now we have software programs
that do it.

So, the training itself has evolved over time,
with the emphasis for the sailors and the Marines that
whatever training we give you to apply to the weapon
system that you work with, that you understand there's a
certain integrity involved, and in that integrity
includes watch standing principles, not the least of
which is verbatim compliance with the procedures that
have been developed to operate that weapons system.

MS. ROBERSON: Okay. Would you like to take a
break?

DR. WINOKUR: Let me follow up with a couple of
questions. I saw that you put a definition from James
Reason, you said Admiral Reason actually, up on the
chart of safety culture. Does the Navy have its own
definition of safety culture, a formal definition of
safety culture? Does the Navy feel there's a need to
have a formal definition of safety culture?

REAR ADMIRAL NORTON: No. It's sort of like we look at industry, you know. I've read a lot about -- since I had the chance to be at the Safety Center, we looked at, for instance, what was going on in Alcoa, what has gone on down in Houston, places like Phillips and BP, and we have looked at their best practices and applied those as well.

But I'll tell you, Doctor, it all comes down to leadership. It's the willingness of leadership to invest in that safety program or that safety -- what I want to say is safety culture because I don't think safety is a program, I think it's a culture. It underpins everything we do. And that's why for a definition, is it's difficult sometimes to say, well, this is our own definition.

Now, it's one that's broadly, I think, hugged or wrapped around by many different industries or many different services as well. When I read the safety culture definition by the United States Air Force and the United States Army, it's very, very similar to ours, you know, saving lives and preserving resources.

DR. WINOKUR: I think there's a lot of reasons why we should talk to you today, and I'm sure that there are ways that the Board can improve and understand
oversight of the Department of Energy, and the
Department of Energy can improve, and hopefully we'll
get to that, but I was really interested when you talked
about operational necessity and what that concept meant
because the Board, the Defense Nuclear Facilities Safety
Board, is an oversight organization because the people
in Congress didn't want the Board to have the power to
tell the Secretary of Energy, who has this awesome
responsibility for assuring the nation's nuclear
deterrent, when he or she could and couldn't do
something. But it is a very, very burdensome, very,
very important power that we have. And we constantly
look to the Department of Energy to see when and if
they're ever going to implement that idea and say that,
yes, safety is important, but we have a mission here
that needs to be performed irregardless, and to be
frank, in my years on the Board, we haven't seen that
yet, and in today's climate that hasn't happened.

But just an example of some of the similarities
between the concepts that you deal with and the concepts
that we see.

I wanted to follow up on another question. You
talked about the fact that the way people see things,
whether they're an Admiral, maybe an officer seeing a
leader, and whether you're on the flight deck can be a
little bit different, and we often see surveys where we see a marked difference in terms of how people view things at different levels of the organization. First of all, what do you think attributes to those perceptions?

REAR ADMIRAL NORTON: Well, you know I think as leaders, and maybe I'm putting this in military speak, so if I need to explain myself, you know we as leaders kind of work at the strategic level, and so you know we kind of have -- the term we use in the Navy is kind of the wave, the top of the waves kind of, the wave top view of how things are going. Whereas sort of your rank-and-file sailor or Marine who's in charge of maybe some mundane job sees things at the tactical level, you know, kind of the day-to-day operations that contribute to mission effectiveness.

And, so, you know at the strategic level, we're seeing that, well, there hasn't been any mishaps, or major mishaps, hardly anyone is not executing to the point where the mission accomplishment is being compromised, so everything must be going along pretty well.

Well, when you go back down to the Sailor or the Marine at what we call the deck plate level, we will find that maybe they're tired. They're perhaps using
minimize shortcuts in order to meet the demand signal, and then
you find that they have an extremely different view than
what the leadership has.

        In order for the leadership to understand that,
they have to get down to maintenance control, or they
have to get down there in the hangars and have the
opportunity to talk to the individuals who are actually
the ones who are tired or feel that the demand signal is
so strong that they have to compromise or cut corners in
order to meet the demand. Those type of things.

        DR. WINOKUR: Yeah, when I look at the
definition of safety culture that the nuclear industry
uses or DOE uses, we talk about the role of the
leadership, which you've already emphasized how
important it is, but in the end, it's the attitudes and
the values of the workers, so in your case it could be
the attitudes and the values of the Sailors.

        Do you see their views as the actual final
measure of whether or not you've established the culture
of safety you're looking for? Are they the final -- and
based upon their behaviors and attitudes, is that the
final measure of whether you're being successful in what
you're trying to do?

        REAR ADMIRAL NORTON: Well, that's a part of it,
but I think it has to be systemic, from leadership,
front office, all the way down to the deck level where everyone feels they're sort of part of mission accomplishment, but they're doing it in accordance with published operational instructions, maintenance instructions, that they have the tools, they have the equipment, they have the manning, and they have the funding in order for them to get it done.

You know, part of what we look at is the training, manning and equipping of the units, and what we find out is if they're not manned to the required level or they don't have the required equipment, that's where we see people trying to meet the demand signal because it's still there, but they can't do it effectively, and so they will tend to try to cut corners.

So, rather than throttling back on the demand signal, and that's where it takes the courage of the commanding officer of the unit to be able to go up his chain of command and say, we can't do everything you're asking for right now because we don't have the training, manning and equipment that is required right now to do all these things.

DR. WINOKUR: And maybe one final question: How do you work on those perceptions at the different levels? I mean, how do you actually in the end get down...
to where you need to be in terms of what you're looking for in the culture?

REAR ADMIRAL NORTON: Well, I'll go back, not to my current job, but back to when I was the Commander in one of my squadrons, and I was at the commander pay grade, but I was the Executive Officer. In the Navy what we do is you go in as the Executive Officer, and you're there for about a year and a half, and then you fleet -- what we call fleet up to be the Commanding Officer.

I had a commanding officer at the time, so I was second in command of the squadron, where we had a sailor, a young sailor, that I was getting ready to go fly, and I was already strapped into the aircraft, the co-pilot was in, the crew were in the back. We were starting up the engines, and this -- they call him plane captain, you know, fresh out of boot camp. He gave me the cut sign on the rotor system, and I shut her down, and he said, Sir, I see an oil leak, and he goes, And my recommendation is that you not go fly, that we down this aircraft.

And sure enough, I unstrapped, and I climbed up on the aircraft and saw that a quick disconnect fitting had backed off, and we had a little bit of an oil spill.
quarters we call them brought that sailor up, and he
didn't know it, brought the sailor up out of the ranks
and presented him with a Navy Achievement Medal for
essentially having the courage to basically down an
aircraft that the executive officer was going to go fly.

That's how you establish a safety culture, you
know, a carrot and stick. I've seen other commands
where people have taken shortcuts, whether it was for
malicious or laziness or shoddy work or whatever it is,
that they've gone to -- under the UCMJ, they have gone
to mast, captain's mast, non-judicial punishment, and
been held accountable for not complying with established
procedures as well.

So, I have seen that, and that's kind of the
stick approach as well. So, when you have kind of the
reward when obviously it is deserved, but also to hold
people accountable when it is deserved as well, I
believe that's how you kind of get from the whole
spectrum of people understanding that safety is critical
and important in this command.

DR. WINOKUR: Thank you. I mean, the Department
of Energy has its work force, also, has stop work
authority because they, like you, deal with very
complex, high hazard nuclear operations, and the
department, I think, acknowledges the fact that workers
in the field, more than anybody, knows what's going on, and they have to have those kinds of authorities, so I think it's healthy they do that.

REAR ADMIRAL NORTON: Yeah, and I think it has to be without fear of reprisal, and it might be a lack of knowledge. Somebody says, you know, I see something, and I thought -- just because I'm uncomfortable or I believe it's unsafe, until someone explains to them saying, no, you know, this is actually normal, normal operations, here it is in chapter and verse, it says it's okay for this to have that rating or for it to operate that way, yeah.

DR. WINOKUR: Thank you.

Mr. Sullivan?

MR. SULLIVAN: Thank you, and good morning, Admiral, and thank you for being here, and I know that you have a very important job and a lot to do, and I really thank you for taking time out of your busy day to come here and help us.

REAR ADMIRAL NORTON: Yes, sir.

MR. SULLIVAN: I want to ask you about the relationship between technical competence and leadership, especially as it applies to safety and being able to make the right decisions in safety. I was particularly struck by your background because you're a
helicopter pilot, and yet you were put in command of an aircraft carrier, it's a ship, had a nuclear power plant. Well, it does launch helos. Most of the aircraft were jets, so you didn't grow up flying jets, you didn't grow up operating nuclear power plants, you didn't grow up -- when I say grow up, in your time as a junior officer in the Navy, driving ships.

REAR ADMIRAL NORTON: Right.

MR. SULLIVAN: Yet you got in charge of all of that. So, I would like you to talk about, well, what preparations did the Navy give you for that role, did you feel technically competent in that job? I'm sure you did, but I would like you to talk about how you acquire -- how you felt you acquired the right level of knowledge to make the right decisions and how that impacted in your ability to maintain safe operations.

REAR ADMIRAL NORTON: Thanks. I'll get a chance to maybe wax poetic here a little bit about my background. I started out in aviation, went through the helo pipeline, and there's a rigorous flight training, including a flight manual that we call NATOPS for standardization and training, operational training standardization is what NATOPS stands for.

In order to make aircraft commander, you essentially had to have the technical expertise that you
could draw and speak competently and critically and technically on all of the systems onboard the aircraft. So, when it came to emergency procedures when you're in flight -- and keep in mind that in a helicopter, unlike most of our fixed-wing aircraft, if you launch in a helicopter, you're going to land. There is no such thing as a ejection seat. There is no parachutes that you are going to be able to count on should things go really, really bad.

So, in order to make aircraft commander, you study all those systems, and then you have a board, and it's very critical, and you get to that point, and then you're essentially given the keys to fly that aircraft in all the mission areas. And usually you achieve that during your first tour, operational tour out in the fleet.

So, I did that, and as time went on, with more experience and more mission areas and competency, I was able to become the model manager for the type model series of the aircraft I was flying at the time, which was the Seahawk.

After my command tour, I got selected into the Nuclear Propulsion Program because they looked at my undergraduate background as well as the success I had in my command tour and felt that I could get through the
training, the technical part of the nuclear propulsion curriculum.

So, I did that. I went down to Charleston, South Carolina, where we had what I call our ground school, and I went through the basics of the nuclear propulsion, went to prototype then, after I got done with that part of the training, up to Ballston Spa in upstate New York, and worked in a propulsion plant up there, the SAG for the folks here that know that program or submarine system, and was able to really do the hands-on part of the nuclear propulsion application, the lab work, let's say, everything from chemistry to scrambling the reactor to doing in-plant emergency response drills, all the things that you would do.

From there, I went down to the Navy Yard where Naval Reactors is located, and then started working specifically on the plant for the Nimitz-class carrier, and keep in mind on the Nimitz-class carrier, there is actually two propulsion plants, the A4W. Went through the curriculum there, went through a pretty intense oral board and written exam, and then eventually was allowed and got certified to operate as a nuclear operator for that particular plant, and that's when I showed up as the XO of the USS Carl Vinson.

The requirement to stay in the propulsion plant,
whether you're the executive officer or whether you're commanding officer, is driven by Naval Reactors, and so you're down there and you're participating in the training, you participate in the drills, you participate in maintenance, mostly monitoring maintenance that is going on. You watch the operations of the plant, and you do this on a recurring basis throughout your tour, and you continue to do this training, whether you're actually under way or whether you're in a maintenance phase, and that kind of keeps you sort of in the game.

There is always an operational reactor safeguard exam coming around the corner, you have to be prepared to do that, you do multiple prep work to get your propulsion plant team ready for the reactor safeguards exams by doing mobile training team at sea periods, and so it goes.

I remember as a commanding officer, I was writing a letter every month to the four-star admiral, in that case -- right now it's Admiral Richardson, but back in those days it was Admiral Donald, and I would be telling him as a commanding officer not only all the training that my propulsion plant sailors were doing, but also what I did to participate in there and the training that I gave and the lectures that I'd also give, et cetera, and the run time you would do and the
boards that I sat on to get people qualified, et cetera.

So, the technical expertise is part of the
environment. It starts with that integrity and verbatim
compliance and forceful watch backup, all those pillars
of proper watch standing.

For Mr. Sullivan, who is obviously aware of the
propulsion plant exams, the USS Ronald Reagan, while I
was there, and I attribute this mostly to my reactor
officer, we got an excellent on our ORSE, so the first
excellent in over seven years for an aircraft carrier,
so that's kind of where the Ronald Reagan was sitting at
that time.

MR. SULLIVAN: Well, thank you for that,
Admiral. So, just as a follow-up, just imagine a
scenario, since you didn't have to live through one,
imagine a scenario where somebody was in the leadership
position who didn't have the technical background. Do
you think that would have an impact on the ability to
make the right decisions for safety or provide the right
safety culture?

REAR ADMIRAL NORTON: I've only been in
leadership positions where I've had the technical
expertise to apply to making decisions when it came to
propulsion plants or aircraft maintenance, et cetera. I
would feel, me personally, very uncomfortable if I
MR. SULLIVAN: Okay. Thank you. I think that's a very fair answer.

Mr. Chairman?

DR. WINOKUR: Thank you, Mr. Sullivan. Let me talk to you a little bit about metrics and assessment. You have a new U.S. Navy Fleet Safety Campaign Plan that was signed out on the 25th of June, and in it it requires a safety assessment mechanism that is metrics based and measurable, and I think you've already pointed out that you can't manage what you can't measure, right?

REAR ADMIRAL NORTON: Right.

DR. WINOKUR: So, tell me a little bit about, from your perspective, about metrics. I mean, you're the head of this center, are there metrics on your desk every morning when you come in to work, things that you're looking at to give you a sense of how things are going?

REAR ADMIRAL NORTON: It's not a daily report, but we have a weekly report where we're seeing -- we compare to where we are today, and we do -- we call it, for lack of a better term, we do sort of seasonal
campaigns, like right now we're in what we call the
critical days of summer, you know, because this is a
time where most of our sailors, Marines, do a lot of
off-duty, high-risk recreational activities, and so we
want to make sure that they apply risk management to
that.

And, so, we will see what they're doing out
there in the Fleet, and whether it's waterborne or
whether it's climbing cliffs or bungee jumping or
whatever it happens to be, but we compare those mishaps
or people getting hurt, and we get the reports in that
compare to other years, and I think we're having an
effect because we see compared to 10, 12 years ago, our
rates, our mishap rates are going down. So, it shows me
that people are applying sort of risk management to not
only what they do operationally when they have their
uniforms on, but perhaps when they're going out the main
gate and they're looking for some recreation, whether it
be riding dirt bikes or water skiing or whatever it
happens to be. So, I'm very, very pleased with that.

We have other things, tools for our sailors and
Marines to use. One is a lot of people do a lot of
driving in the summer, obviously for time off, vacation
time. We have a program that assesses the risk of them
being on the road compared to like how much rest they
had the night before, the driving conditions, the length
of the drive, all those things, and the name of the
program is called TRiPS, of all things.

And at the end of it, you assess your trip, and
it says, yeah, it's low risk. But usually in the
commands at the unit level, a sailor will have to take
that up their chain of command, usually to their chief
petty officer or one of their sergeants, and they will
have to say, see, this is the trip I'm taking this long
weekend, Labor Day weekend coming up, I'm driving 500
miles, but rather than going straight through, I'm only
driving 250 miles and stopping at the Motel 6 and
getting some more rest and continuing on the next
morning, or something like that, to get approved at that
level.

So, you know, the last thing we need is a sailor
driving home from a three-day weekend trying to make
roll call on Monday or Tuesday morning and driving
through the night and fatigued, and he ends up having a
mishap.

DR. WINOKUR: But you've got these surveys and
assessments, which I want to talk a little bit more
about, and you have a new campaign plan to get these
metrics-based metrics and having them measurable. Do
you think you will be putting more effort into that in
the future, or do you think you have what you need right
now?

REAR ADMIRAL NORTON: We have an adequate system
right now, what's called a Web-enabled Safety System,
where the users put in the data and then our analysis
can extract that data to make comments based on mishap
rates or perhaps in particular like a geographical area.

For instance, there was a spike this year in the
San Diego area for both sailors and Marines for
motorcycle mishaps, for whatever reason. And, well, it
turned out that a lot more people are buying motorcycles
because the cost of a gallon of gas in Southern
California is over $4 a gallon, and they were using it
to commute, and especially in the fall through the
winter and the spring, it's dark. And we were able then
to talk to the units out there and say, hey, do you
understand when you expect sailors to be in at 6:30 in
the morning so they can muster at 7:00, they're driving
their motorcycles in the dark, and that's a higher risk
environment.

If you, perhaps, shifted your hours and they
didn't have to muster until 8:00, well then they could
ride to work in daylight. And, so, you can just do
things like that for them. So that's one of the ways we
approached it.
DR. WINOKUR: So, you do assessments. Do you have any regimen about when you do follow-up assessments, or are follow-up assessments basically driven by what you find the first time you look?

REAR ADMIRAL NORTON: We do -- the surveys, for instance, are on a recurring basis. Units, float units, are once every two years, and the aviation units are once every three years, but what we're going to get to is we have the Operational Fleet Response Plan, which is a 36-month cycle, and one of the things we want to do for our assessment, you can walk down the peer, walk onboard a ship when it's doubled up, which means the lines are crossed, and the ship's not really operationally tasked. And you can look at their programs, but if you really want to get an idea of the safety culture, it's better to see a ship when it's under way and it's doing operations.

And then you can see whether they apply best tactics, procedures, operational risk management when there are sort of this fog and friction of war kind of thing going on out there, watch them during a sea and anchor detail, watch them when the ship is doing an under way replenishment.

So, we're going to start doing our surveys at a specific time in this Operational Fleet Response Plan,
so we get them about the intermediate phase of work-up, as the crew comes together, as the ships come together as a strike group, and so we can assess better the safety culture on those ships.

DR. WINOKUR: How important do you think independent assessments are? I'm sure the folks who run the ships do their own internal assessments to get ready for some external Navy group to come in and look at them, but is that enough, or do you really need an independent assessment, an independent set of eyes to come in and look at their version?

REAR ADMIRAL NORTON: I think you do. I think you do, Doctor, and I'll tell you why. We have the ability to see trends across the Fleet, but also we see what I would call best practices or worst practices, and when we go from, let's say from one destroyer to the next destroyer to the next destroyer, we can talk about similar programs, and we can pass on to a commanding officer or an entire command, you know, we think this works, we've seen it work over here, a sister ship, I think it could be applied here, it would be better for your safety culture if perhaps you applied this as well.

And that's, I think, part of the reason we can be honest brokers. And like I say, we're kind of white hats, we can go in and tell a Commanding Officer that he...
may feel he has a strong safety culture, and we can go
in and say, well, compared to your sister ships, you're
kind of right in the middle. That type of thing.

DR. WINOKUR: Makes sense to me. You talked
about the fact that even though you're very busy, you
actually go down and you walk around and you see things
for yourself.

REAR ADMIRAL NORTON: Oh, yeah, right.

DR. WINOKUR: I've heard people express the
opinion to me that a leader should really, just by that,
understand what's going on, that surveys and assessments
are nice, but pretty much you should be able to figure
it out for yourself.

REAR ADMIRAL NORTON: I think sometimes the
surveys and the assessments sort of reaffirm what you
think you know, and I think those leaders that get down
and talk to their team members, whether it's on the deck
plates or wherever it happens to be on their ship or in
their squadron, it can be reaffirming. So, you can kind
of get the, well, I'm going to keep doing what I'm doing
kind of thing, and that's also a real positive.

DR. WINOKUR: All right. Thank you very much,
Admiral.

MS. ROBERSON: Thank you, Mr. Chairman.
Just a couple of finishing questions. When you do your investigations and your surveys, you're looking at contract organizations that are a part of the whole program, right?

REAR ADIMRAL NORTON: Um-hmm.

MS. ROBERSON: How do you, in looking at the data from the surveys and investigations, do you see or have you identified trends that provide more helping influence in the behavior of, say, the contractors? Have their culture of safety in aligning that?

REAR ADIMRAL NORTON: Yeah. It's kind of a -- we don't have a whole lot of what I would call core responsibility to what contractors do. When I put my ship, the USS Ronald Reagan, into maintenance availability and we had contractors onboard, I had a ship supervisor sort of that worked with me as the captain of the ship that kind of handled the contractors. However, when I walked around and I saw contractors that were doing things and they weren't, for instance, wearing their personal protection equipment or they would have a harness on but they wouldn't, like, have a lanyard and they went out on scaffolding and they wouldn't basically snap in, those type of things.

I've been accused of having an Irish temper a little bit, and it's usually when things are unsafe that
sort of it kind of riles me a little bit. And it was to
the point where I had the ship supervisor ask a
subcontractor not to come back because they failed to
comply with the safety requirements during that
maintenance availability.

Well, because it got to that point and the
subcontractor obviously asked for forgiveness, et
cetera, and ended up having a couple of their employees
no longer come back to the ship, but they were able to
continue on with their contract. But I set the safety
center. We don't really have direct oversight to that.
I believe NAVSEA and NAVAIR have more of that when it
comes to ship construction, et cetera.

MS. ROBERSON: Okay.
REAR ADMIRAL NORTON: But we don't have as much.
MS. ROBERSON: Okay. I'll ask that question
again later. And I had one final question for you: You
emphasized a lot in your briefing that, my words, not
yours, safety really is an enabler for the mission, and
I believe that. I think the entire Board and the
Department of Energy believes that, but we also know
there's no 100 percent safety assurance, and there are
mission essentials.

So, can you just speak for a moment about the
balance in safety and mission and its relationship to
REAR ADMIRAL NORTON: Sure. There's a sign over my door down in my office down in Norfolk that says "Our aim is zero."

I don't believe, personally, that we should have an approach towards safety that says, we're going to cut our mishap rate in half, because if you're saying that you're going to cut a rate in half, you're essentially sending a signal that some mishaps are okay to have.

There are some things that you can't get around. I had a situation early in my flight career in a helicopter that I talked about, that if you are going to launch, you are going to land. I had to do a water landing in a helicopter because I lost my tail rotor drive shaft, and it was metal fatigued at the quick disconnect.

So, you're going to have mishaps due to mechanical failure, and there is -- that's difficult to prevent, though we have put programs in place now to monitor, for instance, vibrations on aircraft, etcetera, and look at metal fatigue and say, hey, after so many hours we're going to replace certain components, dynamic components, because at this point it appears that the risk of failure increases.

So, you can put programs like that in place, and...
hopefully not have those type of mishaps.

Mission accomplishment. Well, that is what we are paid to do when it comes to supporting this Administration or any administration in our national security objectives. As I said earlier though, operational necessity is something that, quite frankly, those decisions are made here in this city and not necessarily out there. Where we have to be careful is that we don't interpret orders that we receive from the Pentagon or from the Oval Office that are anything other than -- or interpreted anything other than operational necessity.

So, I guess what I'm saying is, don't imply operational necessity down the chain of command when it's really not there.

MS. ROBERSON: Thank you, very much.

REAR ADMIRAL NORTON: Yes.

DR. WINOKUR: Thank you. We are holding these hearings obviously to learn things from you about what might be applicable to the Department of Energy, and we know that the Navy and the Department of Energy have different cultures, but the Navy is often called upon when the nation has a tragedy or there's any kind of a problem to provide its insights on safety.

I think many people recognize the Navy as having
a strong safety record, a strong culture of safety, so I want to try to probe a little bit and understand what about your culture of safety could be applicable to the Department of Energy, could be something they could benefit from, and I want to start out the discussion by pointing out that in 2000 I think there was a Navy/NASA interaction.

What had happened is NASA had just lost the Space Shuttle Challenger, and this interaction began because the Administrator of NASA wrote a letter to the head of the Department of the Navy, Mr. England, and said, can you help us, can you give us some insight. Do you have any information on that interaction, how well it worked or didn't work?

REAR ADMIRAL NORTON: Well, yeah, it actually works pretty well, and I've been down to the Johnson Space Center. I'm part of their Safety Investigation Board for NASA. And they used the Air Force as well, but they liked our approach to not only safety, but the way we use the HAZREP, hazardous reporting system.

We don't wait for mishaps to occur in order for us to make changes. We try to be anticipatory, and try and get at sort of what I would call the low-hanging fruit, the small things that could -- if they are left to sort of develop over time, could, in fact, lead to a
catastrophic mishap.

They also like the way we do our investigations are separate from sort of the legal aspects. For general counsel there, as you're probably aware, we do JAG investigations for mishaps, but we also do a safety investigation, and they're completely divorced of each other. And, so, we're talking to people that know that they have, quite frankly, a frankness that they can apply to -- we want to get to the what, and we want to get to the why, and we keep asking, why, why, why.

And it may work its way up the chain of command, and a lot of times it gets to that training, manning and equipping part, and we didn't get it quite right. Well, the responsibility for the training, manning, and equipping part generally eventually falls to people who are wearing gold shoulder boards like me, and so it works its way up the chain of command.

So, we want to have that openness and frankness, and people feel that there won't be repercussions, whether they be administrative or from a legal standpoint, for them to be able to say, this is truly what happened, I cut a corner or I didn't do as what the procedural said to do, I skipped a step, or whatever it happened to be. And, so, they can have that, and that's why I think NASA was pretty comfortable with that. Of
course, a lot of their astronauts come from the Navy.

DR. WINOKUR: Right, and I was going to get to it later, but I'll just briefly get to it now. I mean, there are similarities between the Navy and the Department of Energy, in that you're both very diverse. I mean, you have a very diverse structure, you've talked about it here today.

The Department of Energy has production facilities and research facilities and it has cultures that were born during the Cold War, and it's really -- and, so, are there lessons hopefully in terms of how you manage and create a climate of safety in such a diverse organization and what the Department of Energy might do.

And you've already pointed out in a sense that the gentlemen who fly the planes, they likely risk a little bit more, right?

REAR ADMIRAL NORTON: Right.

DR. WINOKUR: And that culturally dealing with them must be a little bit different than dealing with other aspects of your command.

REAR ADMIRAL NORTON: Well, as you said, Doctor, I kind of grew up and joined the Navy and got commissioned in 1981 at, arguably, the height of the Cold War, and everything was very much very secretive when it came to our nuclear weapons. I was part of that
1 program early in my career for anti-submarine warfare
2 weapon system that was out there, all the way through to
3 nuclear propulsion.
4         I think what we see today, and I think it's
5 healthy is, when we have near misses, we do critiques,
6 and we have the ability to talk to everyone from the
7 most senior person on the watch team to the most junior,
8 for them to be able to sit down and say, this is what
9 occurred, and this is how it occurred, and this is what
10 we need to fix it.
11         And, you know -- some of it, it's not
12 comfortable. A person may lose their -- temporarily
13 have to go through remedial training or to get their
14 qual back so they can stand watch, et cetera, which
15 actually puts the burden on other people to fill in the
16 watch. You know, we don't have this deep bench,
17 especially on submarines, where people who are disqualified
18 because of a mistake they made, and rightly so, they
19 need to go maybe back under instruction to get that qual
20 back, but somebody else then has to fill that
21 watch-standing requirement, et cetera.
22         DR. WINOKUR: Thank you very much.
23         REAR ADMIRAL NORTON: Yes.
24         MR. SULLIVAN: Thank you. Admiral, I would like
25 you to expound on some things that you've mentioned
earlier. One of them was accountability, I think you
talked about rewards and a stick, but you also talked
about the fear of reporting, so people might not report
things that they knew were wrong or safety situations.

And my experience is that those can be in
conflict. If you try to encourage everybody to report,
then you may get reports of people who did something
wrong who might otherwise be punished. Talk to me about
it, how does a leader balance that?

REAR ADMIRAL NORTON: It's a tough balance. You
know, you want -- hopefully the integrity of your
sailors and your Marines are such that they're
self-reporting, and they can go back, rather than having
other sailors sort of reporting on them, though that
happens from time to time as well.

I truly believe if you give them the time and
the tools and the training for them to accomplish
whatever you expect them to do, they will do it right
because they understand -- they have to also understand,
I believe, what your mission is, and I think that's
where it's important for the commanding officer at
whatever unit level is to make sure that they understand
exactly what it is they're doing, why you're being
extended on deployment, why it's important to our
nation, why it's important to the Navy for us to
continue to strive day in and day out to support and fill in the blank of the mission that you're doing, you know.

I think when people understand that they're contributing to a greater cause, I think they truly will embrace the opportunity to do things right, and it's fun being part of that type of an organization. You just enjoy being there.

I remember my Air Wing Commander came down to my squadron late in my command tour, and he walked in the squadron, and he just looked at me, because he was going to go flying with us that day, and he goes, you know, KJ, he goes, I walked through your hangar here and I talked to your sailors, and I can just tell that they want to be here, that they enjoy what they're doing. And that was a great compliment from my ISIC, my immediate superior in my chain of command, and I think that's when you understand that you probably got it right.

MR. SULLIVAN: So, I guess what I'm trying to ask, Admiral, though is, if, in a perfect world, say you have a great leader who is doing great things, but there are occasions where the leader has to take over in a situation where there's an existing climate with problems or an existing culture with problems, and then
people aren't doing the right things.

REAR ADMIRAL NORTON: Right.

MR. SULLIVAN: So you still have to face these decisions.

REAR ADMIRAL NORTON: You hold them accountable.

MR. SULLIVAN: Okay. And, so, I'll just make my statements and then I'll ask if you agree with me. So, if you said, well, we're just going to punish everybody proportionally, that leads to certain problems where people don't report. And on the other hand, if you don't punish anybody, then people won't fear any reprisals from doing the wrong thing, so a balance is required, and a balance isn't always easy.

Would you agree with all of that?

REAR ADMIRAL NORTON: I agree to the extent that I believe you have to hold people accountable. You have to make sure they understand your expectations, and then I believe you hold them accountable if it's -- I don't want to necessarily say malicious, but due to maybe malingering or just shoddy work or a bad attitude or whatever you're saying, if they're not meeting your expectations that you have been very, very clear on delivering to the entire crew, then you have to hold them individually accountable.

We have seen recently Admiral Richardson, for
instance, hold a bunch of instructors accountable for an issue down in Charleston where he had to -- because people were sharing questions on an exam back and forth, et cetera, and I know that was difficult probably for him to do, but that was the right thing to do because it was an issue of integrity and the integrity of the entire program.

So, as difficult as it is, sometimes you do have to hold some demographic, however large or small it is, accountable if it's kind of this group think or there was a certain tolerance going on and people didn't bring to their leadership in a timely fashion things that were other than right, yeah.

DR. WINOKUR: Thank you very much, Admiral.
REAR ADMIRAL NORTON: Yes.
DR. WINOKUR: Ms. Roberson?
MS. ROBERSON: I don't have any further questions at this time.

DR. WINOKUR: All right. I think we want to thank you, we have a couple more, but I think we have to move on here. I want to thank you for your presentation today. It was excellent. I think we had a great dialogue with you, and everybody learned a lot, and I would just encourage you to maybe take a question for the record or if you have a moment, we're just
interested in any additional insights you have about how
an oversight organization like the Board might do a
better job assisting the Department of Energy and
helping it to establish a robust culture of safety.

REAR ADMIRAL NORTON: Well, as you know, going
through the Navy Nuclear Program, I had a chance to sort
of kind of see behind the curtain on what the Department
of Energy does when it comes to the nuclear programs as
well. Admiral Richardson has a role there in the
Department of Energy, as you know, and I feel that the
protocols that we have in place, whether it applies to
the Navy Nuclear Program or to the Department of Energy
Nuclear Program, or one and the same, and from what I
can tell, they're the best in the world.

So, it's been a real honor for me, and I'm
somewhat humbled by the opportunity to be able to talk
to you folks here as the oversight for the Department of
Energy concerning how we view safety programs in the
United States Navy.

So, I want to thank you again for allowing me
the opportunity to speak frankly about some things, and
if there's any follow-up questions, et cetera, after
this Board basically reports out, I would be more than
happy to follow up with any other questions you might
have.
DR. WINOKUR: Thank you, Admiral Norton. I think we'll turn now to the presentation from Admiral Eccles.

REAR ADMIRAL ECCLES: Okay. Thanks very much. Thank you, and good morning. Am I live? I think so. You guys can hear in the back? I'll just try to put this thing about halfway down my throat.

Well, good morning. Thank you for having me here today. As the sign says, I'm retired from the Navy, and I just want to amplify for a second that point, that while I had the privilege of wearing the nation's cloth for an awfully long time and I had a wonderful time doing it, today I speak on my own behalf, and my views are mine and not representing the United States Navy, as Admiral Norton is, and I'll speak from my experiences certainly gained over many years of service, but my time today is as a private citizen, in a sense.

What I'm going to speak about today differs quite a bit from the perspectives that Admiral Norton and his team bring because rather than looking across safety as the complete, broad spectrum of everything that entails the slightest bit of injury or mishap at a low level, whether that's in dollar value or consequences to people, all the way to the largest
catastrophes, that's the scope, I think, of what Admiral Norton and his team deal with in the Navy, that is full spectrum.

In my case, I'm going to talk to you in particular about one program, as you've said in your introduction, sir, the Submarine Safety Program or SUBSAFE, and about that I'll speak a little about origins, a bit about the fundamental building blocks of the program, as it was developed about 50 years ago, and then what that might mean, in my opinion, about ways that other high reliability organizations might consider those facets of that particular program in securing submarine safety and apply it elsewhere.

I do not have any firsthand experience in the Department of Energy or in the nuclear facilities that you oversee, but I have an interest in all of that, so let me see if I can pull it together and offer something of some value.

So, just over 50 years ago, the Submarine Thresher was lost at sea, and it was lost with all of her crew and 17 civilians. The ship was on a sea trial, and the failure was not pinned down to a particular failed joint, but it was determined that the ship suffered a flooding casualty, and then the consequence of the systems that were affected by that flooding
caused the ship to lose its ability to stay afloat and propelled, and, importantly, design flaws, which not only led to the flooding perhaps, but also led to the failure of systems that could have been used in recoverability prevented the ship from coping with that flooding.

So, there was a twofold effort then undertaken to consider a system of putting in place to prevent future losses like this, something that would have these attributes, to assure hull integrity to preclude flooding in the first place, and, of course, if that was 100 percent successful, then there would be no purpose in the second, but knowing that all of these are systems of machines and men and women, there is no way to completely assure 100 percent likelihood of one or another thing.

So, operability and integrity of critical systems and components that are used to control and recover from flooding, bringing the ship safely to the surface, that was the second aspect of this.

In the underlined italics there with quotes around it is an important phrase used in the Submarine Safety Manual, the book that came out of the loss of the Thresher, and that is "maximum reasonable assurance."

Many people have observed that in and of itself,
that's a conflicted phrase, and I'd say yes, and
purposefully. That is, it was purposefully -- ah,
thanks, I didn't know I had a button for that one,
maximum assurance would be one thing, and few could
argue what maximum assurance is, but, of course, if we
really sought maximum assurance, ships wouldn't sail,
planes wouldn't fly, people wouldn't engage in the
application of lethal force for the purposes we use.

It's all a part of the mission to accept some
level of risk, but maximum assurance, tempered by what
is reasonable, while it's a phrase intention, it often
gives people the opportunity then to make the right
judgment in the face of challenges that have to be
weighed on both sides, to what Mr. Sullivan said,
finding the balance. So, we'll speak more about that in
a few minutes.

Basic elements of a culture of safety when
looked at from a SUBSAFE perspective are to recognize a
responsibility from top to bottom in chains of command,
not only in the military, but also in the civilian
population that helps to design, maintain, construct,
test and modernize our ships.

I would tell you that in the SUBSAFE program, in
my experience, from top to bottom, workers feel a duty
and obligation, a burden, and we'll speak a little bit
more in a few minutes about how that is instilled in people, in a sense the loss of Thresher was the inspiring event. It also becomes a touchstone. It's a real thing that happened. Real lives were lost. You can speak with the real survivors of the families who lost loved ones, and when you do that, as a worker new to the program or one who has been doing it for 20, 30, 40, even 50 years, then my experience is that that responsibility is heartfelt, and it is because each of these individuals has been trained and educated in what the consequences would be of failing in this regard, and there are personal touches that can be made to reinstate that sort of responsibility.

Accountability is a topic we've already covered a little bit this morning, but it is essential in a program where consequences are as important, as in this program, that when requirements aren't adhered to, that responsibility is also an accountable responsibility. That is, one where there are consequences to one's failure to act or for the wrong actions.

Integrity, a rigid adherence to a code of behavior, is a presumption, but it's a presumption with controls, along the lines of in any human endeavor, we seek to put in place the right people, the ones who uphold the highest sense of integrity and who will be
true to that responsibility and understand the accountability that goes with it. But also to put in place second checks, to put in place methods of verification and validation, to look at things at tactical and strategic levels so as to avoid the downside consequence of having an incremental approach of accepting small amounts of risk, one day add to a tipping point that perhaps puts us in a bad place.

So, integrity is foundational, but integrity is not taken on blind faith. Elements of that culture of safety. If you were to decompose the program and say, well, you know, how do you take the loss of Thresher and the facts around it and generalize to a condition where a program that will last for decades, and likely centuries, can have enough of a foundation of building blocks that it properly covers the whole landscape where risk is dealt with. And remember, I'm not talking about the risk that a ship might hit another ship or the risk that a ship might back into something while trying to moor. I'm not trying to discuss whether the submarine will carry out its mission effectively.

This is a fairly narrow perspective, but it is one about the loss of ship and the attendant loss of life. So, in that, it comes down to something like this: Do we understand how we design the ship so as to
not present undue risk or to have maximum reasonable assurance that we will not have that flooding, and in the event of flooding, that we will not compromise the system's recoverability?

To do that, we start out with a set of requirements, and the requirements are made as simple as possible, and in describing those requirements, an envelope of affected systems and components is described. The work discipline that evolves from being able to describe the scope of the responsibilities and then the requirements that go with each of those components and systems is brought under the topic of work discipline, and being able to explain to the work force, whether you're talking about the welder who's putting something together in new construction, or the same kind of a welder, perhaps his grandson, who 40 years later working on another ship of the class near its end of life, is still putting the same integrity into the same kind of welded joint, or if you're talking about the people who in design of a ship have to take into account factors of safety and so forth, all of the moving parts of that requirements in the system of systems has to be translatable, it has to be well documented, and it has to be something where a sense of discipline about adherence is recognized.
In material control, the bullet under it, correct material installed correctly, I think is fairly self-explanatory, but boy, there's a lot tied up in that. How do you make sure that what you're receiving in shipyard is what you ordered? Do you take it based on the vendor agreeing to have stipulated that, yes, he sent you the right wall thickness, or do we measure that wall thickness a second time upon receipt so that we make sure that we know what we've got?

Do we do that after we've done something to it mechanically so that if we bend, for example, a piece of pipe, but we're expecting a certain strength, did that strength change in the bend, and it did, but did it change in a way that we understand and that we are okay with.

So, material control is about receiving the right material, having specified it properly, then controlling it well so that we know exactly what's getting installed in the system and that it's being installed properly.

Documentation really is a bit of an underlying catch for all of this, but it not only comes in the sense of requirements and the design's integrity, but also an important phrase that permeates this whole system, "objective quality evidence." Objective in that
it can be measured, back to the point that it's hard to
manage something that can't be measured. Well, here
we're trying to measure things so that we can instill in
our system a level of quality assurance that is given by
evidentiary documentation. We don't just say, I want
everybody to stand up in the morning and pledge that
they'll weld well, that they'll wire things well, but in
the case of the most important components of this, if a
welded joint is critical to the safety of that ship,
that welded joint is going to have additional
assurances.

And you can go back today in a ship that was
designed and built 20 or 30 years ago and find the
signatures and records and hard copy of the individuals
who performed all of those critical component processes.
You can find how they attested to what they had done was
correct, and in the most critical of those, you can
follow them in a likewise scheme of objective evidence,
a trail of certification by individuals who did the
follow-on inspections, the nondestructive testing, the
imaging, whatever was used to validate that yes, what we
thought we were there to achieve and which we properly
trained and educated a worker to achieve was indeed
achieved because now we can perhaps in the case of an
x-ray look right through a weld and show that its
integrity was as fulsome as we expected.

So, that objective quality evidence is something that is not only in the early days in design and construction, but it'll be just as true on a ship with 25 years of life where that ship undergoing some modernization needs to have additional work done inside that scope or that envelope, the same process of objective quality evidence is used, whether we're maintaining, modernizing or doing new construction.

Compliance verification, I've kind of alluded to some of that. Inspecting on top of the work that's being done, you do the right work with the right material, you do it right the first time, you attest to it, you second check it where you need to, and then you conduct inspection and process surveillances, whether those are 100 percent or spot-checking. There's a lot of decision space in which we work for that, but we can get into questions there, if you like, but compliance verification is intended to build a level of assurance that not only we doing what we intended to do, but we're achieving the results that we expected to achieve.

I'll speak more on another slide about a balance of separation of authorities, but I think that's a key part of how the Navy achieves within this framework a sense of balance in getting to the right place, and the
need for continual education and training, I think, pops up in an Admiral Rickover quote that I have at the end, it is human nature for people to reduce the retention of knowledge to become more complacent in any endeavor I think.

And, so, the need to reinforce and to raise the level of training, and to take into account changes in the way we do what we do, especially as technology gives us opportunities to do things differently and better, there is education and training that goes with that, so whether it's to stay up-to-date or to reinforce the basic tenets, that's a big part of this program.

In the area of compliance verification, just to give an example of a way I think the net we weave that goes beneath the wire we walk has sort of -- there's a couple of different dimensions of webbing. In the top case, before a ship goes to sea coming out of a major overhaul or in the case of new construction, there is a ship-specific set of audits that's done to go through every element of how that ship was designed and built and that we built the verified design that we met the requirements, both for construction and all the material pieces of it, and that the design itself had been properly reviewed and met its requirements.

All of that is somewhat diametrically opposed to
another simultaneous set of audits that's going on, that is that they're always going on. In any activity or facility where we do this kind of work, then we go in on a regular basis and perform functional audits to look at the health of the system and to specifically pull examples out of the record sets of that objective quality evidence and look for compliance with the program requirements at the highest level and all the way down to the nuts and bolts.

And in doing that, and doing a sampling process for that, we find that we can highlight in each of these two cases what's right, what's not so right, where best practices need to be reinforced, particularly if you go from activity to activity, but also as we build ships, if we build them well and successfully, do we take things for granted and begin to atrophy some of the compliance, or do we build upon the success of the last one.

These certification audits and functional audits together give us a sense of confidence that not only is each individual hull ready to go, but also that the people and facilities and processes who are making this happen every day are complying properly with those requirements. So, the second one is more of the health of the program, and the top one is the readiness of that
individual ship.

On the subject of balance and separation of authorities, here's how the system works. When I was a program manager for Seawolf Submarines, and in other roles, but as a program manager, I would present to a certification authority, and generally that was my boss, and I served in both of these roles, so I can kind of speak -- in fact, I served in all of these roles one way or another.

When I was a program manager, I would talk to the one with whom the buck stopped, the certification authority, these days that's the deputy commander at the Naval Sea Systems Command for Undersea Warfare, and it's Admiral Jabaley. So, today, a program manager, for example, for Virginia-class submarines will walk in to Admiral Jabaley, and it's not done in one moment, in one day, but over a series of months, he will present to him a full set of documentation and auditable results that show that the ship he's getting ready for sea trials should receive the proper certification without which it will not sail, and in that certification, he can -- that Admiral Jabaley, the guy in the gold box in the middle, can rest assured and can examine that not only has the platform program manager done what it took to get the nuts and bolts put together, but he complied with the
requirements of the Submarine Safety Program Manual, and
that it's agreed by an independent technical authority,
in that case the chief engineer for Naval Sea Systems
Command, and his team, as well as an independent safety
and quality assurance authority who doesn't report to
the program manager, does not report to the chief
engineer, and is in the fabric of all of this for the
purpose of examining whether or not compliance is
ongoing, that all three of those pillars are of a like
mind.

When they're not, then that surfaces issues, and
issues like that are the things that would prevent a
certification authority for saying, let's move ahead.
And having acted as that certification authority myself,
I can tell you that I was looking for the balance of the
program manager saying, I've got this date for sea
trials, and I've got a ship that says it's really ready,
I've got all of the other peripherals that go with it,
the records of having done all the construction, having
done all the testing, having done all the quality
assurance. And my only hang-up is that I've got one guy
over there working in NAVSEA's engineering house who
doesn't like the thickness of something.

We nailed that one down before we made a
decision that the ship is ready to go, and by having
independence in each of those voices, we had the ability
to hear any of those solo opinions, or two of them
saying, we're moving too fast. These things create a
constructive tension around one another. On the worst
days, they're barriers to moving ahead, but you have to
ask yourself -- that's why we put it in place, right?
We're trying to create a barrier whose job is to say,
let's not let the thing that happened to Thresher happen
again, and that particular thing that happened to
Thresher, which was probably a sil-brazed joint and a
piece of piping connected to the seawater systems, is
not very likely to happen because we've examined that to
death.

But so many other things are critical, and so
many small things, when accumulated, can present a
larger risk that it's this team, despite the program
manager's responsibility and cost and schedule -- the
technical authority's responsibility for getting it
technically right, the safety and QA authority to show
that it's all properly documented, despite the fact that
those can be intentioned.

In the end, they're working together so that
when the certifier says the ship is ready, then it
really is, and then under the operational control of the
fleet commander, they've got the ability to send it out.
Now, that same construct is fundamentally in place for all major work, like overhauls, through the life of the ship as well as a new construction, and there is a version of this that goes on inside the fleet day in and day out when commanding officers at sea make decisions to break into these same boundaries and do work, or when they're in port, just in the execution of maintenance, whether it's corrective or preventative, that same notion of integrity of process is put into place, and there's a certification at the fleet level that mirrors this.

So, challenges. Such a system sounds perfect, right? Well, no system is, and the ability to generate these human attributes of ignorance, not even recognizing the problem, sometimes really does crop up. We can find people who, without the right training, without the right education, can certainly demonstrate ignorance, and that can be a problem if you've only gone one deep in a critical place.

Arrogance is a much more common problem, and it isn't arrogance like the way you might use that word to describe an individual that's pretty distasteful. I mean, this is the kind of arrogance that the best people can still have, that they're pretty sure they understand what's happening, and without someone else giving them
the support needed to recognize or for themselves to question their own assumptions, then this arrogance presents all kinds of challenges.

I had some experiences, as was said in the introduction, in the Deepwater Horizon investigations, and in that, I think it's evident by the facts that there were people making decisions on the rig who hadn't been given the ability to know, so in some way were ignorant of what was happening down in the earth's crust, and they didn't recognize some of the risks that were being taken.

They also used a presumption of knowledge to rationalize some of the steps that they bought into. They looked at test results that were evidently failing, and they found a way to rationalize that those results were positive. I think that was a collision of ignorance and arrogance at that same point, and, frankly, I think it was a case of the system setting the team on the rig up for failure by not giving them another voice. A less ignorant, a more knowing voice, and one that was in the business of routinely questioning its own intellectual superiority.

In fact, in the end then, much of that can lead to complacency, but you know, even people who aren't ignorant and aren't arrogant can still say, It's been 50
years since we lost one of these submarines, you know, in the years before that, which was approximately 50 years, the Navy lost something like 16 submarines to noncombat losses, and since then, just one, and it was not a submarine safe, certified submarine. That was Scorpion.

If we wanted to, we could sort of rest on our laurels or haunches or something right now and say, I guess that statistically it ain't going to happen again. We'd somehow have it right. I don't think anyone in that system looks at it that way, but the danger is that we might, and that would be a sense of complacency.

Now, the real truth is that the same risks that are presented in those 16 earlier incidents and the two that happened in nuclear submarines all need to be guarded against today, and so these challenges are ones that leaders must remind themselves of.

I do not expect that the people at the deck plate level every morning are getting up saying, let me think about complacency, right? Now, I hope they do, but I don't really think it's what they're thinking about in the line at Starbucks or wherever.

I do think, though, that they think about it frequently because it's instilled by leaders who get down there on deck plates, who do that walking around,
who check in on people who are new on the job, who ask
the people who should be mentors whether they're doing
that mentoring, and when is the last time they had a
workplace conversation about complacency.

So, Admiral Rickover, in his long-term view,
said, you've got to drive these ideas into practice with
courageous patience, and importantly, he said, all of
this can be overturned or subverted through apathy or a
lack of follow-up, so a continuous effort is required,
and he was famous for his diligence and his continuous
effort. That legacy has lasted far beyond his time. It
is a part of what goes on in the Submarine Safety
Program.

I think it's important to recognize that while
Admiral Rickover was personally involved in the hearings
that went on with the Atomic Energy Commission back in
the -- or I'm sorry, the Joint Committee on Atomic
Energy right after the loss of that ship, it is a
separate program, the Submarine Safety Program, from the
one that Admiral Rickover and his follow-on, Admiral
Richardson today, Admiral Donald a few years ago, have
instilled in Naval Reactors, but there are some similar
characteristics and traits, and this diligence and
discipline and the need to guard against complacency is,
I think, a common factor between the two.
And that's probably about as far as I will go in terms of trying to weigh into Naval Reactors territory, but I think it's important when you're looking at this from the perspective you all have, that these systems are hard fought, hard won. It continues to be a challenge every day for the people who work in this environment to get it right, and every morning when they wake up, the leaders in this community do have to remind themselves of these challenges and this kind of a long-term view.

In going back to Thresher and asking, how do we personalize this for individuals, how do you take somebody who has shown up at a place like Portsmouth Naval Shipyard today working on submarines that were designed and built before that individual was born, in some cases, how do you get that person to understand that the events of 51 years ago, and a history that goes 50 years before that, is relevant in today's world and the work that individual does right now.

I think part of it is that we listen, pretty regularly, at least annually, believe it or not, to the audiotape, about two minutes long, of the sounds of the Thresher hull imploding, and all those people dying. It's a terrible thing to hear, and it would be abstract if it wasn't being narrated by someone who is telling
you live what it is that you're about to hear, and then
listening to that, it raises the hair on the backs of
the necks of most people. You have to be damn near dead
to not get a little emotional about that.

And I think that what that does is it reinforces
on a regular basis for people that this is about real
folks, and it's about their own brothers and sisters,
fathers, mothers, and their own kids and grandchildren.
This is who they have to worry about.

If you have a tragic event like this and you
have an opportunity to do something about preventing its
recurrence, and you can tie people back intellectually
and emotionally to what did happen and the need to
prevent its recurrence, then I think you've got a strong
connection that has to be made and sustained.

So obviously there are many other famous events
like the ones mentioned earlier. Challenger and
Columbia both had people who came over from NASA, looked
in the Navy and looked in many other places and said,
how do programs that seem to be succeeding instill the
right traits in place in their people? How do leaders
embrace this need and keep it forefront in what they do?
How is it that the foundation and the construction of
the program, the way it's documented and the way it has
requirements that don't change frequently, how is all
that built and then attempted to try to bring those back
to using those same notions in other environments.

NASA, I'm not an expert on the NASA side of it,
but a predecessor of mine in the chief engineer job was
one of the ones who answered the question in the early
2000s to go over and meet with the Challenger group and
gave them some testimony on the SUBSAFE program, not
unlike what I'm talking about this morning, and that was
Paul Sullivan. And when he did that, it began this
dialogue that I think has grown into where Admiral
Norton is really a full-fledged member of their safety
board, that they open their eyes and minds to other
parties who have similar stakes and interests. I think
that's all healthy.

Professor Meshkati, who is here, and I were both
on this team that did the report on the far right. We
were not on the one that did the report to the President
in the middle, but looking at that Deepwater Horizon
thing, I think there's, even today, an ongoing dialogue
in the energy industry about how we don't let things
like that happen again.

It's a best practices discussion, but it's a
really different environment from the one in which the
Navy put together a list of requirements, built the
framework around which all that stuff would be executed,
and then requires it of our people, holds them accountable under the Uniform Code of Military Justice in the military case when they don't comply, and instills that same requirement in contracts, puts it in place so that it isn't a negotiable point. It is like a specification point.

In fact, it literally is in the statement of work and the spec that the Submarine Safety Requirements Manual will be invoked, and we can talk more about this as you like. I would tell you that we get the same kind of support out of people who are required by contract, like the workers at the submarine construction yards, and even at the subcontractor level today as we do from the sailors who are working these things either because they're already in the crew or they just came from and are likely go back to the crews of these same ships. People who sail in these ships recognize firsthand how important it all is, but I think it's also recognized by many people who never get the privilege to sail in them but they have a responsibility to get it right. So that's my experience.

The ability to translate that then into something like an energy industry and be able to avoid blowouts and the consequences in a rig, that's a more tenuous discussion because not all the same controls
exist, as we have the luxury of imparting on the Navy side.

And then you can't beat something at the end of a show like a big picture of a Virginia-class submarine like New Hampshire up there in Groton, Connecticut, so that's my closing slide.

I think I've closed with a picture of some Navy ship for every briefing I've done for 25 or 30 years. Okay. That's all I have. I'm happy to answer any questions you may have.

DR. WINOKUR: We do have a few. Thank you very much for the presentation. Once again, it's very insightful. I'm going to start the questioning, and I want to ask you from a personal point of view when you were the chief engineer for this program, what did you do personally to convince yourself that you had the culture of safety you needed and that these subs were being built to the specifications they needed to be built to? What did you personally do?

REAR ADMIRAL ECCLES: Yeah. So, as an individual, in my personal role, I guess I'd say I had three or four things that were really important. One is that I made a regular practice of getting out to the places where we were working on ships. I walked ships every time I walked into a shipyard. I don't think I
ever have gone to a shipyard and just gone to a meeting. That just is a huge mistake for any officer to do. It's about the sailors. It's about the ship workers. And, so, speaking with welders on deck plates, speaking with people who are putting components in place and visiting the places where our manufacturers do what they do and test the devices that are going to end up on our ships, those factory floor tours and those walk-arounds on ships are very important.

An extension of that is that in my role as the certification authority and as a program manager, I would as often -- well, always as a program manager, I would make the first dive on a submarine that was in new construction. That's part of the deal is if you're presenting this thing for certification, then you'll be there with the captain and crew on the first dive, and not alone. The Director of Naval Nuclear Propulsion has done that for as far as I know every ride ever made on a submarine on its first dive, and I've personally been out with several of them on several of those.

DR. WINOKUR: It's called incentives.

REAR ADMIRAL ECCLES: It's a pretty personal incentive, and just to take the incentive to the right place, the other couple of bunks on those ships are for the presidents of the two construction yards. These
days those Virginia-class ships that are going to sea are built -- each of those ships has been in part built by Electric Boat and in part by Newport News Shipbuilding, and so the chiefs of those two yards are under way on those sea trials.

I think that makes it personal, and I think it also makes it a great leadership example for the people who every day are doing the work on those ships. They want to know that there's commitment, and that's one way to show it.

So, personal commitment and getting out there with the people who are doing the work is a piece of it. The other is a very diligent process of selecting the right people for the right jobs. And, so, it was my privilege a number of times to influence people's careers by giving them the opportunity to get into this kind of work, but also to have them understand that only the best get that kind of assignment, and then to hold them accountable for doing a good job while they were in it.

And I guess another factor in all of this would be to have the knowledge gained through experience and education to be able to personally dive into the details on some of these things and ask the hard question when someone says, we accepted this, even though it wasn't
within some parameter of acceptable conditions, the
reason we accepted this outlier is as follows. If the
people who are making the decision to accept that are
led by folks who cannot understand the basis for
acceptance, then there's a breakdown in what I think is
a wholesome system.

So, I believe that just as being a
NATOPS-qualified aviator in a plane requires you to have
not only the experience and the skills, but the basic
knowledge, the same kind of idea holds true on the
submarine side. It holds true in any really critical
safety endeavor, and I think as you move up in the
leadership ranks, you've got to retain some ability to
get back down into that stuff.

As a diver, I dove up until my last couple of
weeks in the Navy. It just didn't ever seem to me that
I was allowed to get old enough to stop doing it, okay,
and the troops like it when they see you do it because
they know you're committed, but I'll tell you, it also
means I'm checking whether the regulator's in good
condition or not before I decide to take breaths
underwater with it.

So, I think that kind of personal commitment is
commonplace in the system. I think it's exactly the
kind of thing you find in the people in leadership
1 positions in aviation surface submarines, people taking
2 care of our warfighters, people taking care of our
3 weapons, and doing all these other things that most
4 Americans would consider high-risk, but finding a way to
5 do it with safety in mind for our people.

   DR. WINOKUR: Were there metrics that you
7 tracked in your role as chief engineer, things that were
8 on your desk?

   REAR ADMIRAL ECCLES: Yes, and some of those
9 also were on some other people's desks, and that's part
10 of the overlap of requirements here. A guy who's an
11 individual who might be the certification authority and
12 one of those other legs like the chief engineer, and
13 I've been in both of those jobs, so I know that we often
14 were looking at the same basic measures of
15 effectiveness, and they included things like in a
16 long-term view, what are the trends in these audits that
17 we do in facilities?

   Are we seeing the major exceptions or the
20 recommendations that would be written by audit teams for
21 improvement? Are those things growing and how do we
22 characterize and categorize them? Are they presenting
23 current risks to ongoing programs or are these good
24 ideas that we should take from one activity and extend
25 to another.
We would have recommendations that we tracked as individual numbered items that each unto themselves were important, but they could have really different meanings, one to another. And the accumulation of those things was one kind of an indicator of whether or not we were seeing progress in a good direction or in a not so good direction. And that was true system-wide. It was also true at an activity level and on a project basis.

So, in all of those areas, yeah, we would look at measurements, even to the point of looking at things like how many quality assurance findings are we getting in a given production activity. Is there something not coming out right because there's a problem in the process, occasionally even ferreting out wrongdoing, but that's pretty rare, but we would have from time to time a recognition that someone we were counting on did have an integrity problem, and it was picked up because the system has enough mesh to it that we could eventually filter out the problem, but when you find that, whether it's a malfeasance or an innocent mistake, you've got to get to the bottom of it. So, we did that through indicators.

DR. WINOKUR: Mr. Sullivan?

MR. SULLIVAN: Thank you, and good morning, Admiral, or Mr. Eccles, whichever you prefer.
REAR ADMIRAL ECCLES: Good to see you, sir.

It's always Tom to Mr. Sullivan.

MR. SULLIVAN: Maybe it's just Tom, okay. I want to go back, I hate to take the picture of the submarine sitting in Groton, Connecticut, off the screen, but if we go back to slide 7, which was I think your three-headed monster there.

REAR ADMIRAL ECCLES: Yeah.

MR. SULLIVAN: So I want to ask you, where is cost control in that diagram? I seem to recall back the submarine program having a Congressional -- the Seawolf Program having a Congressionally mandated cost cap, which had to add a degree of difficulty to what looks like an otherwise simple diagram. Would you speak to that?

REAR ADMIRAL ECCLES: Yes, happily. So, the program manager is the one in that picture who has responsibility for cost and schedule control, and really is the leader of getting the job done when it comes to all of this, and the others could be looked at as controls.

The others are flying in support. You know, if this was a formation, you would say that the one with -- on point or with lead is that one at the platform program manager level, and he might well be the junior
one in the picture, but he's that individual for that particular moment and project has the lead.

The Independent Technical Authority is really a large organization with a lot of people, just as the platform program manager's team is a fairly large organization with diverse skill sets, but that program manager is the accountable one, and when I was in that role, besides the seriousness of getting under way with the ship the first time, making the first dive and all those things, saying let's be personally committed to the right thing. I also had someone brief me on the way into the job that it was I think two different felonies if we somehow failed on that cost cap, and that got my attention as well.

So, it's a constraint, for sure. How is it managed? Well, honestly, through a bunch of judicious decision-making, so that what we don't do is let any of this get so out of balance that we're either shorting ourselves and taking risks we shouldn't take, or creating an opportunity for a risk-averse culture to run so rampant that we literally tie the ship up and never get under way.

We couldn't have it that way, so if you have to come in under a cost cap but you've got to get under way, then finding that way is one of them and is one of
the great challenges.

In my own case, with the SEAWOLF submarine, Jimmy Carter, we actually found between the contractor, in that case the prime was General Dynamics/Electric Boat, and the Navy, that we had a common interest in driving to that cost cap, and we worked a whole bunch of day-to-day systems of controls, so that we would not pay too much attention to the little stuff and pay a great deal of attention to the things that mattered most.

And we found efficiencies the way we did that, and we actually did control it and came in with like a dollar and a half to spare at the very end. In fact, I don't think I admitted we had that buck and a half, but we slid into home on that one, and --

MR. SULLIVAN: You were a buck and a half away from two felonies, is that what you're telling us?

REAR ADMIRAL ECCLES: It was something like that, maybe a buck 350.

MR. SULLIVAN: Okay. Well, thank you for that. I mean, it just seems to me, though, that there must have been situations where there was a problem and then there was a solution one and a solution two, and two was more expensive than one.

REAR ADMIRAL ECCLES: Yes.

MR. SULLIVAN: But two would have given you a
better product and perhaps additional margin of safety.

REAR ADMIRAL ECCLES: Right.

MR. SULLIVAN: How were those decisions made?

REAR ADMIRAL ECCLES: Yeah, great question. I think those decisions are made every day, and I think that there are many, many examples of those, and I think in the end, that is the dialogue that these arrows might represent where you get a conversation going that says, I could do it the way I've always done it, but I know what that's going to cost, and maybe there's a risk that goes with that that is something like a reliability challenge. And then there's a new way of doing it, and that new way might cost me some more investment up front, but it might give me the reliability that's been eluding me for all this time.

And, so, finding a way to translate that into terms that can be recognized as value and accepting them, that's a tough one, but if it can be done in dollars and cents and in the near term, then that makes decision-making pretty easy. Is it worth doing as a business case? And that, frankly, when those go the right way, nothing is hard.

The hard ones are when you say something like, my savings will come so far out in the future that it's not inside anyone's incentive plan to get rewarded for
that, or when the way to translate that is, we'll be more operationally effective by doing the more expensive thing, then how do you make that trade?

And very often, the people in this diagram would turn to the requirements officers in the Pentagon and look for another value discussion, too, that would say, I have a choice here, and I could do this and give myself some margin on cost for the future, but if I do the right thing, and this is my recommendation, then we're going to be happier in the end because you will be this much more capable. Maybe stealthier, maybe more accurate with weapons fire.

And, so, whatever that proposition would be, we would look to the people who set the requirement on the operational side and who actually hold the purse strings as well to say, I'm thinking about spending the treasury like this, what do you think. And on the best days, those conversations go really well.

I think the -- it may be a bit off topic, but some of the improvements done to lower the cost of Virginia-class submarines, and this is pretty much out of my scope because it's largely after my time, but much of that thinking and work required people to embrace long-term benefits from near-term investments, and it's paying off now. The first of those ships is at sea.
Things are working right, and as they continue to come off the production line, they're going to be built at a lower cost for the same capability, and they wouldn't have been able to do that if someone didn't have the courage to spend some serious money a few years ago. In the end, the taxpayers will be better served.

MR. SULLIVAN: Okay. Thank you. I do want to shift gears a little bit now, and I want to ask you about the fire on the USS Miami, which I think occurred in 2012.


MR. SULLIVAN: Yes. So, just a little over two years ago now.

REAR ADMIRAL ECCLES: Yes.

MR. SULLIVAN: And, so, for those who aren't familiar, the USS Miami was undergoing overhaul up in Portsmouth Naval Shipyard. There was a fire that ultimately was decided was deliberately set by a disgruntled shipyard employee.

REAR ADMIRAL ECCLES: Yes.

MR. SULLIVAN: But the actual location of the fire remained undetected long enough to allow the fire to grow out of control, and actually threatened the reactor compartment. It didn't actually go to the
1 reactor compartment, but there was concern that it
2 might, it burned out of control for so long.
3 So, can you speak to the lessons that were
4 learned within the community -- the Navy's maintenance
5 community for what happened there and how safety was
6 subsequently improved?
7 REAR ADMIRAL ECCLES: Yes. I can speak to some
8 of that, and some of the evolution of thought that's
9 gone on on that subject is after my time, so, you know,
10 I probably have an impartial or an incomplete set of
11 comments on that.
12 One thing I would like to do is clarify that
13 from my perspective, and I think the way the Navy
14 spokesman put the word out at the time, the fire was
15 confined to the forward end of the ship, and yet it was
16 devastating for sure, and the consequences of it were
17 pretty terrible.
18 The reactor compartment and the propulsion plant
19 were isolated from the casualty, and remained manned
20 throughout, and was in a shutdown mode for a couple of
21 months preceding. So, to the best of my knowledge, and
22 it's not my territory either, but that was not a factor
23 in that fire. But, yes, it was a big, devastating fire,
24 and you have it right that it was a deliberate criminal
25 act of arson, and it was done by somebody whose arson
tendencies weren't detected until some time afterwards. We were proceeding on the notion at the time as investigators, doing both the safety investigation and JAG manual investigations, and I was more on the side of reviewing results from those things, that there was a cause that was more of a technical cause in nature. We were looking for accidental reasons for this, and the damage was so sufficient or so complete that it was really difficult to get to the bottom of that clue set and pin anything down. And we pinned down a few ideas, but, you know, saying, this is the one and we know it conclusively, couldn't get there.

So, it's good that in the end a criminal investigation determined what really was the cause, and a confession came from that, and a guilty finding. Your point that having been started deliberately but then allowed to grow by lack of detection led to extreme amount of damage, that's true. And, so, there's been some work done inside the Navy and with people outside who work on fire fighting and fire detection systems to say, can we raise the game in how we detect things like this?

And I'll tell you, the Navy's view has been not to confine this to just a submarine discussion or a Portsmouth discussion, but a broader one across our
industrial base, public, as Portsmouth is, and private, and across all ship types, and even shore facilities. And say, where do we run the risk? That whether deliberate or accidental, a fire could go undetected and then result in a significant amount of damage or risk to people and all of that.

So, earlier detection, some of that by unmanned systems, some question about whether the way watch standards are deployed and how that process is run operationally is another factor. Beyond that then, how are responders organized, and are the people trained who show up as professional firefighters and as crew members on that ship and nearby ships, all focused in their energies and their equipment and their tactics to be able to combat this together, or is there a hand-off process?

And that night, there was a process that was followed, and it proved to yield a lot of lessons learned. People were really spent by the heat exhaustion that came from that fire. Additional crews had to be called up. Firefighters came in from out of town. Firefighters came from other communities. Interestingly, some of the firefighters who came as volunteers from outlying communities were people who had worked their day shift at their day job as workers
in the shipyard, and actually some of those people were particularly helpful in being able to show up as a firefighter who might not have known anything about a submarine, but in that case, some team members did. So, learning that being able to take the people who live just outside the gate and familiarize some of them in the event they might have to be called is a part of that decision or -- that education process. So, those are kind of the main lanes that people are going down.

Because the cause was deliberate, those accidental ones were able to be ruled out, the ones that were theories. On the other hand, each of those was a thread worth examining, too. Could it be that by employing certain kinds of equipment, we could have led to a fire through an accident? And should we change that equipment? So, there had been some component and equipment changes done for tools that shipyard workers use and ways that ships are equipped. How good is a battle lantern versus a modern LED light at providing light that cuts through dense smoke, or are any of those any good, and how do we find a downed firefighter if one of them is left behind? How do we make sure we don't leave anybody behind, and we know when we've got someone who has been brought unconscious?
There are tools that are used in civilian firefighting that can be used aboard ships as well. So, all those kinds of things, how do people communicate with one another, which is a classic one. Every time we bring people together in a network who weren't deliberately networked before. So, in each of those cases, good news is there are lessons learned, documented. There are plans of actions and milestones that are being used to implement those changes, and also to a point that Admiral Norton made, there's a clear separation between the Judge Advocate General's investigation, the process that leads to accountability from a misconduct perspective, and that -- and a judicial one in the case of this one that got prosecuted up in New Hampshire, but also then on a different tack, is the question: What happened and how did it happen and why did it happen and how do I look at that in terms of a safety investigation, and give people the freedom to speak without risk that that will cross paths over to the JAG discussion so that we can get the lessons learned that are as fact-based and objective as possible out to the fleet as soon as possible through the Naval Safety Center and their components. That, I think, worked very well in this case.

MR. SULLIVAN: Yeah. Thank you.
DR. WINOKUR: I want to ask you a question about changing an existing culture, so let me start out by saying we've acknowledged, and I think it's true that the Navy's often asked to help out in terms of providing its insights on safety and safety culture. And in your particular case, when it came to the investigation of Deepwater Horizon, the SUBSAFE program was pointed out as a model of an organization that successfully operates a high-risk program. But do you have any insights on how you go about changing a safety culture that's an existing safety culture that's very different than the SUBSAFE program?

It seems like the Navy has had some benefit from getting it right at the beginning. I mean, you have Thresher, of course, but then you created a very -- it sounds like a SUBSAFE program that was very well conceived, and, you know, other programs and naval reactors, but what if you're faced with making suggestions to an organization that has a very entrenched existing culture but from your perspective isn't what you need in order to provide the kind of safety to ensure the mission?

REAR ADMIRAL ECCLES: Right. Well, so in the SUBSAFE program, 50 plus years does sound like a pretty good record, and I don't want to take anything away from
that, but in the 50 years preceding that, there were a lot of really daring people in those earliest days about 100 years ago willing to lock themselves into a windowless tube and take it under water, especially given that in the century or two before that, there had been very few successes from all of that, right?

So, submarining, right off the bat, starts sounding in its earliest days like a very high-risk venture, and it certainly didn't have the basic tenets of the Submarine Safety Program, because there hadn't even been enough experience to start drawing conclusions like the ones drawn in the early '60s and into the '70s and '80s for SUBSAFE, and I would say there's probably a very similar story in aviation.

Most of us would probably not be the one to first try to land on the deck of a pitching ship, Admiral Norton excluded because he did do that, but the first one who did that has got to be a little like the first one who ate an oyster, right? There's a certain trepidation.

So, if you ask yourself, how do people with an engrained culture, or people who are taking something on who have never taken it on, try to get to a place where they can build such a system that has a likely successful outcome over a long time. I think that you
have to decompose the problem into individual pieces
that you can then examine in really clear ways.

Like it is easy to explain to someone on their
first day on a job that we have a program that only has
two things it's trying to achieve: Prevent flooding in
submarines; and then make it so that if the submarine
does flood, you can recover that submarine to the
surface.

I can explain that, and have, to children, very
successfully. You can do it at the worker level. You
can tell your mom and dad about it. It's not
complicated. And then in similarly articulate ways, we
can take the pieces of that, break it down and say,
well, look, it depends on getting the right material
properly installed in the right place, and that sounds
easy. The systems that achieve that are very
complicated, but really, at their core, there's a simple
construct that we're trying to achieve, and we do it by
breaking the program and the process down into its
elements.

So, I think that, for example, in the energy
industry, if there had been a question asked the day
that the Deepwater Horizon had that problem, we're out
here -- there were executives on the platform giving a
safety award that day, as you may know just from reading
the papers, and it was a slips, trips and falls kind of safety award, and that's important in an environment where slips, trips and falls can be fatal, but it is not the whole picture.

And a question I guess would be, is there a way that team of executives, having finished giving those awards, would have had the thought and conversation, so what are we doing about systemic risk, and what are we doing about the highly complex operation that's going on down below the sea floor and managing all the energy that we're tapping into, because they're essentially taking a household plug and plugging it into a really powerful source.

So, how well is that going to go, how well do they understand the process, and do the people here on the rig have everything it takes to make local decisions, or are decisions being made at the appropriate level by the appropriate people with the appropriate tools and knowledge?

And I think if they had asked that question that day, before everything went badly, they might have found some things lacking, and I think it's been pretty well documented what many of those are. You could take a similar question without the big catastrophic event and just ask the question similarly, if I went into this
factory where this downside effect is possible, and has perhaps never occurred, what’s being done today to frame that proposition that we must avoid that catastrophic event, or whatever the family of catastrophes is, how is that being articulated, made plain to everybody at any level that can influence the outcome, and how is it being instilled as a basic part of what they do every day?

I don't know that that's common. I don't think it's typical. I think that you can find it in many places. For some reason aviation safety is pretty darn good in America right now, and generally around the world. This is actually, despite some of what you've read about in the papers, this is a safer year in aviation safety, as I understand it, than the last ten. So, there's something going on right there. How do we take those kinds of things and extend them into places where maybe that discussion isn't happening every day?

DR. WINOKUR: I'm just trying to get some insight into how you manage a work force that could be very resistive and just simply say, we always have done it that way? I mean, that's the way we do things around here. How do you get the light to go on that they need to make changes?

REAR ADMIRAL ECCLES: Yeah, well, it is like
swimming upstream, I'm sure in many cases, but if you can make that proposition that what you're trying to achieve is something that is clear and it's simple and it affects their individual lives, then I think that individuals can relate to that.

Now, if they've never had the bad thing happen, then certainly there's maybe some difficulty convincing people that the risk is present. In my experiences, as in most places where we deal with a lot of risk, there are at least small pieces of that that have been presented, and you might not have blown the whole end off of a building, but you probably had people hurt.

So, how do you talk about those cases and make them real for the people who are nearby but not directly affected? And I think that's a communications challenge, and I think it has a lot to do with how leaders frame the thing they're trying to achieve. It has to do with clear articulation and simple statements, and I do think that the more we make that complicated, the less we win the troops over, whether those troops are in uniform or not.

DR. WINOKUR: Thank you.

Mr. Sullivan?

MR. SULLIVAN: So, what did the Navy do for its contractors to make sure that they had the right
1 mindset? I mean, we could talk about contract law, but
2 that's pretty cumbersome. I know you mentioned earlier
3 General Dynamics. You can't really threaten to take the
4 business away from them because there's only so many
5 places you can go to build a submarine, so what did the
6 Navy do in order to make sure the contractors had the
7 right mindset?

REAR ADMIRAL ECCLES: Right. I think that most
8 of the same things that were being done inside the Navy
9 from the beginning of this program, the SUBSAFE program,
10 to today has been done in a very similar way that is
11 sort of an emotional and intellectual attachment of the
12 program's goals, its objectives, and then the how of the
13 program.

That has been laid out for people who are on
15 private sector payroll just as for Navy civilians and
16 uniformed sailors from the operators who are really
17 facing the risk each day, to the people who are perhaps
18 sitting in a building doing the design for the next
19 thing.

And they might be the furthest removed, perhaps,
21 or from a subcontractor who's busy making a valve
23 somewhere in Pennsylvania, but may not ever get to see
24 that valve installed, and certainly is unlikely to sail
25 in the ship.
That connection is one that I think has been made by a combination of the big precipitous event, the calamity when it happened was real news, and it was something that I think people found easy to embrace 50 years ago.

Then you'd carry it forward, and part of what's been done is a messaging process in the training, and this is just as true on the private sector side as public sector, that for a long time, family members and people who are like design leaders in the shipyards where the decisions had been made, people who survived, even a few people I've known who were supposed to have been on the sailing list, but for one reason or another did not make the trip, and would have been lost and then weren't, these individuals, when they, you know, realized the depth of the tragedy and the closeness of their personal connection, they became very, very forceful spokespeople for how important it is to never let it happen again.

So, since many of those people would be a hundred or more years old now, there has been a process of building living histories from those folks, using technology now to make it so that web-based training that people receive on their first day and that they receive annually thereafter, in some cases we do it a
little bit differently in the cycle, but you listen to people who were there then. You listen to adults who lost their dads. You listen to people who work in a shipyard now but are the children of someone who was lost in Thresher. And those kinds of people have a way to express things that you just never really lose track of.

And I think that we can make an impression in a valve manufacturer in Pennsylvania just as easily as on -- inside the USS name-the-sub by using those kinds of connections.

And then the contract law piece of it, not to get into any of that because you'll whip me on this one, but what we really do is we just simply make it a non-negotiable mandate that the system and the authorities and accountability that go with it, that that system transcends private and public sector. Everybody has got to toe the line, and there is a disciplinary consequence to not performing.

MR. SULLIVAN: Thank you.
REAR ADMIRAL ECCLES: Thank you.
DR. WINOKUR: Thank you.
Ms. Roberson?
MS. ROBERSON: Yes. Just one follow-up question. I was going to ask you, the way I understood
your comments earlier about the effect on the contractor
work forces, you really don't see a difference, either
in mission commitment or in the culture of safety.

REAR ADMIRAL ECCLES: Right.

MS. ROBERSON: So, on the National Academy of
Engineering effort for Macondo well blowout, what did
you see in that arena?

REAR ADMIRAL ECCLES: That's a great question.
I think the people who are out there on the platforms
are every day dedicated to doing the job right and
coming home to their families at the end of that period,
and, of course, they don't come home every day. They're
often out there for several weeks, and then home for a
time, and then back out, so they do this on crew/off
crew kind of thing.

Some of those crews seem very, very tight. And
I went out there to visit with crews on nearly identical
rigs, and spoke with them about that camaraderie and
about the sense of watching out for each other, and they
certainly are in a dangerous environment, whether
they're plugged into the energy source or not, because
they're also living out in seas that are sometimes
pretty unforgiving, and their job is to stay put, too.
They don't usually just outrun a storm. You know, the
storms kind of hit them.
So, the people are not unafraid of managing these kinds of things, and they do watch out for each other, but when you look at it at a more corporate level, I saw differences between the major energy companies and their commitment to investing to put the right connections in place. In one company you might find that the expectation was the people on the rig have got it, and they'll call us with status and they'll let us know if they're in trouble, but, you know, of course, in the particular event that was the Macondo well disaster for Deepwater Horizon, those calls weren't made or recognized to be made until everything was going to hell.

But if you would take it from a different company's perspective, there are several others where it's likely that the same conversations that were done only locally on the rig would have been done across a net connection to the beach, and on the beach would have been a greater depth of knowledge base, and maybe a more senior decision-making level that could feel a little less encumbered by the pressure to get going, meet the schedule, because that pressure was -- any company's capable of exerting a lot of it, but if you never give it any relief, then it really does build.

And, so, a relief process would be to take
decisions and kick them up the chain to someone who is actually entitled to say, today I won't produce because today there is something I don't understand about what's going on down there on the sea floor, and or a mile or two below it.

In my opinion, the people in the Macondo case, at the Deepwater Horizon, didn't have that outlet, and if they had had that kind of an outlet, if they -- or if the investment had been made upfront to have a decision process and the equipment that goes with it so that they could take robust challenges and meet them with robust knowledge and make an executive decision at a level far above what's normally out on the rig, then I don't think they would have gotten the same outcome.

MS. ROBERSON: Okay. Thank you. One last question, Mr. Chairman.

DR. WINOKUR: Sure.

MS. ROBERSON: The Navy has a well understood hierarchy of rank and seniority, strong culture of discipline and obedience, a well-defined process for succession planning, and well-developed leadership training and educational programs, and we've talked a lot about those today, and those are kind of embedded in the culture.

And Admiral Norton has talked about it at the
MS. ROBERSON: And I think there's often a lot of investment made, so I guess I want to ask you at the operational level, what kinds of positive or negative incentives did you use to change behavior?

REAR ADMIRAL ECCLES: Well, I think the story that was given in the aviation example of the sailor who was willing to take the XO's airplane and say, I don't think you're flying today, even though he might have come out of boot camp the night before, or some time like that, that was truly a sailor whose example was excellent, and calling him out and rewarding him for it was the right thing.

It's hard for me to put my finger on an exact example of that, but I've seen dozens of cases where whether sailors or shipyard workers, public or private, there have been similar happenstances where it took guts to say, this isn't right. And in so identifying it, a person took individual risk, maybe risk that they were afraid could actually result in termination or reassignment or something like that. And in so doing, when well led, they had been rewarded for making the
right call, usually by simple acts of recognition. The Navy Achievement Medal or a certificate to an individual or the ability to just say well done from a foreman to a crew. That kind of positive incentive is all it takes. We do not need to try to put money in place to get people to do the right thing when it comes to safety, in my opinion, and, frankly, I think there would be too much downside risk to create some kind of mercenary reward for doing the right thing. So, sometimes right is just right, and an 'attaboy is all that ought to be required.

On the other side of it, a failure to comply is something that needs to be remedied, but, you know, making a mistake can run a real gamut, from malpractice to a person who's still learning, and I've certainly made a few mistakes and been lucky enough to work for people who said -- even one where I made a big mistake with a ship and I put it in the wrong place in dry dock, and there was some adverse consequences to that, and I went up to explain myself, and my boss, a captain at the time, decided that he had heard everything he needed to hear, and he said, that's it, you're dismissed, and I didn't really want to leave because I was pretty sure he left out the part where I get fired from that position.

And I mentioned that to him. He says, why would
I fire you? And I said, I thought I just went through that. And he says, yeah, but you're the only guy at your pay grade who's actually made that mistake here, and if I give this job to those other guys, anything could happen. Are you going to make that mistake again? I said, no, sir, not that mistake. You know, I didn't -- I wasn't smart enough to realize I had some other ones I was yet to make, but he had the trust and confidence to go take somebody who has made a mistake and might learn from it and put him back to work.

And we can do that, but we have to be able to understand the difference between learning and trusting versus finding somebody who needs to get a different message, and sometimes that message is separation, but other times the message is something much more like something Admiral Norton talked about. When we've got an individual who meant to do the right thing and that the wrong thing resulted, then a re-education process might just mean that your qualification to do that thing you were just doing is suspended, and you need to earn it back. And, in fact, you're going to have some incentives to earn it back because you're going to do an awful lot of push-ups between here and being ready to get qualified again, but you need to go get re-educated, you need to go through some training, an examination,
and then come back, and we'll let you have the keys again.

And I think that systems like that work really well in the public and the private sector, and I have now employed them in both sectors. And I did have somebody say to me early in my new private sector career where I became the boss of some stuff that this isn't -- he said, this isn't the Army, we don't follow orders around here. And I said, well, I know it's not the Army, but you're damn sure going to follow some orders.

And it turns out -- well, not everything is given by decree. It is not so different in all our different parts of life that when the most important things are required, then that requirement has to be followed, and when it's followed well and good things happen, people should be rewarded, and when there's a deviation, then we need to deal with the deviation and figure out why and what we do about it and self improve.

MS. ROBERSON: Thank you.

REAR ADMIRAL ECCLES: Thank you.

DR. WINOKUR: Just a couple of very brief questions to end. I wanted to just ask you briefly about complacency, and do you think there's a cyclic component to where every 20 or 30 years you get a new corps of officers and they become more distant from
events that you grew up with and you understood. Could
be wars, could be accidents, things of that nature, and
how you go about overcoming that and making sure you are
moving in the right direction?

REAR ADMIRAL ECCLES: Right. I mean, if I think
about us as having been about the same age and coming in
the Navy in the same era, we probably have certain
shared traits, whether one was in submarines and one was
flying because we're just products of our time.

On the other hand, you know, our flow of
officers and enlisted into the Navy, just as in the
workplace, is somewhat continuous, and yeah, there are
ups and downs, you know, and yeah, we have these bimodal
distributions of age in some workplaces, but by and
large, what we're doing is continually working on the
process of educating, training, sustaining, and I think
that we can overcome any sense of cyclic forgetfulness
through that.

I do not have the sense that there is an
interval of 20 or 30 years over which we forget things.
I think that if we don't pay attention to things, it
takes much less than that to forget, and when we do pay
attention, I think we can achieve a nearly continuous
awareness, if we're doing it right, but that's a
leadership challenge. How do you do that when you're
retiring people who were there, and part of the answer
might be, let's get some of them to put that testimony
into a format where we can show it 100 years from now if
we have to.

DR. WINOKUR: Thank you.

Mr. Sullivan?

MR. SULLIVAN: I want to ask actually a question
for both of you, maybe you can take turns answering, but
the injection of new technology, Admiral Norton, you
talked earlier about night vision goggles and the effect
that that has, but the other day I was down at a --
visiting Pantex where the NNSA puts together and takes
apart nuclear weapons, and I was supposed to meet up
with my escort at a particular place to get taken
somewhere, and we had a miscommunication, and so we
weren't in the same place.

And because they had taken my cell phone away
from me, I was like at a loss, all of my ability to
reach out to this person was now gone. So, the point is
there's always a downside, right? Through my career,
navigation systems improved, that was great, but there
were old things that we had learned back when we had to
look at the stars that helped us make sure the
technology was working.

Can you speak to the I would call it, and this
1 is just my opinion, there's somewhat of a double-edged
2 sword, technology is always -- you always want it, but
3 there's always some downsides. Can you speak to that
4 and how the Navy deals with it? Maybe Admiral Eccles,
5 you want to go first?
6
7 REAR ADMIRAL ECCLES: Yeah, let me just take a
8 quick shot at that. I mean, certainly there are some
9 things where we need to be able to work in directions
10 that are very progressive, by keeping in mind these
11 downsides. There are other places where we should be
12 much more conservative and ask the question, why must I
13 change or when will this thing that seems promising
14 prove its utility, and we'll deal with what the downside
15 is successfully enough that we'll let it displace what
16 it used to do.
17
18 And, so, I think there are a lot of examples of
19 places where highly reliable components and highly
20 reliable system approaches have not been shifted until
21 the technology that was present had matured a lot
22 somewhere else and where risks are lowered, before we
23 adapted and adopted these things into higher risk
24 environments. And maybe also part of the math in this
25 is, so how big is the benefit?
26
27 So, for example, in submarines, there's a
28 fly-by-wire kind of technology being employed today, and
really for the last decade or so, but not much before that, where instead of using hydraulics to move our control surfaces that change the attitude of the submarine under water. We always used hydraulics, and then airplanes really sticks with wires and pulleys would be the analogy, and now both have moved in a direction toward sending telemeterized signals from processors near the stick to processors and actuators back at the control surface.

If you asked an old-time person, are you going to let somebody send photons or electrons back and forth to give the command, or are you just going to trust in that wire or in that hydraulic pipe, most of the traditionalists would say, you better not give up the wire or the hydraulic system very fast, and most of them would also say, I want to see a lot of redundancy built into whatever that path is that sounds to me fragile.

So, we engineer more redundant systems, and now F-18s and lots of other airplanes are flown with fly-by-wire systems, and adopted it faster than the submarines did, even though they go a heck of a lot higher and faster and all of that, high-risk environment, but the payoff for doing things lightweight and highly responsive, the way that technology was, had a more immediate transactional value to the aviation
side than doing that in a big submarine did.

But it turns out to be a good thing in submarines, too, but we had to get to where we could build the faith, build the confidence, and we built it through observation of other places that were embracing it and having to deal with some of these same risks.

So, I think sometimes we need to be a bit slow about this. That said, I'm really glad I have the iPhone I carry today and not the lousy BlackBerry I had a year ago.

REAR ADMIRAL NORTON: The -- it's an interesting comment. You talked about shooting the stars, celestial navigation, even aboard with the GPS systems we have the radar systems we have, the connectivity we have, it was fun for me to watch my -- the ship's navigator and also the quartermaster actually still go up and do celestial navigation just to keep those skills up, so that's still going on out there at least on the big decks, on the aircraft carriers, et cetera.

For the young sailors, the young quartermasters to reach their quals, they still rely on those things. Fortunately for me, I never had to rely on that, I always had my GPS and the radar systems, et cetera, and we still shoot fixes when we get close to -- using navaids when we get close to shores, et cetera, but,
yeah, out there in the deep kind of blue water ops,
relying on celestial navigation it's more of an art than
it is a science right now.

Yeah, we do rely on technology now, and I agree
with what Admiral Eccles says concerning the fly-by-wire
systems that we have, the night vision goggles, et
cetera. Ultimately we rely on some of the old
techniques. I can speak certainly from the cockpit,
even though we had night vision goggles, there were many
nights that to practice our instrument flying skills, we
would flip those up.

We would actually put hoods on so all we could
read was our instruments on the panel in front of us,
and so we would keep those skills. So, we still have
requirements to go back to what I would call the basics,
if we're going to fly in instrument flight conditions.
So, it's not in lieu of or we no longer do those type of
things. We use the technology to -- in the correct
environments, and mostly they're in the landing zones or
on the back ends of ships, et cetera, but there --
certainly have, in my opinion, have saved probably
untold lives and certainly equipment over the years
because of those technologies that are out there.

MR. SULLIVAN: Thanks to both of you.

DR. WINOKUR: One final question, Admiral
Eccles. We're interested in DOE safety culture. It's DOE safety culture or culture of safety, it's not the Board's, but we're an oversight organization. Do you have any ideas about how we can effectively assist the Department of Energy in providing some benefit to their desire to improve their safety culture over time?

REAR ADMIRAL ECCLES: Yeah, that's an interesting question whose answer I'm sure I don't really have great -- a great way to give to you because I've been a part of oversight organizations, but not as distinctly separated as this construct is.

Instead, usually what I was looking at is something like the people who are a part of a process in operationalizing something, then take some level of executive managers or leaders and make an oversight entity out of that and have the operational folks report on a periodic basis the status of things to that oversight group.

That's much less of a live connection than the one I might infer from your question, but if you accept the idea that that's more of a periodic check-in and a steering question, are we doing what we said we would do, are we achieving the kinds of ends that we intended to achieve, and if not, what are we doing about it. That kind of an oversight board has very little
1 operational connection but can still hold value in that
2 kind of a way.
3 And that's what I would imagine you already have
4 as a relationship, but I don't have familiarity with the
5 DOE, Defense Nuclear Facility Safety Board relationship
6 to be able to comment on how strong or not that is.
7 DR. WINOKUR: All right. Thank you very much.
8 REAR ADMIRAL ECCLES: Thank you.
9 DR. WINOKUR: So, I want to thank you, Admiral
10 Eccles, and I want to thank both of our panelists,
11 Admiral Norton and Admiral Eccles, for your valuable
12 insights into the safety practices and tools that the
13 Navy is using to improve or sustain a robust culture of
14 safety, both in operations and in the design and
15 construction of nuclear submarines.
16 At this time, it is the Board's practice to
17 provide an opportunity for comments from interested
18 members of the public. We will offer a similar
19 opportunities at the end of this afternoon's session,
20 and it's my understanding is there are no members of the
21 public or our audience today who wish to comment, but I
22 do want to ask again, is there anybody in the audience?
23 Yes, please? Let's get a mic.
24 Thank you very much.
25 (Brief discussion off the record.)
DR. WINOKUR: I think we're just going to entertain comments. I don't think you're going to question the panelists, but if you have thoughts or comments you'd like to share, please do that.

MR. SINHA: Hi, so my name is Ashish Sinha with the Alliance for Nuclear Accountability. So, the overall just thing, I think, that I was interested in and to consider was in the wake of the Air Force's recent challenge with cheating, Admiral Kirby had mentioned about his concerns about systemic problems with low morale within the nuclear mission, and so one of the things that I have been wondering about is that, is there a correlation between personnel's value of both their mission and work on their willingness to support a robust safety culture, and how do we guard against that if there is that sort of correlation?

DR. WINOKUR: I want to thank you for that comment, I appreciate it. That's something that certainly we'll be thinking about as we go about these investigations. Thank you.

MR. SINHA: Thank you.

DR. WINOKUR: Are there any other comments from the members of the audience today?

(No response.)

DR. WINOKUR: All right, thank you very much,
then. At this time, I will recess this meeting and hearing for lunch. I will hold my closing remarks and ask other Board members to hold their closing remarks until the end of this afternoon's session.

Once again, I would like to thank our two witnesses for supporting this session. The Navy has clearly put significant amount of effort and resources into understanding the concept of safety culture and improving their operations based on that understanding.

We appreciate the insights into those efforts that our two witnesses have provided today. I want to thank members of the public, Congressional staffers, elected officials, and other representatives of state and local organizations who may have been present this morning or observed our webcast. I invite all of you to return for this afternoon's session, which promises to be and interesting and informative -- which promises to be as interesting and informative as this morning's session has been.

This meeting and hearing is now in recess until 1:00 p.m. Thank you.

(Whereupon, at 11:51 a.m., a lunch recess was taken.)
AFTERNOON SESSION

(1:00 p.m.)

DR. WINOKUR: Good afternoon. My name is Peter Winokur, and I'm the chairman of the Defense Nuclear Facilities Safety Board. I'm presiding over this public meeting and hearing. I would like to call this afternoon's session to order.

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. We three constitute the Board.

Mr. Batherson, representing the Board's Office of the General Counsel, is seated to my far left. Mr. Steven Stokes, the Board's Technical Director, is seated to my far right. Several members of the Board's staff closely involved with safety culture oversight at the Department of Energy's defense nuclear facilities are also here.

Today's meeting and hearing were publicly noticed in Federal Register on August 14th, 2014. The meeting and hearing are held open to the public per the provisions of the Government and 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, associated documents, public notice and video recording will be available for viewing in the public reading room here at headquarters in Washington, D.C. 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 4:00 p.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 wish 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 comment, should time
permit.

Presentations should be limited to comments,
technical information and 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 September 27th, 2014.

I would 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 second of
a series of hearings the Board will hold to -- convene
to address safety culture at Department of Energy
defense nuclear facilities and to address the Board's
Recommendation 2011-1, Safety Culture at the Waste
Treatment and Immobilization Plant. Later hearings will
be announced by separate notices.

In this hearing, the Board is holding two sessions. In this morning's session, the Board received testimony from current and former Navy officers with a focus on safety practices and tools that the Navy uses to improve and sustain a robust culture of safety, both in operations and in the design and construction of nuclear submarines.

In this afternoon's session, the Board will hear testimony from a panel composed of a member of the United States Chemical Safety and Hazard Investigation Board, and two experts in human and organizational factors in management of high reliability organizations. The panel will discuss the role of the organizational leaders in establishing and sustaining a robust culture of safety within organizations conducting complex and hazardous operations.

In a follow-on session later this fall, we will discuss with 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.
1 Ms. Roberson?
2 MS. ROBERSON: I have no statement at this time,
3 Mr. Chairman.
4 DR. WINOKUR: Mr. Sullivan?
5 MR. SULLIVAN: No, Mr. Chairman.
6 DR. WINOKUR: This concludes the Board's opening
7 remarks. At this time I'd like to invite our three
8 panelists to the witness table for this session. I
9 notice you're already there. Each witness will be
10 provided 25 minutes to make a presentation that
11 addresses some of the initial lines of inquiry provided
12 by the Board in advance of this hearing. The Board will
13 then question each witness.
14 Our first witness is the Honorable Mark Griffon.
15 Mr. Griffon was appointed by President Obama in 2010 to
16 the United States Chemical Safety and Hazard
17 Investigation Board, also referred to as the Chemical
18 Safety Board.
19 Prior to that appointment, Mr. Griffon served as
20 a member of the Federal Advisory Board on Radiation and
21 Worker Health, which advises the Department of Health
22 and Human Services on occupational illnesses and
23 compensation policy. Mr. Griffon's career has included
24 work in academia, the public sector and the private
25 sector.
The Chemical Safety Board is an independent Federal agency with a mission of investigating significant chemical incidents and hazards, and effectively advocating the implementation of recommendations to protect workers, the public and the environment.

The Chemical Safety Board primarily conducts root cause investigations of chemical accidents at industrial facilities, but they also -- but they are also authorized to conduct investigations of chemical hazards, regardless of whether an accident has already occurred. Some of the significant investigations performed by the Chemical Safety Board during Mr. Griffon's term include the Deepwater Horizon explosion and fire, the Tesoro refinery fire and the West Texas fertilizer plant explosion and fire. All of these accidents resulted in significant loss of life and property.

Given the mission of the Chemical Safety Board, it could be said that Mr. Griffon sees organizations at their worst rather than at their best. With that in mind, Mr. Griffon will provide his perspective on the role that organizational leaders play in either contributing to the occurrence of accidents, or in responding to them, and perhaps share some ideas on how
leaders can help prevent accidents.

Our second witness is Dr. Najmedin Meshkati from the University of Southern California. Dr. Meshkati is a professor of civil environmental engineering and a professor of industrial and systems engineering. For the past 25 years, he has been teaching and conducting research on risk reduction and reliability enhancement of complex technological systems, including commercial nuclear power, aviation, and the petrochemical and transportation industries.

Dr. Meshkati has inspected many petrochemical plants and nuclear power plants around the world, including the Chernobyl Nuclear Power Station. Dr. Meshkati was the Technical Advisor for the National Academy of Sciences Committee on Lessons Learned from the Fukushima nuclear accident for improving safety of U.S. nuclear plants.

Prior to that, he was a member of the National Academy of Engineering, National Research Council Committee on the Analysis of Causes of the Deepwater Horizon explosion, fire and oil spill, to identifying measures to prevent accidents in the future.

He also serves as a consultant to both the National Transportation Safety Board and the Chemical Safety Board. Dr. Meshkati obviously brings a wide
range of experience to this meeting, but two of his most 
recent activities are of direct interest to this Board; 
namely, evaluations of the Deepwater Horizon accident 
and the lessons learned from the Fukushima Daiichi 
accident.

Dr. Meshkati will discuss his perspective on the 
influence that organizational leaders can have on the 
success or failure of the organization to respond to 
situations that challenge or exceed the design basis of 
the facility.

Our third witness is Dr. Kathleen Sutcliffe from 
the Johns Hopkins University. Dr. Sutcliffe is an 
organizational sociologist, and has recently joined the 
faculty at the Johns Hopkins Carey Business School as a 
Bloomberg Distinguished Professor. Prior to that, she 
was on the faculty of the Ross School of Business at the 
University of Michigan.

Dr. Sutcliffe's research has been devoted to 
understanding the fundamental mechanisms of 
organizational adaptation, reliability and resilience. 
She has focused on how top executive team composition, 
cognition and learning influence a firm's adaptability 
and performance on processes associated with team and 
organizational resilience and high reliability 
organizing, and on the social and organizational
underpinnings of mishaps.

Her explicit goal is to gain an understanding of how an organization's design contributes to its members' ability to successfully manage unexpected events.

Dr. Sutcliffe has studied and provided consultation to a wide range of organizations conducting hazardous operations, including the U.S. Forest Service wildfires, major oil companies, and healthcare providers.

From Board Member Griffon to Dr. Meshkati, we hope to learn how leaders influence the behavior of an organization and its likelihood of success when the organization is seriously challenged.

Dr. Sutcliffe will discuss with us her perspective on how organizational leaders can learn from such situations, and how they can work to improve themselves and their organization in order to be better prepared for future situations.

I am very pleased that these three distinct experts have agreed to be here and share their perspectives with us today. I look forward to their presentations and discussions.

We will begin the presentations with Board Member Griffon. Welcome.

MR. GRIFFON: Thank you. That's fine. Thank
you, Dr. Winokur, and members of the Board. Thank you for inviting me here, and I have the distinguished opportunity of being the first speaker after lunch, which we always know is quite troublesome.

I also feel like I'm returning the favor here. Ms. Jessie Roberson was nice enough to come to a Chemical Safety Board hearing where she testified at our hearing on process safety indicators, and she was very helpful, and I appreciate that, and so I hope I can give some insights into what the CSB's done in our investigations and particularly focusing on safety culture.

I think you are right, our perspective coming in is more probably glass half full than -- or glass half empty, I guess we tend to see organizations at their worst, and we also have a bit of hindsight bias. We're looking at what went wrong after the fact, not trying to prevent going forward, although our recommendations are focused in that regard.

So, I am going to do a quick intro to how we do our work, and then try to get into a couple of the investigations that have involved safety culture, and the last several slides are going to focus on a lot of sort of challenges questions that I have, and I'm hoping that we'll engage the dialogue between you all and the
whole panel, as I'm going to defer them on answers.

All right. First, my disclaimer. The only thing I really want to -- you know, this is our lawyers helping with this, but the important part for me as a board member is that I'm going to say quite a bit of information that's on the public record that's based on Board votes, and that's our process, similar to yours, is that our published reports are all voted on by the Board.

I'm also going to add into this presentation some of my own observations and views that aren't necessarily Board opinions at this point, but I think it'll will be helpful in creating a dialogue.

So, I don't know why this was laid out this way, but I'll just put it all up there. The CSB, I mean, we're a very small Federal agency. Most of you, I think, in this room, anyway, know us. Most of the audiences I go to don't know us, but we got funding in around 1998. Right now we have two Board members, we're supposed to have five. And we have about 45 staff, and maybe about 15 to 17, I think, of those are investigators.

We're modeled after the NTSB, but I often say that we're jealous of the difference in budgets. We -- so, our intent is to look at root causes and make
recommendations toward prevention. Of course, we’re not regulatory or and we don’t have enforcement authority.

I think at this point, I added in this slide because I think it’s important for people to understand how we go about our investigations, at least the more comprehensive investigations that we do, and this -- since I’ve been on the Board, we sort of modified our protocol to include or to change this approach, and the top bullet, I’ll read this out because I think it’s important to understand. “Formal analysis to identify underlying technical, unifactor management system, organizational and regulatory causes of the incident.”

So, the point being there is that we try to go beyond the widget that broke, beyond the worker error and ask, as someone earlier said, ask the whys, why did all this happen.

And, of course, we’re also -- as we do this, we’re looking at systems that were in place, but also the deltas between what management thought was going on versus what was actually going on.

And the other factor is why -- what conditions were present and what decisions were made that led up to the incident. So, we try to take that higher level look for causes.

I want to put this presentation into a context
1 of process safety and personal safety. This is a theme
2 that has come up in several of our investigations, and,
3 in fact, the two that I'm going to talk about, Macondo
4 and Texas City, also have a component of this. And I
5 think it's important as we get on to safety culture,
6 too, so we're really dealing with two distinct
7 disciplines, and on the one side, we have the attributes
8 of one, prevention for process safety. We're looking at
9 mechanical integrity, hazard evaluation, management of
10 change, the risk -- while there might be fatality risks
11 in both personal accidents and the more process safety
12 accidents, the major accidents, the property damage, the
13 environmental damage, the multiple fatalities usually
14 occur on these sort of larger process safety incidents,
15 so another distinction.
16
17 Also the indicators, I think, is very important. Personal safety, right now a lot of the indicators are
18 recordable injury rates, days away from work, and I'll
19 also note that these are some of the only indicators
20 that are required for reporting for a lot of the
21 companies that we cover. As you go into process safety,
22 you might be looking at other releases to the air or
23 more leading indicators to process events.
24
25 So, they're very different disciplines,
is not, but they're very different.
So, starting with BP Texas City, obviously I think this is the incident that probably took -- put the CSB on the map. A lot of people followed this incident, and it involved a large hydrocarbon release, a vapor cloud went through the site, and there in the foreground is the trailer. Obviously the vapor cloud found an ignition source, and these temporary trailers with contractors in and around took the brunt of the explosion, 15 deaths and many injuries, 180 injuries.
This resulted in actually two different reports. The Chemical Safety Board did a report, but they also asked for Secretary Baker led a panel, which we refer to as the Baker report, to further look at organizational issues, including safety culture.
So, some key organizational findings out of this, I just picked some obviously, but the first one, personnel checked off safety procedures as done when incomplete, and I think the point I want to make here is that, you know, obviously we don't want to stop the investigation there, and it was clear that these work-arounds had been occurring for quite some time.
The other thing -- the other way you think about the systems, reward systems, reward and punishment systems is that oftentimes workers are almost
encouraged, albeit subtly, to do these work-arounds, to be more efficient to make the system work. It's only when the procedure fails when there's retaliation or punishment to the workers. So, there in this case they were, they were working around these procedures for quite some time, just never had an event, and this obviously in this case they had one.

The absence of reporting of abnormal situations for fear of blame, this is another finding of the report. The message just wasn't getting up the chain. No messages -- no emphasis on learning from mistakes to prevent worse incidents. They certainly had prior incidents. They even had internal audit reports that were warning signs that they should pay more attention to process safety, and yet these were not emphasized at all. And the last part is the internal surveys.

So, the Baker panel went further with this, and I'm just highlighting again some of their findings, ineffective process safety leadership, lacking an open, trusting relationship between management and the workers, and the contractors I'll add in there. There was a multiple dimension there.

A lack of unifying process safety culture, and I'll come back to that unifying thing later. And, again, personal safety emphasis versus process safety.
They -- I think it was mentioned earlier from Macondo, there was a ceremony going on to reward a great safety record, the same thing that was happening pre-Texas City. They were getting an award for their very low lost time injury rates, and they were heavily relying on lost time injury rates to sort of be a predictor of major accidents, which is a fallacy.

And then there was a production versus safety component, too. Cost-cutting pressures seriously degraded the infrastructure. The maintenance budget I think was cut by 25 percent preceding this, and a lot of things that were waiting to be repaired were just put on hold longer, and so certainly a component.

They did, as a part of the Baker panel report, they did a safety culture survey, and some of the focuses of this, the attributes they were looking at, does the work force feel that they were empowered? Do they report safety-related incidents, process safety awareness, trust, information flow? Several of these are attributes that a lot of you are probably familiar with, but when you look at some of the survey items, and I just took a few snapshots off -- I'm not so good with my PowerPoint, but I took a few snapshots, and these are percentages that disagree with the question, the stated question. "I believe the culture exists at this
refinery that encourages raising process safety
concerns."

You see Texas City and Toledo, but I think the
importance is, I have three of these slides, they're all
similar. I think the -- there's a bunch of stuff to
look at and maybe ask more questions on, but one thing,
Texas City, of course, has sort of worse scores in some
regard, but I also point you to the differences between
management, engineering and the workers essentially, the
operators and maintenance people, and there's supposed
to be a last line which is contractors, but it was cut
off, but if you look to the report, you can find that.

The other thing that doesn't show up on this
simple overhead is that Carson and Cherry Point were
recent acquisitions by BP, so they might have had a
different culture because they -- a lot of the people
that were working there were under another operator
fairly recently, but there's a lot of more drill-down
that has to happen there to understand that.

Just another similar question: "Is management
more concerned with correcting hazards than assigning
blame or issuing discipline?" And, again, these are
even higher disagrees on this, so there was really a
focus or at least a perception by the operators and
maintenance folks that they were going to assign blame,
which makes them very unlikely to report, right?

And when process safety is involved, can I challenge decisions made by the supervisors without fear of a negative consequence? Again, similar numbers.

So, they have a fairly lengthy survey of this, concluding in part that there were some problems with Texas City's, and BP's to some extent overall safety culture, or at least some challenges to improve.

And then fast forward to 2010, Deepwater Horizon, so this is about five years after for BP anyway. Of course, we don't want to forget that Trans Ocean and Halliburton, and there were some other big players involved in this incident. So, the incident has been described, people are well aware of this incident. We, the CSB, is still trying to complete -- did I say that on the record, trying to complete? We're going to complete our report on the -- on the investigation fairly soon, and we've put out one -- two volumes out of the three, I think, that are going to be the full report, but at this point we're still looking at those components of safety culture, organizational failures.

We've got a lot of information, but I'm probably -- I'm going to focus on -- there's so many other reports that are out there right now, that some of the slides I'll share with you are from these other
1 reports, and I think we're going to -- we do agree with
2 most of these, anyway, that are up here.
3
4 The Presidential Commission Report Safety
5 Culture, again, must be accompanied by sweeping reforms
6 that accomplish no less than a fundamental
7 transformation of its safety culture. When I read this,
8 it also makes me think back to the Kemeny Report after
9 Three Mile Island, the Presidential Commission report,
10 where they also warned that the regulator and the
11 industry have to have sweeping reform. I don't know if
12 they used those same words, but essentially the same
13 idea of the way they do their business, and they didn't
14 use the words "safety culture" in that report, but, boy,
15 rereading it, it certainly sounded like safety culture.
16
17 The Commission's Chief Counsel Report went a
18 little further than the initial Presidential Commission
19 Report, and they added some findings on this that these
20 errors can lead back to management failures and
21 decisions, management errors. They didn't fully
22 appreciate all of the risks that Macondo presented, and
23 I think that was discussed a bit earlier, too, and they
24 didn't adequately supervise the worker and its
25 contractors.
26
27 This is this notion of deference to expertise.
28 They had the experts on shore. They weren't really
going to them. Part of it was the way they were organized and dealing with decision-making. This is related to the decision-making. They addressed one risk while increasing the overall risk profile. Again, this is from the Presidential Commission's findings. Failed to take full advantage of the shore-based expertise, and this is interesting to me, too, the overreliance on individual preferences and experience.

So, they were really dealing with the guys on the rig experiences on making these decisions and it almost -- at least we have some indications or questions about whether it led to sort of a group think atmosphere going on where they all kind of just -- no one really wanted to say no, and they just kind of proceeded that way, and never had problems doing it this way, so...and I think as was stated earlier in the morning panel, it might have been a good time for just a pause, talk to the onshore folks that didn't have those pressures and get sort of that secondary expertise or opinion.

I had to put a slide in for Dr. Meshkati. The National Academy of Engineering also did a report, and just to read the one, the lack of a strong safety culture resulting from deficient overall systems approach is evident in the multiple flawed decisions that led to the blowout, and they failed to appreciate a
plan for the safety challenges presented by the well.

So, again, not fully appreciating the risk. I think the sense we also have is that there was a real focus on the commercial risk, but sort of an underestimation of the potential major accident hazard risk so that they viewed, leading up to the incident, the view was that well, if all else fails, we'll end up having to redo the cement job or we might lose a few days of production, which in offshore drilling is no little thing. Obviously a lot of money is being lost, but they weren't really thinking of the major accident, at least in the sense that it played out.

And, so, with those two in mind, I want to come back to this concept, the safety culture model, and this is adopted from the IAEA model where you have the -- it's a circle diagram, and in the middle, of course, is a definition of safety culture, a lot of times thought of as the way we do things around here.

Outside of that is the values, which I list down here, and then the artifacts or symptoms are on the outer edge of that. And I just want to remention a few of these, because I think they're important. You know, the learning-driven concept, and the artifact is encourage reporting. Encourage reporting would arguably be a good thing, an improved safety culture.
The thing I think you have to look at, though, is does management want the reports. The workers are smart enough to know if management really wants to hear this or if they don't. They also have to understand about retaliation, and so these are important things when looking at this learning-driven. It's easy to say, but implementing it is much harder.

The first one -- I skipped over the first one, that it's a recognized value, across the organization safety culture is a recognized value, and my comment is unified safety culture. I think this is been expressed before, that can you really expect to have a unified safety culture, especially in big organizations? You have contractors, you have unions, you have different unions. You have, so so -- and on Deepwater Horizon, many different organizations working together, perhaps with different cultures. Can they -- can they unify around some practices? That might be a different question.

Resiliency, I always say, you know, this is a challenge in the field that I'm working in in that it's low probability/high consequence, so it's a common pressure that they have to say, well, we haven't had anything happen here for 20 years, why do I need more money for this process safety group, you know? And, so,
it's a real challenge to stay and stay resilient in that kind of atmosphere. And let's see, I think that's enough on that. We'll hit the other ones, I'm sure. So, the next several slides I have various titles for them, but they're all around the same notion, cautions and challenges, challenges going forward, et cetera.

The first one, this is a quote from Dr. Fleming, I think it's St. Mary's University in Canada, Regulator's Guide to Safety Culture and Leadership, and he's been working with the International Regulators Forum for Offshore Drilling and trying to put together a sort of international guidance document for offshore drilling on this issue, and one thing he says in this paper is that the popularity of the concept has been counterproductive, and there's a danger of it becoming meaningless.

And I've done several talks on this because I see the same concerns, I have the same concerns. I see a lot of headlines, safety culture caused, and I think if you stop there, my biggest concern is a lot of times the fix -- the answer for some of the companies we work with anyway, the answer is to say, you're right, that's fine, we're going to train up those workers and make sure they don't, you know, they get -- they get better.
behavior, and that doesn't answer any of my questions on
the whys going up.

So, I think he is worried or he states this
correctly, I agree with that, that we could dilute the
concept. There's a real fear of that.

I think I sort of hit on this, the overemphasis
and this is on the sharp end, the front line worker, and
I think this is a -- sometimes I think it happens
because it's the easier thing to address, you know, that
it's easier to take these recommendations and say
clearly we can train workers to look at this better,
train their attitudes.

It also ends up, I think, focusing more on
personal safety because that's the easier things to
grasp, and I had a trip to the United Kingdom where the
Regulator there, and they have, a lot would argue, a
much more robust regulatory system than us, in the Gulf
of Mexico anyway, and the Regulator there was -- the
industry wasn't very happy with us either, but she had a
big PowerPoint slide with a person carrying a cup of
coffee with a lid off of it, and she said that we have
to start thinking farther than the coffee cup with the
lid on it.

And I guess this whole focus on holding
handrails when you're on the rigs, putting coffee lids
on. Not that it's not important, but she said that there was no emphasis, at least on the shop floor, the line workers, on how she was pushing for campaigning for a better training program and how -- what the workers were doing on a day-to-day basis related to the system, the overall system, and major accident risk. So, that was an emphasis of theirs.

And I think, you know, a lot would argue that they're much further along than we are in the Gulf on these issues, so...

Another issue is risk tolerance. When you think about safety culture, it's a matter of sort of unified values about safety and risk, and, again, I don't know that you can unify those values. I also think there's a question there of -- a larger question of who defines what's tolerable, you know, or what's acceptable. Is it the corporate level? Is it regulators? Is it society? And how does that play out, and what other work, you know, if -- if the work force has a much lower tolerance for risk than management, it seems like it creates quite a -- quite a tension there.

So, and, you know, the other thing you get into there is this whole notion, and I think it was brought up earlier, of stop work authority, and they have -- they have this -- and in, in most of these offshore
facilities have this, in talking to, again, Norway, the UK, some of the higher level running organizations, they say, yeah, we have stop work authority, but the reality is if it's any critical path item, it's, it's -- you use it at your own peril, you know, and most people are very reluctant to use it at all, so it's not used for critical path.

In fact, petroleum engineers at a conference I was at were sort of challenging that and calling for that saying that we have to do better at this. We have to, you know, allow people to have that authority and be comfortable with that authority.

The next slide, just, just looking at I think most of the studies out there on safety culture right now and also on how you implement change, I don't see much considered on the question of power and authority, and, you know, obviously in these organizations you have different levels of power and authority from the line worker to the health and safety.

In Deepwater you had the safety people not reporting all the way up the chain. They were reporting to operations management, whose main driver was production. So, did they have the authority going up the line?

Similarly with the worker, that, you know, if
you're going to -- I think it's interesting that the
Baker Panel Report called out for empowerment. Most of
the reports you see call for involvement or informing
the workers. This said worker empowerment, which I
think a lot of work force people would appreciate that
kind of language, but how do you do it? And I think you
have to acknowledge when you're trying to make safety
culture change, that these dynamics exist, otherwise --
and they could be reasons for everything to fail or
collapse when you're trying to make this change.

And, you know, it's not simply a moral
commitment to safe behavior. You know, I feel, and by
the way, if I didn't preface this slide, these are my
opinions now. We're not getting into Chemical Safety
Board opinions, but, you know, I feel that there's a
better opportunity to change actions rather than change
the way people think, so perhaps as an oversight group,
you might have more influence in in recommending certain
actions be done or recommending certain -- rather than
recommending that everyone think the same and you have a
unifying safety culture.

What safety culture shouldn't be? You can read
down these, but, you know, my second -- the second
bullet, I think, is the one I want to emphasize the
most. I don't think it should be concerned with
employee -- with only the behavior-based safety programs, and this gets back to that addressing just the personal safety side of it. It's the easy part to address, make sure the workers have the -- the term I heard in the UK was they had the safety reps and the safety reps had more authority. Even within the regulations, the safety reps have designated stronger authority than the average worker on the rigs, and they were a derogatory term they were using was they were the PPE police.

So, if those reps are just watching for PPE and not reporting other things or looking for other process problems or maintenance problems, then that's an issue.

I'll go down to the impact of the regulatory oversight. I think -- I think it is an important role that -- and can have a lot of influence, especially in terms of telling people or advising what can be done. So, if they have a structure, for instance, if you're just requiring reporting of lost time injury rates and all the reporting metrics are related to personal safety, it should be no surprise that the strongest programs people have are in the personal safety arena.

I think this could be flipped, though, and more requirements could be included to improve metrics on process safety.
And there's this bit of an add-on, I see this as safety culture is part of the organizational culture, and I don't think it -- much like process safety or safety in general, it shouldn't be outside of everything. It shouldn't be an add-on to your organizational functioning. I think the same is true of the safety culture. It has to be thought of as part of your organizational -- part of how you do -- how you do what you do.

And this -- this, this speaks to how do you fix the problems, and, you know, this is just a caution I guess that the things that are measurable and malleable in terms of your behaviors, and it's often the lowest level actors with the least authority, as she says, in the organizational hierarchy.

So, again, the fix can't be just at the fix the worker, or blame the worker, fix the worker approach.

Finally, leadership in safety culture, just a couple of final concluding points. Measuring safety, the absence of failure, this is our business, right? The absence of failure doesn't equal effective systems. We see this all the time. They haven't had anything wrong for 20 years and they have a -- they have the big one.

They can't let the boundaries of safety slide.
I mean, I think this is this resilience issue, and if management doesn't want to hear it, people stop talking. And then there's the complacency thing, but the management doesn't want to hear people stop talking, I think the other challenge from leaders is that I've seen this a lot where in a lot of organizations we've looked at, that there seems to be high commitment from leadership, but then somewhere in middle management, there's mixed signals being sent. They're still being -- they're still getting most of their performance reviews based on production, so if that's the case, then what are they going to tell the shop floor workers, and what are they going to -- they're not going to want to hear bad news.

So, even though the leaders at the top might be saying safety first and all this stuff, somewhere in the middle, in middle management, all their metrics, all their performance measures are flipped, and we've actually -- I've heard from several that are really looking at that now since it's a topic in several large refineries where they're looking at changing those performance metrics for middle managers.

And you know what? I realized I should have like a submarine at the end of my presentation instead of an email address, but anyway, so that's all I have.
I hope that was helpful, and be happy to answer questions.

DR. WINOKUR: Thank you very much. I think it was very helpful. You might try the explosion at the end, that would probably get some attention, too.

MR. GRIFFON: Yeah, I've got to rework that.

DR. WINOKUR: So, we're talking about leadership and safety culture, and I want to stay on that theme a little bit, and I want to get a sense of what leaders we're talking about here. So, let's talk about what happened at the Texas City refinery and what happened in the Gulf.

We're not really talking about the head of BP, British Petroleum. I mean, he's in London. And we're not really talking about the Secretary of Energy. He's here in Forrestal, and he's running $30 billion worth of programs.

I mean, there must be some leader that you've seen who can make a difference here and, you know, get this connection to the workers and the attitudes and behaviors and so on. Where do you think that leader is in these plants or what's the sphere of influence that we really need to be looking at for the right leader?

MR. GRIFFON: Yeah. I think, I mean, based on my observations and the CSB's investigations, I think,
you know, a lot of these organizations, the plant manager is -- and I know it's a bit cliche, but we've heard it earlier, you know, that they, they really have to walk the walk, walk the talk, and the ones that are effective, the ones that get out on the shop floor can have the influence.

I think it's also important, a lot of what we've seen is looking at the leadership, not just necessarily a single leader, but the general manager along with the folks that work at the leadership level, and how that decision-making occurs and what information they get fed up to them. So, they have to be, I think, interested in hearing some of the bad news, not having it filtered out at the lower level, not just saying, you know, well, our injury rate levels look great, and I guess we're doing great.

I've been shocked by, over the last four years I've been at several conferences where I'm having a really good discussion with one of the co-presenters from a company, and they'll be saying a lot of the right things in terms of process safety and, you know, how we're thinking at the CSB, and they lead off their presentation by saying how great fill-in-the-blank X company is doing. You know, in the last five years, our injury rate -- you know, they just start with three or
four slides on injury and illness rates, and like I said, not that that's not important, but when you're at a process safety conference talking about major accident hazard, and they had no metrics on the other stuff. So, so, I think that general manager and that general manager's interest in process safety and understanding the importance of sort of being resilient in that regard, I think that's critical. And I think they do set the tone, but I also think they have to pay attention to not sending mixed signals. It's not just sloganeering. It can't just be, you know, safety first and a lot of posters around the facility. It's got to filter to mid-management as well.

DR. WINOKUR: So, when we look at leaders and things that they may improve or the weaknesses, and we had this discussion a little bit this morning with Mr. Sullivan, is it the fact that they don't understand the hazards? They may not have the technical background they need to appreciate what can happen, or is it that they don't respect the hazards, more along the lines of being complacent and saying, it never really happened here before, we don't expect it to happen again? Where is the pitfall in terms of what their -- because when it's all over with, they must be just beside themselves that 10 or 15 people have died and --
MR. GRIFFON: Yeah. I mean, I think it's probably a mix of don't fully appreciate the hazards, and also when they're being told for several years that everything is going well, all these metrics look good, everything they're reporting is good, and at the same time they're being asked for more money to do X, Y or Z, it's an obvious question of why.

So, there might be a little bit of not understanding the idea of this -- the field that we're in. Again, the low probability/high consequence incident, and not fully appreciating the risks that they could face. I think that's part of it.

DR. WINOKUR: So, what does it take to get a leader to acknowledge and understand the dangers of these low probability/high consequence accidents?

MR. GRIFFON: Well, hopefully it's not the big accident. Sometimes that's the case though, you know? I've actually spoken to somebody that said they -- that some of these managers that went through these big incidents, anybody was reluctant to hire them for similar positions, and the person I was talking to made the reverse argument, they said, this would be the perfect person to hire because they've gone through this and they really respect it and appreciate it.

I met a person at a conference that was doing
exactly that. He went through -- he wasn't the general
manager at that time, but he went through the Phillips
incident, and he said it changed his life. It gave him
a whole new respect for it. But I guess it's just these
ideas of lessons learned.

I also think it's an understanding of
cross-sector. I've tried to do this for the last
several years with talks with the nuclear industry,
particularly because of my background, I've been engaged
in that, but the idea that these learnings -- just
because it was a refinery, doesn't mean that there can't
be learnings for managers in the nuclear sector. I
think the NRC really appreciated that, they invited me
my first year on the Board, and they said, we would love
for you to come and talk about Macondo, but we don't
want to hear anything about the blowout preventer, and
that, to me, spoke that they're really thinking about
how this could apply to what they're doing.

So, I think that's another thing, is that they
-- that you can't wait. The leaders shouldn't be
waiting for it to happen at their facility, but they
have to be exchanging this information. I think there's
a couple of model, I won't name companies, but there's a
couple of companies that are doing really good things in
this regard, they're doing training where they actually
link -- they actually talk about process safety elements within their own organization, and then they link it to a Piper Alpha accident or something like that, and it tells the younger work force that, you know, you haven't seen one of these, but if this isn't done right, this is what could happen.

So, I think that part of it is critical. Don't wait for it to happen at your facility, you know, share those lessons learned or get those lessons learned from others.

DR. WINOKUR: Alright. We can chat about that more later. Mr. Sullivan?

MR. GRIFFON: Okay.

MR. SULLIVAN: Thank you, and thank you for coming, Mr. Griffon, and I've already forgiven you for not having a submarine picture.

MR. GRIFFON: I have to work on that, yeah.

MR. SULLIVAN: But you only get one free pass. I want to -- you just -- I want to follow up on the Chairman's question talking about the level of leadership, and I think you identified sort of the plant manager level. My background is in the Navy. It was a big Navy. We've got fleet admirals, but sort of the commanding officer of a vessel might be a comparable level.
The question goes to what is the experience and the background of the person who got there, how did they get there, and what I'm really looking for your insight on, based on your experience, is if you notice any difference or place any preference for what I would think is a trade-off between you have an individual who maybe comes to a plant and starts at the lower level, 20 years later that person is now the plant manager, so they know that plant. They know its ins and outs.

On the other hand, if they learned something that is a bad way to do business, bad habits, if you will, those bad habits may stay. The Navy sort of benefits by having -- you have many submarines, and from a technical standpoint they're all very similar, if not actually identical, and so you can move from one to the other as you grow, get higher in authority.

By the time you get up to that plant manager level, you are the technical expert on that submarine, but on the other hand, you didn't stay in one place and you get to see different ones.

MR. GRIFFON: Yeah.

MR. SULLIVAN: So, is there -- would you say, generally, do you have any thoughts about whether or not it's better to see movement prior to you getting to that level or have somebody who really understands that plant
and has been there for a very long time, be at that
plant manager level?

MR. GRIFFON: Yeah. I don't know if I have a
lot of experience to offer on that question, but I mean,
I would say we see a variety of leaders at the different
plants that have been, you know, as you describe, the
ones that worked there for 30 years, worked their way
up, and they're in charge, and there's certain benefits
to that.

We've also seen some that come from the outside
but not even with the technical background. They're
more run there to get the plant in financial shape.
And, so, I guess for me, I don't -- you know, I think I
could see places where either leader could be effective,
but they also need to probably have a good leadership
team.

So, the person that's more financially oriented
has to understand what they don't know and has to ask
questions and have a team of experts around them that
could be working with the lower managers and process
people, and I just don't have experience with what you
said, shifting from one, it makes a lot of sense in the
Navy system.

What does happen in like refineries, and I'm not
sure this is necessarily a positive, is that they have
constant either selling refineries, so they have
different company takeovers, and upper management will
change and come in with a bunch of their own new
initiatives. And, you know, it may be better, it may be
worse, but it's new. It definitely creates a flux
situation for all the site because they're used to doing
things a certain way.

So, we see a lot of that. I'm not -- I'm sure
there is some migration of people that had a lot of
experience at one plant and moved to manage another, and
might be some benefits to that, but the effect we've
seen on that -- the other issue we have as far as sort
of safety and sort of continuity in it, is this the
challenges of the middle managers.

Middle managers in the refineries, and I think
it's true offshore as well, a lot of them are looking
for the fast track to corporate. And, so, just, again,
it gets back to ways their performance are measured, and
a lot of times they're very reluctant to take on sort of
long-term safety challenges because it's going to make
their bottom line look worse and their performance not
look as good, so they want to look as good as they can
for the three or four years they're in that position and
then move up the ladder.

And, you know, again, that's a challenge to sort
of having the organization's process safety continually improve.

MR. SULLIVAN: So, I would like to --
MR. GRIFFON: I'm not sure I got to your question because I just don't have much experience on that one part of it.

MR. SULLIVAN: That's okay. I don't remember my question anymore. I want to follow up on, you talked about the flux that happens in refineries when companies get bought out. We actually see something similar when we're doing our oversight work with the Department of Energy, that they compete contracts for contractors, but the nature of the beast is they can change contractors, but there's only so much talented work force in the vicinity of the plant.

They happen to be the same people, so the middle -- the middle to the lower, they're all end up being the same human beings, and we just change out the corporate structure.

MR. GRIFFON: Right.
MR. SULLIVAN: So, we see that happen in the area that -- that we are interested in, and I'm just wondering if you -- I know you mentioned it. I'm not sure you gave any thoughts as to whether that was a good thing, a bad thing, or a mixed bag.
MR. GRIFFON: I see it -- it's a -- it's a challenge I'd say. You know, I'm not saying whether it's good or bad, but it's a challenge. I know talking to some of the folks at Texas City, that plant got sold, and they actually told me, this is four years -- I mean, this is three years into my term, so it's several years after the 2005 incident, and they said they actually felt like they were making headway, but then the new team that came in had all new initiatives, and they're dropping this initiative that they thought was very -- so, you know, it creates this flux and you have to at least manage that and understand that, you know, and if you're going to have -- I mean, that's the challenge of a unifying safety culture, too. If you -- there's got to be a meeting of the minds at some point that this new management team coming in -- maybe they have great ideas and the work force that's been there for years should be open to this change, but you have to manage that change.

That's all I'm saying. So, it can be -- I think we've seen mixed bags, but it's something that certainly has to be paid attention to.

MR. SULLIVAN: Thank you.

MR. GRIFFON: Thanks.

DR. WINOKUR: Ms. Roberson?

MS. ROBERSON: So, I guess first I make a
comment and then I'll find out if you agree or disagree, and then I have a couple of questions.

One is, I mean, as you know, I definitely think the focus on process safety, first personal safety is an important one, and the -- I call it the personal safety, the safety bubble, and therefore if there's any turbulence inside or outside, you can burst the bubble pretty easy, but why is it so hard for leaders -- so, this morning we talked about the Navy, their SUBSAFE system I consider to be a process safety investment. Why -- you guys do investigations. Do you see the leadership in different companies taking hold of that lesson learned from accidents?

MR. GRIFFON: Yeah. And I think to different degrees I guess I would say, but yes, there is definitely more attention now to sort of process safety and process safety metrics, and how to get their arms around it. Some of it is pretty challenging.

I mean, I've heard anecdotally people that they start measuring a certain metric and they collect all this reams and reams of data, and they realize that it probably wasn't the right metric to begin with. So, you know, there's a lot of trial and error with these metrics. What's the appropriate metric to be looking for when you haven't had the major accident that you...
might be trying to prevent for years.

So, it's harder to see the leading indicator, whether it's the right leading indicator, but there's certainly more attention being paid to it. I guess the shocking thing for me is that there's still so much out there that you see people presenting and saying that injury rates are low and therefore we're doing wonderful, you know. So, there seems to be some sort of disconnect still.

I know that prior to Deepwater, I think it was in 2009, there was an argument made by the industry group that there wasn't a need for a safety and environmental management system regulation offshore in the Gulf, and part of their argument was that they have a slide in their presentation showing the low injury rates compared to other industries, and their offshore is way down here and then petroleum and general sector, you know. And, so, on that graph, it was obviously a convincing argument to some, but I think, yeah, it's definitely being paid attention to more, but there's still, I think, some, some disconnect.

MS. ROBERSON: So, let me ask you, in the -- what you can share in the investigations that the Board has conducted or the ones that you've evaluated when you weren't on the Board, have there been any where there
was an obvious disconnect between the quality of leadership and things going wrong down below?

MR. GRIFFON: I would say, their -- their -- that we've seen problems with the organizational issues, you know, including the inattention to -- that safety didn't report directly up the chain, that sort of thing. I don't know that we looked at individuals themselves, you know, individual leaders and their qualities, but there was obviously the structure of the organization, the focus of the organization seemed to suggest -- had a flawed model to start with.

MS. ROBERSON: So, are there other things that you conclude would be important traits? I mean, the structure is definitely one you just cited. Do you have to pay attention to the other key traits that you think would be important for a leader to pay attention to?

MR. GRIFFON: Yeah. Well, I guess just, you know, this notion of really understanding what's going on, you know, below them in a sense, you know, and then being on the shop floor, being willing to hear bad news. And when I say that, it's like, well, who is not going to be willing, but I mean, there has to be some sort of openness that the workers really say, yeah, this is okay, we can report this up.

You know, there's also challenges to making that
happen. I mean, it doesn't get lost on me the fact that we talk about this trusting relationship to report bad news up the chain or whatever, and yet some of the systems that we say are the best is like in aviation, they have an anonymous reporting model. Well, if they had an open, trusting work environment, why do you require an anonymous reporting model?

And I know there's reasons, but, I mean, it's just -- so, I think -- but the leaders have to be open to hearing that bad news and not just want to put on the blinders, so to speak.

MS. ROBERSON: Thank you.

MR. GRIFFON: Sure.

DR. WINOKUR: Mr. Sullivan?

MR. SULLIVAN: I want to follow up on the structure, specifically with respect to internal oversight as opposed to external oversight by a regulator, but whatever internal oversight models have been used by different companies, if you can share any either best practices or worst practices that you've seen?

MR. GRIFFON: Yeah. I mean, there is definitely the internal oversight models. I think I've seen -- we've seen the gamut of it. Again, it goes back to the internal, the corporate auditor being sort of accepted,
and that they're, just a -- not viewed as, oh, here
comes some bad news from corporate, but rather, they
give us some great insights, and we have to address
these. This is good. We're getting a fresh set of eyes
to look at our issues, and I think you can quickly see
the difference.

I mean, there's some that -- so, I think that
model is important, that the management from the top
down has to say, this is corporate coming in, but we
want to look at this as a learning opportunity, not as,
you know, clean everything up and cover everything up
and don't give them everything, don't give them access,
that sort of thing.

So, I've seen both sort of models, and I think
obviously the one that's in my opinion more effective is
that one where they're using it as a learning
opportunity. And then in some of the systems we've
looked at, you also have the sort of third-party
verifiers, and that's been a bit of a mixed bag, too,
because there can be a strong impression that they're
basically paid by the company to tell them what they
want to hear.

And I've heard from the third party verifiers
some of the frustration they have is they're doing a
sort of random audit, and they'll find something wrong
like one flange is bad. Well, they only looked at ten
out of a thousand, and they found two that were bad, and
the company says, oh, that's okay, we're going to fix
these right away, and don't write that up, you know.
So, that's not the way to work with your
auditor. That's not the right model. It's not going to
help you in the long run, so.

MR. SULLIVAN: Thank you.
MR. GRIFFON: Thanks.
DR. WINOKUR: We've been talking about process
safety and personal safety for a long time, and when I
first came on the Board, and that was eight years ago,
all we pretty much saw at sites was slips, trips and
falls. I mean, the site managers immediately want to
tell us about their DART and TRC records, right, and
we've worked with the Department quite a bit on that,
and I think they've made a lot of progress. I think
they have a better set of metrics and they certainly
have a pretty good occurrence reporting system, so in
that sense DOE, I think, is doing better.
But I want to understand why you think this
imbalance continues to exist between -- or there isn't a
clear enough understanding of the need for process
safety at these facilities.

MR. GRIFFON: Yeah. I mean, I think -- I can't
1 speak to DOE so much, but in the OSHA arena and in the private sector chemical companies that we're dealing with, I think some of it comes back to a sort of compliance mindset. So, I'm not in any way blaming OSHA, but the regulations are focused on reporting those things, and therefore if the company also has this sort of compliance mindset, then they're going to have their safety -- they expect their safety group to comply with OSHA, and that's the extent of it, and they don't want to, you know -- now, OSHA also has process safety management, but they don't have the reporting requirements and things like that in there. So, I think that's part of it.

I think, you know, the other factor, which I've already mentioned, the other factor is that they just don't see these things very often, and especially for smaller companies to make a bigger investment on something that they haven't heard of or seen in 30 years, it's difficult, you know. So, there's a challenge there to just not just say, well, we've been out -- I think we're still working on this investigation, but we went to a place that had unbelievable, by our investigator's accounts anyway, housekeeping was immaculate. The general manager, I think it was like a family kind of owned place, you
know. The general manager knew everybody there, knew everything, you know, would probably get great scores on safety culture, and that part of the safety record was great, and I think they just never -- the hazard, the explosion that occurred, they just never anticipated the hazard at all.

They weren't covered under process safety management, so they weren't even required to look at it. And, you know, so, some of it, I think, is back to the focus, the emphasis for the last 20, 25 years on reporting anyway, and on everything the Government is looking at is those injury illness records, less interest on the process, and I think one role the regulator could play, and we've actually made this recommendation to OSHA, to add in process safety indicators.

MR. SULLIVAN: And you've made that point that there could be a regulatory component. One of the things that I've personally spoken at some DOE workshops about is the cost of safety and the cost of accidents, and it's pretty sobering.

MR. GRIFFON: Right. Yeah.

MR. SULLIVAN: And you may not be aware, but DOE recently had some accidents down at the Waste Isolation Pilot Plant, which may be offline for two or three
years, and the cost, in the end, is hundreds of millions of dollars to fix the problems down there. And typically, I mean, I don't know, what is the cost of the -- to BP of the Macondo or Texas City refinery? What are those costs roughly? Are they in the billions?

MR. GRIFFON: Yeah, I don't know -- I don't know even know the numbers there, but they're huge, yeah, yeah. But I don't know that they -- that those large oil companies can't absorb those even, so...this is my opinion, of course. But they're enormous, yes, and the other thing they also consider is obviously the effect on the corporate image and everything else, and the communities they're working in. So, yeah, it's a big toll.

DR. WINOKUR: One of the things I've heard why slips, trips and falls are a good measure as opposed to process safety is that they say slips, trips and falls are leading indicators, and if you can't take care of the little things like somebody tripping on a step, then that's eventually going to lead to bigger and bigger problems.

So, it's just there's a value on it, and once again, I'm not minimizing slips, trips and falls, and I would not minimize them on an oil rig, where I do think if you tripped or fell, you could have a serious
But still, I think there is some of that mindset. Do you think that that's true?

MR. GRIFFON: I think it's a false premise. I don't think these are leading indicators of the process accidents.

DR. WINOKUR: I don't think so in that sense either.

MR. GRIFFON: Yeah. Right. I mean, I think -- look at oil rigs. You know, they -- right after I went out on my first rig offshore, they shared with me a presentation on all the helicopter accidents that occur, and it was my first helicopter ride to a rig, you know? So, I don't -- I don't minimize the personal safety side of things for sure, and the falls from height on the rigs are another major problem.

Especially in the North Sea, I mean, these things are all over the place and very, very dangerous, but I think that's been a premise that's been put forward for years, that if we have these rates low enough, therefore we're protected from a major accident, and I think it's been pretty well -- literature has pretty well gotten rid of that notion, that the two are disconnected, and you have to look at other indicators. You have to look at other metrics to sort of have a
Dr. Winokur: What was the basic point, one more time, my last question now, about what you were trying to say associated with power relationships?

Mr. Griffon: I think to look at safety culture at the sites and not to consider power relationships is -- it's not appropriate. I mean, you have to weigh in the different power relationships and authorities that people at all different levels have within the organization. Otherwise it could end up being -- it could end up blowing the whole thing up, the change you're trying to promote if you don't consider how the unions are working with management or contractors.

There's a lot of -- on refineries especially, there's opinion, we hear it quite frequently, is that workers say, well, you know, especially during shutdowns, they hire a lot of contract workers, and the union workers are usually pretty angry about that. But it's not only connected to wages, they say, it's also a health and safety component because you're bringing in these groups of people that might be the low bidder or whatever.

So, you have these -- whoever is right or wrong on these issues, you have these relationships, the contractors, the unions, the management, and you have to
consider that when you're trying to consider how do I unify the culture around safety.

DR. WINOKUR: Thank you.

Ms. Roberson?

MS. ROBERSON: I don't have any additional questions.

DR. WINOKUR: Well, I'll just end with one question and then we'll move on, and that was that last question, and I don't know if it was mine or yours, but I asked it before, it may not even be a good question, but what recommendations can you make to an organization trying to provide oversight, you know, a better way for us to perform the oversight role that could help DOE improve its culture? And once again, it's DOE's culture, not our culture, but where can independent oversight provide some benefit?

MR. GRIFFON: Yeah, I mean, I think you can play a role, at least in -- well, I mean, I think there's a program right now that's sort of come up through DOE out of the incident. It's a -- I knew I'd forget the name of it.

DR. WINOKUR: Safety-Conscious Work Environment?

MR. GRIFFON: Safety-Conscious Work Environment, yeah, and I guess I would -- one role is I think it's appropriate for your Board to be looking at, is that the
right tool or the right fix for the problem? And I will say I talked to some safety reps at the conference I was at with you, Dr. Winokur, in Las Vegas, that are now questioning whether that points more toward personal safety fixes than toward the more systemic problems.

And, so, I think that's maybe one area where you can weigh in with guidance or with additional recommendations, you know, clarifying recommendations, whatever.

DR. WINOKUR: All right. Thank you very much for that presentation and answering our questions, and we will now move to Dr. Meshkati, or Professor, I believe.

PROFESSOR MESHKATI: Thank you very much, Chairman Winokur. My name is Naj Meshkati, I'm a professor at University of Southern California. And to the Ms. Roberson and Mr. Sullivan, it's really an honor for me to be here.

There are much more qualified people than me that can make this presentation. One of them is watching us over the Internet, that's my mentor, Mr. Earl Carnes. I want to be on the record that I acknowledge him, but whatever I do good, I learn from him; whatever I did bad is all my own fault.

DR. WINOKUR: I'm so happy to hear you have a
mentor still.

PROFESSOR MESHKATI: In fact, I would like to start with another -- first of all, I would like to point out that this is basically my personal reflection of last 25 or last 30 years being in this business. As you mentioned in my bio, I have visited many nuclear plants, Chernobyl, Three Mile Island, Fukushima in 2012, and many nuclear plants, and I have been on several committees, and I've had the privilege of being on two national panels on that, but what I'm presenting to you is very much my personal reflection and the story that I learned from my mentors and from my own research.

I would like to start again by another mentor of mine that he has a book, which I'm going to show it to you, and that is Professor Jim Reason, that I noticed he was promoted to be Admiral Jim Reason in the previous panel, but Jim Reason is so dear and God to me at least, but he has a recent book, and that is this one. It's his latest book called "A Life in Error", and again, being a university professor, I would like to assign a reading to all of you colleagues here. This is a must-read. It's a very smart book. And, it's called "A Life in Error." This is really a compilation of Jim Reason's research in last 30 years that you know about human error, you know about organizational accidents,
you know about human contribution, but this is really
the finale, so far. I know that he is working on
another book.

But look what he has said about safety culture
in this, and I'm quoting that from his page 81, and I
put this title because I think -- I put that in this
title in the context that I'm familiar with, root cause
accident, common mode failure, and because of what Jim
says, Professor Reason says, I think culture is a very
important issue.

This is exact quote from page 31 of his book.
"Because of their diversity and redundancy, the defense
in-depth will be widely distributed throughout the
system." We know multiple layers of defenses that we
have in nuclear plant, the last layer of defense is the
containment dome, and then we have other layer of
defenses going down. But this layer of defense for all
sort of technological systems, to the extent that I
know, they are basically, they exist in different
places.

Then he says, "as such, they're only
collectively vulnerable to something that's equally
widely spread, the most likely candidate is safety
culture."

And the last line I think that is the key: "It
can affect all elements and systems for good or bad."

For example, if you look at, we could have -- I always refer to the accident that I started my career by investigating that or writing about that Bhopal Chemical accident on December 3, 1984, and that accident, we could have stopped the release of the material, that was cyanide. After the water got into tank 610 and the reaction started, we have had several layer of defenses, like water curtain, and then the scrubber, and then from the scrubber the water curtain and flare tower, but all these three were broken. They all fell off because of bad safety culture. Of course, there are many examples like that.

I think Jim Reason genius has put such an important issue in such a succinct of three, four paragraphs over there. And I call that this is my premise, this is what I have seen in my professional career, I want to come back to that.

For now, I would like to concentrate on Fukushima because I knew the Honorable Mark Griffon would be here, he would be talking about BP, Deepwater Horizon, and Rear Admiral Tom Eccles was here that I had the honor of serving with him and others on the BP Deepwater Horizon, that's why I want to concentrate on Fukushima, and if there is some question on that, I can
come back to the BP Deepwater Horizon.

Let's look at Fukushima. That's the one that I spent the last three years of my life on that. But this is a very rudimentary map of Japan. You see Tokyo over here. You see Fukushima Daiichi over here. You see Fukushima Daini over there. I would like to come back to it later.

As you see, Fukushima Daini is closer to Tokyo than Fukushima Daiichi, and I will come back to it. This is just to give you some relatively -- relative location. I want to come back to this map because there is another nuclear plant that I would like you to pay attention to.

The Fukushima accident happened on March 11, 2011, and there have been several investigations of the Fukushima accident, excellent investigations by the International Atomic Energy Agency, by the Parliament of Japan, which is called National Diet, and then by other agencies which I will come back to it.

But if you look at the -- really the root cause of the two Fukushima accidents, this is what happened exactly. One, we had -- of course, we had the earthquake; 45 minutes later the tsunami came. The earthquake basically caused loss of offsite power. That happens a lot. We are prepared for that. In U.S.
nuclear plants, everybody, loss of offsite power. That's why we have something which is called emergency diesel generators.

And because of the loss of offsite power, of course the reactor, they shut down automatically, in the case of Fukushima, both plants, Daiichi and Daini, emergency diesel generators are kicked in.

However, I have to say for the record that emergency diesel generators are very temperamental machines, and as we know about this accident -- this earthquake that was near Washington, D.C. a few years ago, one or two of the emergency diesel generators at the nuclear plant, they didn't kick on.

But in this case, the diesel generators kicked off, and everything was good. However, 45 minutes later, tsunami came, and that tsunami basically inundated emergency diesel generator or their switchboard or their cooling pump. In some cases, basically emergency diesel generator, they became inoperative because they themselves got inundated or their cooling pumps they got inundated. They couldn't send the cooling water around the diesel generators, they had to overheat and shut down or some of them their switching systems and they cut off.

The combination of one and two, meaning the loss
of offsite power inundation after emergency diesel
generator due to tsunami caused something which is
called a station blackout, and a station blackout was
exactly the thing that it's one of the most severe
accident that could happen, and there is this history,
you know that very well.

However, the difference between Daiichi and
Daini was in the case of Daini, when that great line
that fell off, one 420-kilovolt pylon was still on.
However, that was sitting outside the fences of Daini.
Everything inside the connection of that to the plant
got lost.

That's one of the biggest or luckiest things
that the Daini people had, which Daiichi didn't, as far
as I remember. I can double check that for the record.
But I would like you to keep that in the back of your
mind when I come back to it.

National Academy of Sciences, at the request for
U.S. Congress, they put together a committee, it was
called Fukushima Lessons Learned Committee for Improving
U.S. Nuclear Power Plant Safety and Security. This
committee consists of like 20 members. I was a member,
and a technical advisor on this committee. The
committee released this report on June 24, 2014, just a
few months ago.
As this committee visited Fukushima, Daiichi, Daini and other plants and studied a lot of issues over there, however, I have to have this disclaimer that I learned from Honorable Mark, that I am speaking as myself here, not as a former member of the committee or maybe I'm not reflecting the points of view of committee. That's why I put that personal opinion under that because I quote the committee, but I may give a little spin to that that some committee members may not necessarily agree with that, but anywhere that I have excerpts from the committee, I quoted.

These are my personal observations. Was Fukushima a natural disaster or what we call that natural disaster or earthquake triggered a anthropogenic man-made accident? From the day one of that, or after a few weeks, this issue was discussed in media by many people. What was Fukushima? And basically this report came on the first anniversary of that.

As you see, the title asks "Why Fukushima was Preventable." The former commissioner of -- and this statement is very interesting, let's say. It was preventable if it had we had appropriate enforcement.

The former Commissioner of U.S. NRC, my dear colleague from MIT, Professor George Apostolakis, gave a talk at a meeting. I think he gave a talk at that first
anniversary. As you see, his statement is very politically correct, about the issue of preventability and being able foresee. But again, because he was a Commissioner on that, he had to be politically correct. But basically the debate on preventability of Fukushima came to attention of people, and that's what I would like to concentrate on that and relate that to safety culture and leadership here.

National Diet of Japan, which is the name for the Parliament, they came with their report. It was released on July 2012, I guess, and the Chairman of this group was Dr. Kiyoshi Kurokawa. I met him when we went to Japan, and I met him again when he was in Los Angeles on a private trip two months ago. And, so, I learned a lot from this gentleman.

He wrote an introduction for this National Diet report. It's the most comprehensive study that I saw. That introduction is one page. Within that one page, four times he uses the term "mindset," in one page, "mindset." And then these are some excerpts from that, Dr. Kurokawa's introduction to that Diet report. I say that Daiichi cannot be regarded as a natural disaster. It was profoundly a man-made disaster that could have and should have been foreseen and prevented.

Then he said that it was a man-made accident in
These are some very strong statements considering that it is in the National Parliament of Japan. It requires a lot of guts to put that in a very polite society like Japan. That’s why I salute Kurokawa for this.

And then these are two other excerpts from that that he says that we -- in Japan, we failed to learn from Three Mile Island and Chernobyl. In fact, he was talking about Kemeny report, Rogovin report that you mentioned to it, and also Chernobyl report by IAEA, and others. Then, of course, he talks again the issue of the mindset over there.

This is very interesting. If you look at the National Diet report, the way that I studied that myself with my students, it’s very revealing. It’s really a seminal report.

And now I want to take you to another issue which is related to that. You have heard about Fukushima Daiichi and Fukushima Daini. I have asked this question all over. I have asked it from many audiences in different conferences and that, have you heard about Onagawa nuclear plant? The typical answer is -- some people say yes, the majority of the audiences that I have asked that question, they say no.

In fact, we had a conference about the economic
effect of the great Tohoku accident in USC in June.
There were a lot of people from Japan that I asked that
question from them, and only a few of them have heard
of, I don't know why.

Well, maybe the reason is this: Look at this
map, please. This is very, very interesting, and it's
going to be revealing for you. This was Daiichi. This
was Daini. You have seen that over here, and this is
Onagawa. But you haven't heard or many people, they
haven't heard about that. And I will tell you later
that this plant, as you see over here, was 60 kilometers
closer to the epicenter. Tsunami height was one meter
higher, but we haven't heard about that.

This is very interesting, and Fukushima in a NAS
committee report that has done a good job, beautiful
report, but it doesn't do justice to this question in my
judgment, and I think there should be like a sequel or a
complement to that report, about specifically about
Onagawa.

And by the way, I wrote an editorial which was
published in the Japan Times, the day before yesterday,
I have a copy of it, which is I'm going to submit that
to you as part of the record, specifically about
Onagawa. There is also another article that my students
wrote about that.
This is, again, another map of Japan that shows you the location of Onagawa. It's more detail over there. Here is epicenter, and this is interesting that this map was sent to us by this gentleman from Japan after my student article appeared in Japan Times. This is my former Japanese student, extremely bright student by the name of Airi Ryu. I encouraged her to work on this term paper for my class last fall. The title of her term paper was "Nuclear Safety Culture in TEPCO and Tohoku Electric Power Company, the Root Cause of Different Fates of Fukushima Daiichi Plant versus Onagawa."

And this is her receiving the Discovery Medal at the last May commencement. She now works for Bloomberg in Tokyo. Brilliant, brilliant student. She accessed a lot of Japanese documents that our National Academy report and others didn't have resources to study that. That's why I think her paper, which is posted on our website, and that is one of the seminal reports about Onagawa. Undergraduate USC. I should plug my university here.

A short copy of her paper got published in the prestigious Bulletin of Atomic Scientists last March on the anniversary of Fukushima, the title of that "Onagawa: The Japanese Nuclear Power Plant That Didn't
Melt," and then a longer version of that, as you see over here, got published in Japan Times.

And this article generated a lot of response to us, those photos and that that I showed to you. People sent it from Japan to us. And this is something that I'm going to now concentrate, why you haven't heard about Onagawa.

Let's give you some information, this information, by the way, is by my student, I didn't know how to do it. It's great. Daiichi and Onagawa, let's look at that. The nuclear power plant. They are both -- Daiichi had six reactors, BW, boiling water reactor. Onagawa had three reactors, boiling water reactor.

Their commission engaged with construction is always the same. Their regulatory oversight is always the same. Ministry of Economy, International Trade and Industry, and then this Nuclear Safety Agency or something, Nuclear Industrial Safety Agency.

In that case, you see that these two plants, they are the same age, the same vintage, the same regulatory oversight. See that basically I tried to go selection by elimination. It puts the regulatory oversight common to these.

If we can attribute that to the regulatory problem, they have the same oversight, but let's look at
Onagawa was 60 kilometers closer, and tsunami was higher at Onagawa, almost one meter higher than Fukushima. In that case it was -- it should have been more vulnerable. And then when you look at IAEA report, this is a direct quote from IAEA, which Airi has quoted in her paper. It was the closest nuclear power station to the epicenter, and the strongest shaking that any nuclear power plant has experienced in history, and it was shut down and was remarkably undamaged. Remarkably undamaged. This is the report of IAEA.

We got this photo, again, by this gentleman Woody Epstein from Japan. This is the city of Onagawa before the earthquake and tsunami. This is that location after that. It was devastating, as you see over there. But I think this is the key to understanding Onagawa's success. If you look at that every year, 1970, 1987, 2002, they basically had some estimate for the tsunami value, and they constantly learned and they increased the height of the wall. They learned from Indian Ocean tsunami, they improved their defenses. They learned from Chile tsunami, they improved their defenses. They constantly learned, and remember that Onagawa, please remember, that belongs to a different utility called Tohoku, whereas Daiichi and Daini that they belong to TEPCO. I want to come back to
This, again, was sent to us by Mr. Woody Epstein in Japan after that article got published in Japan Times. That basically says that the man who created Onagawa, he insisted for a much higher layer of defenses, and he is able to raise that in 1968, and finally they raised that to 15, but there's all this detail is in my student's paper.

This is a very -- let me give you, this one is even better. It's very interesting. When the earthquake happened, people were evacuating. They were escaping from Daiichi and Daini, but Onagawa was the only plant that had the power -- that's why the evacuees that they lost power to their home, they came, they took refuge in the gymnasium, in the gym of the Onagawa.

It's really a very ironic fate that people escaping from nuclear plant, because of the accident over here, it was becoming a refuge for the people, because they had power and water. That's a very interesting photo that we gathered some 300 people at that -- that stayed in this for several weeks. Here, I think this one, also, is a better photo of that, that they had 300-plus people, local residents, that lived in the gymnasium of Onagawa for several weeks because they had water, power and food. That's another comparison of
Onagawa and Daiichi that we put together for you.

The owner of the Onagawa is Tohoku. The owner of Daiichi is TEPCO, and this is the tsunami risk characterization. Basically this is what one of my colleagues, Professor Costas Synolakis, who is one of the world experts in tsunamis, he is my next-door colleague at USC, he said that in an interview to New York Times, what TEPCO people did with respect to the risk analysis of the tsunami "was a cascade of the stupid errors that led to the disaster."

This is the way they did the estimation of the tsunami, based on Costas Synolakis, who is a world renowned expert of tsunamis. He runs our tsunami research center.

And in the case of Onagawa, they were proactive. They initial construction was ten meter elevation, and they were underestimating tsunami level, and they constantly increased that to 14.7 meter.

This is a very good comparison from the National Diet report about the way that TEPCO and Tohoku they addressed tsunami risk. I would like you to look at this quote from the National Diet report, which is very interesting. Basically when it came to risk of tsunami, "TEPCO resorted to delaying tactic such as presenting alternative scientific studies and lobbying." Basically
they fought for improving their safety. They
resorted -- this is the direct quote from Dr. Kurokawa's
report.

Now, let me, and then, of course, in the case of
Onagawa, they learned from Chile tsunami and they
constantly and continuously improved their counter
mission.

Let me say something about Daini, also. Daini
was a plant. This is my article the day before
yesterday in Japan Times, it is mostly about Daini. In
fact, I start by talking about the Navy Admiral in that
article. That's Admiral Togo, but not submarine.
That's a talk about Russo-Japanese War of 1904 and what
Togo did over there.

This is, again, that thing, and remember, Daini
is 20 kilometers closer to Tokyo. And Daini had four
nuclear reactors operating at the time of earthquake and
tsunami, and they had also station blackout, but then
they had that 420-kilovolt pylon study outside the
plant.

The superintendent of Daini, a Mr. Masuda, and
200 workers, we met him, he gave a presentation to us.
They worked heroically in order to save their plant, and
a committee report acknowledged that, but I still,
that's an epic story that needs to be told. That's what
I tried to highlight that in my Japan Times article. Basically this is what our committee said, which is music to my ear because many people say that human operators are the weakest link in the chain. I say no. They are the first layer of defense and last layer of defense when something goes wrong in a technological system. I have seen that in aviation industry. I have seen that in nuclear power industry. I have seen that in petrochemical refining and other high hazard industry.

These are some quotes from our National Academy report, but there are some -- there is one quote that I would like you to pay attention to, that's last line, that talks about Daiichi, but it applies even more to Daini. The way that they saved the plant. They were able to bring the four operating reactors to the cold shutdown, by laying out nine kilometers of cable that typically takes 20 days to do, they did it in almost 24 hours.

By flexibly using emergency operating procedure, by improvising decision-making. There was a good article in Harvard Business Review, also, by Chuck Casto, who was a resident representative of NRC during this accident over there and a Harvard Business School professor that shed some more light on that.
And what Masuda and Daini and his personnel they did, they did impromptu but prudent decision-making and improvisation. That is what I mentioned flexibly applied, it is what he told me, emergency operating procedures. Temporary cable line, this is a direct quote from him, by the way, which it typically takes 20 personnel and a month to put.

We met Mr. Naohiro Masuda in his office over there. By the way, Mr. Masuda and his 200 people, I asked him, how long did it take you to find out your family were alive and survived? He learned about that after almost 24 to 36 hours, but they stayed over there and they worked, and this is his cot in his office, that he slept on this cot and lived in this office for almost three, four weeks.

This is the man that I called him in my article, he should be considered as a national hero of Japan in 21st Century, the same that Admiral Togo was considered as a national hero of Japan in 20th Century.

Now, I want to come to the finale of my talk, and this is the man that I admire and there's a photo of him on the wall of my office. This is my submarine photo with no submarine in it.

This slide is given to me by one of my nuclear Navy friends, Mr. Bill Blunt that works now -- he was at
Diablo County and now he's at Amgen. If you see that this is basically the report on performance of Nuclear Navy. This is what Nuclear Navy for the right reason is proud of. This is what they have done successfully, thanks to this gentleman. But Admiral Rickover said this statement, and I would like for the record to read this statement because when I was watching Mr. Tony Hayward, BP, CEO of Halliburton, CEO of Transocean, sitting before the Congress in a table like that testifying, and they were doing this pointing fingers to each other for the blowout, that reminded me of the truth of Rickover's statement, and I would like to read it to you.

By the way, this one is on the wall of my office. Next to his statement by Valery Legasov, who investigated Chernobyl, who was a member of National Academy of Science of Soviet Union, and then he committed suicide on the second anniversary of Chernobyl.

He made a statement that we didn't learn lesson in Soviet Union from Three Mile Island and from Bhopal, and this statement is sitting side by side. That's a statement you might want.

Responsibility, I would like to -- I have less than one minute or two minutes. I would like to use
this finale to finish it, because this, to me, captures
everything that I do or I said in a much more beautiful
way. "Responsibility is a unique concept. It can only
reside in inherent single individual. You may share it
with others, but your portion is not diminished. You
may delegate it, but it is still with you. You may
disclaim it, but you cannot divest yourself of it. Even
if you do not recognize it or admit its presence, you
cannot escape it.

"If responsibility is right for yours, no
evasion or ignorance or passing the blame can pass the
burden to somebody else. Unless you can point your
fingers at the man responsible when something goes
wrong, then you never had anyone really responsible."

And the most interesting thing, I want to finish
with this note, is when I learned when he said that. I
had this quote on my wall. Last week before coming
here, I said this to my Navy -- Nuclear Navy friends. I
said, please check the quote if it's good, the Ts are
crossed, no errors are in there. Two of my Navy
friends, Richard McPherson and Tom Herring, they said,
no, the quote is good, but the source of that or the
reference for that is even much more amazing and much
more related to this meeting.

Admiral Rickover said this quote in a public
hearing and testimony before a Congress panel in Congress, when that he was asked about the SL1 nuclear reactor in January 3rd, 1961. They were asking him if that accident could happen at civilian reactor, and he made this statement without preparation or something. That's the reference for this statement.

I have another one that I want to finish with that, but I would like to come back to it because I want to finish my talk with the submarine photo. This is a statement that I learned from my colleague, Bill Hoyle from U.S. Chemical Safety Board. It's a title of a paper that was presented in Australia. Of course, this is a paraphrase of the late Peter Drucker's philosophy, Culture Eats Strategy for Breakfast, but this, I think, captures some of the discussion that we have over here, particularly about Onagawa versus Daiichi, and really I think culture eats systems for breakfast, if we don't take that into account.

Again, as I said, I want to finish my talk with a photo of submarine here. Thank you.

DR. WINOKUR: Thank you very much. Thanks for an excellent presentation. I'm going to start by asking you a couple of questions. That last one, I'm not going to ask you to switch to that slide because you want to stay on this one. Does culture eat leaders for
breakfast?

PROFESSOR MESHKATI: I'm sorry, could you please repeat that question?

DR. WINOKUR: Does culture eat leaders for breakfast?

PROFESSOR MESHKATI: Wow. That's a very profound question. I would say yes, definitely if leaders are green and brown, but no if leaders are seasoned and experienced.

DR. WINOKUR: Okay.

PROFESSOR MESHKATI: I think that's a very profound question. By the way, I have seen that myself in some organizations that I have dealt with as a consultant, as an instructor and that a new leader came and tried to change the safety culture, or for that matter organizational culture and safety culture, and that leader was eaten alive, literally, by the culture.

DR. WINOKUR: Yeah, that's what I'm trying to get to and understand better, and that is that I understand how these incredible leaders create culture, how Admiral Rickover created a culture, how Steve Jobs created a culture at Apple, how Fred Smith created FedEx, but I'm just wondering what it takes to come in and change an existing culture, and, of course, the DOE culture, and DOE labs have done phenomenal stuff, but
DOE's culture has been established for, you know, since 50, 60 years, and it has many, many accomplishments, and many and wonderful things it's done, and it accomplished many of those things because it had a certain kind of culture, and now we may be asking leaders to come in and change that culture to be a slightly different culture, maybe to be less risk-adverse, and it seems to me like a major challenge for leaders to be able to do that.

PROFESSOR MESHKATI: It is absolutely, Mr. Chairman, a big challenge. I can tell you one example from my own experience with a major water utility in Southern California, a new leader came, tried to change the culture. In this particular case, I had them, with some of the studies and some of the work over there, the strategy that we chose, as you know, water utility are very deep -- they have deeply entrenched culture. Very much -- utility industries are very deeply entrenched. Water utilities even more.

The approach that we took was basically a top-down, bottom-up approach. You need to start from the top, the leader needs to lead, but at the same time you need to work with the rank-and-file from the bottom. This is the discussion that I think Mr. Sullivan asked Admiral Eccles and that about the commander and the troops, if they -- don't agree or disagree.
I think it's a very difficult, delicate thing, but it cannot be unilaterally done and instilled from the top if you don't at the same time simultaneously try to build it up from the bottom up. That's why I consider that. It's a simultaneous approach from bottom-up and top-down approach for culture change.

DR. WINOKUR: You talked to us about the different Japanese leaders of these different power plants, some we know, maybe two of them were fairly successful. They didn't do as well at Daiichi as they did at the other plants. Is there something different about the Japanese concept of safety culture than it would be with the U.S. concept of safety culture? I mean, could we view them in a similar way?

PROFESSOR MESHKATI: That's another excellent question. I have been struggling with the issue of cultural context of nuclear safety culture for the last 15, 20 years. In fact, I have a book chapter published in 1997, its title is Cultural Context of Nuclear Safety Culture, because when IAEA came with INSAG 1 and then INSAG 4 after Chernobyl about safety culture, they don't talk about national culture, but then the Fukushima issue raised that, and then for your information, and for the record, International Atomic Energy Agency hosted a meeting last April, it was called Cultural
Factors and Its Impact of Safety Culture, and I had the privilege to be invited and gave a talk over there. This is a very important issue, Mr. Chairman, and more than nuclear industry, as you may know, aviation industry has been struggling with that for the last, I would say since 1977 Tenerife accident, when two 747, KLM and Pan American, they had a runway incursion in March '77 on Tenerife. And then another aviation accident which was Avianca Flight 052, Korean airline in Guam, and the last one Asiana 214 in San Francisco.

The issue of role of cultural factors in safety culture still is a very hot topic. I have written about that. We published the stuff on that. I want to make this story short, I think there is something out there. For example, in safety culture, we talk about one of the biggest element of safety culture that both U.S. NRC, and INPO, they raised that, it's called questioning attitude.

Questioning attitude is one of the pillars of safety culture. IAEA has it as one of the three pillars. There are certain cultures, national cultures that questioning attitude cannot be nurtured or it will be stifled, and using Hofstede's model, power distance, the higher the power distance in the society, it impacts and it stifles the questioning attitude.
One of the contributing factors for the accident of Avianca Flight 052 was the lack of questioning attitude in the cockpit, according to the late Bob Helmreich of this Latin culture, the Colombian culture of cockpit.

Back to excellent question, I would say that Japan society collectivism, politeness and the power distance could have played an important role over time.

DR. WINOKUR: Yeah, and I'll end my question with just a statement, the way that somebody explained it to me, or what I read said that in the United States, the squeaky wheel gets the grease. In Japan the saying is the nail that sticks up gets hit by the hammer.

PROFESSOR MESHKATI: Excellent.

DR. WINOKUR: So, it will have a little bit of an impact on that questioning attitude. Alright, let me move to Ms. Roberson.

MS. ROBERSON: Thank you, Mr. Chairman. I wanted to do kind of a cross-section of the leadership for the Fukushima event and the three nuclear power plants. So, you have quite a bit of admiration for the superintendent at Daini. And I'm assuming you also had the opportunity through the review and evaluation to understand the superintendent at the other two plants.

So, what was the difference in leadership?
instance, if you had swapped the superintendents at Daiichi and Daini, do you think the results would have been different at Daiichi?

PROFESSOR MESHKATI: That's -- wow. I think the superintendent of Daiichi, I think it was Mr. Yoshida, also, there -- there is a very good analysis of his decision-making, which was again very, very heroic, done by Mr. David Lochbaum from the Union of Concerned Scientists, in his latest book on that.

I think David -- in my judgment, again, this is my reading, based on my reading, I think Daini and Mr. Masuda had the luck of that 420-kilovolt pylon standing over there, but he used his ingenuity and improvisation to the maximum. That's my judgment.

Daiichi, they didn't have that element of luck as well as I remember, and -- but they still worked very hard. They still worked very hard. Again, this is my, Naj Meshkati's humble opinion. I think in that particular case, it wouldn't make any difference.

MS. ROBERSON: It wouldn't have made a difference.

PROFESSOR MESHKATI: Again, this is my speculation, of course. Had Masuda was in Daiichi, I think because of that 400 -- that 420-kilovolt live offsite power, that made a big difference. But what
made the big difference, which I tried to explain in my focus in my Japan Times commentary, Ms. Roberson, is really at the end of the day, it was not automation, it was not PRA, it was not expert system that saved the day at Daini. It was the human operators, that they improvised and they literally rewired the plant.

I tell my USC students, just to imagine under what condition that they did that. The water in some cases was still up to here (indicating) and there were a lot of debris, wire and hazardous material lying over there. I told my students that it's not like you take a piece of wire to run from my office on campus to the cafeteria. They did it in a most dire, difficult condition.

Coming up with that solution, that's another thing which was remarkable, but at least they had this pylon standing there, and then they used that and they rewired it. But that's a very profound question. That's deserving of dissertation by itself.

MS. ROBERSON: One other question. One of the things that seems to come up in investigations of organizational accidents like Colombia, Fukushima, Deepwater Horizon, is an organization's failure to manage changing conditions. While a lot of people are tempted to view this as a process failure, the recurring
nature of the weakness suggests it's a fundamental weakness in leadership. Is the ability to effectively recognize and manage change, changing conditions an essential element of effective leadership?

PROFESSOR MESHKATI: In my judgment, exactly. I mean, if you remember that slide about what Tohoku executives, what did they learn from past tsunami? How did they incorporate that risk analysis done? And improving their defenses, in order to protect their plant better. Again, that plant was 60 kilometers closer to the epicenter, tsunami was one meter higher. I think it was exactly, because their original wall of defense against tsunami wasn't that high. They constantly managed that change, and they improved from that, rather than miss reinterpreting the science and resorting to lobbying. They managed it beautifully.

That's what I think, that's a good example that your statement is very, very pointed.

MS. ROBERSON: Okay. Thank you.

DR. WINOKUR: Mr. Sullivan?

MR. SULLIVAN: Thank you, Doctor, and thank you for coming today. I really appreciate it. How is your football team at USC going to do this year?

PROFESSOR MESHKATI: Can I take a fifth on that, sir?
MR. SULLIVAN: Yes, you can. There's got to be a game like on Saturday, and you're here.

PROFESSOR MESHKATI: That's another good answer there, implicit answer.

MR. SULLIVAN: I want to ask a question that I think is kind of related to what Ms. Roberson just asked you, when she was talking about swapping the leaders, and you called her question very profound, so I will just try to copy it and change it a little bit.

But if you could, if we had a time machine and you were the consultant and you go back ten years and show up at TEPCO and talk to the leaders, other than convincing them that you had a crystal ball that said there would be a 13-meter high wall of water, what do you -- what do you tell them? How do you -- how do you go into that scenario again? So, this would be roughly middle of the last decade at TEPCO. You have the mindset that you -- that ultimately we know existed, what do you tell them? How do you try to change it?

PROFESSOR MESHKATI: I tried that, sir. In fact, when the Tokaimura Nuclear Processing Plant accident happened in September 1999, I had an article in Los Angeles Times looking at the root causes of that, September 1999, got reprinted in Japan Times. And at that time, then on the anniversary of that, I had
another article in Japan Times. Its title was Japan Needs to Commence Nuclear Safety Reform.

And in 19 -- around 2001 or 2002, four executives of TEPCO, they resigned in disgrace because of falsification of data. And I had another article in 2007, after Kashiwazaki earthquake, they also, again, they came dirty-handed.

The problem is this: Again, I'm on the record that I've said that at least what was the problem at Tokaimura, what lesson could be learned, what Japan should do.

Sometimes I think that I carry Cassandra's curse and nobody believes that, which is obvious, but a man looking like me nobody believes, but -- but going back to, again, your profound question, Japan is a developed country. It's a first-rate country. However, when it comes to the regulatory system industry, the relationship between regulator and industry, I think, is a perfect textbook example for regulatory capture. Perfect and textbook example. And lack of independent oversight regulator, something else that they have it, they call it "Amakudari," unholy alliance, between the METI industry and some other groups over there. That is what we see the result over there.

If they would have listened to me 10, 15 years
again, I say that TEPCO should have gone to a major
massive culture change. Again, I did some work with
another utility in Japan, which is called KEPCO, Kansai
Electric Power Company. They have a reactor in the city
of Tsuruga called Mihama. Mihama had a major steam
generator rupture accident in around 1992 or so, but
they massively learned from that. They created, Mr.
Sullivan, they created Institute for Nuclear Safety
System. That's why I went there in 1999 and then 2009
to that institute because it was created by KEPCO to
learn lessons from Mihama accident. They put that steam
generators in the -- in a glass to -- they made a museum
of that accident.

It was, by the way, part of my original slide
that my dear colleague, Dr. Douglas Minnema (inaudible),
cut it out from this presentation, because it's too
long.

But that was what KEPCO did, learning lessons,
managing to change. However, TEPCO was misinterpreting
or -- I mean reinterpreting science and resorting to
lobbying. My advice with them is at least look what
your neighbor, KEPCO, did, become better KEPCO people,
rather than falsifying record, lying to the public, and
then resigning in disgrace. I still have a photo of the
fourth TEPCO executive bowing to public and they
resigned in disgrace because of falsification of data.

MR. SULLIVAN: So, just to follow-up, let me
more or less give you the same question with respect to
the BP incident, and whether it was BP and/or
Halliburton, just imagine it was, again, 2008 or so.
So, it's before the actual accident, and you have an
opportunity with your crystal ball to talk to the
leaders of those companies. So now there's no element
of Japanese culture here, whatever that might be.

Do you tell them anything different in terms of
how you just answered the question with respect to --
with respect to TEPCO?

PROFESSOR MESHKATI: In the case of BP, I admit
I have a little bias because at a very important
meeting, I was with the State Department for a year and
a half. I was at a meeting in Athens at the Track II
Diplomacy Conference, and I met a very high-level
British person. That individual, it was almost a month
and a half ago, a month and a half after the BP
Deepwater Horizon, around June 2010 or so.

That individual told me a story about the motto
of Lord Browne, who used to be the CEO/president of BP
before Mr. Tony Hayward. His motto was a line from
Oscar Wilde that I have memorized. He said this is what
he instilled in his executive. The motto and the line
goes like this "consistency is the last refuge of unimaginative. Consistency is the last refuge of unimaginative."

This is what his motto. This was his marching order. This is the way that he ran his company. Mr. Sullivan, imagine a CEO of a nuclear power aircraft carrier, he goes on the loud speaker and say every day, consistency is the last refuge of unimaginative. What will be the operation on the flight deck?

Imagine if a refinery manager, which in the case of Texas City, unfortunately, they listened, because their bonus system is also attached to that. It's a struggle for survival. If I was -- or had the power to advise, I would say, please remove Mr. Lord Browne from that position because this motto is doomed to failure.

It was under his watch that the Alaska failure happened. It was under his watch that Texas City happened in 2005. It was under his watch that the root causes festered that led to the BP Deepwater Horizon. That's the role of bad leadership. That's the role of infested leadership, in my judgment.

MR. SULLIVAN: Thank you very much.

DR. WINOKUR: I want to ask you a question about learning organizations, because it's always been my sense that culture plays a very important role in
whether an organization can learn, because if the workers are always saying, we don't do things that way, and this is what we're comfortable with, and this is the way we've always done things and so on and so forth, it can be very challenging for a leader to come in and change the organization and make it learn new things.

Do you have any sense of that process, of what leaders might do to be more effective at coming into an organization that has a very established culture in helping them learn?

PROFESSOR MESHKATI: I have one personal observation about that, and that's why I was involved with this organization, and I'm very proud to name this individual. You remember Metrolink had a major crash with Union Pacific in September 2008, near Los Angeles?

DR. WINOKUR: I do.

PROFESSOR MESHKATI: You remember that?

DR. WINOKUR: There's a story, but I'm not telling it to you. I do.

PROFESSOR MESHKATI: Tell me off the record or after the meeting. That accident happened in September 2008. Twenty-five people died. I got there at the site of the accident like three hours later. I slipped through the barriers. I wanted to see that so I took some photos. And it was a horrific, horrific accident.
And Metrolink has had similar mishaps and accidents before that, but unfortunately, that organization didn't care about that.

A year later or a few months later they changed their CEO, and they brought in Mr. John Fenton. John Fenton became the CEO of Metrolink. In a matter of two years, John really converted that organizational culture. Every single employee from I told you about, top-down, bottom-up, with senior manager, and Metrolink is really an umbrella organization. They have multiple contractors. Their signal is maintained by one of the train operators and other ones.

John Fenton was very successful in doing that with the assistance of Jim Schultz, that was his advisor and he was a former Air Force pilot, and these guys, they really did that culture change. To the point that the Honorable Robert Sumwalt from NTSB, he led a session on the safety culture for them, and I had the honor of sitting in the audience. This is what John Fenton was able to do in two or three years over there, and it was successful.

DR. WINOKUR: Do you think that one of the things that helped there was the crash? In other words, if we look at NASA, they lost the Challenger, lost Columbia. Typically after an accident that serious, the
workforce is more open to change, and if you get the
right leader in there at the time, do you think that
that's what helps make a big change?

PROFESSOR MESHKATI: I think it will make the
big change, but the question is not when the culture
change, which people are more amenable to that, but
sustaining that change.

I vividly remember the late astronaut Sally
Ride. She sat in both investigation of Challenger '86
and Columbia, and in the Columbia one, she said, I
vividly remember her words, that I'm hearing the echoes
of Challenger here. See, that is the problem. They go
through this culture change, but then sustaining that
culture change is, again, a leadership issue.

And that's, I think, a very important factor,
not reverting back to the old habits.

CHAIRMAN WINOKUR: Thank you very much.

Ms. Roberson?

MS. ROBERSON: I have one -- one question, and I
want to talk to you about worker commitment. I think
it's certainly been my experience everywhere I've been,
and the DOE complex is no exception, it is very clear
that the workers have a strong commitment to the mission
of whatever the requirements are or production
requirements are for where they work, but often they are
much less committed to the senior leaders or middle
management. And I don't know if you've seen that, but I
would say, I've seen that.

Is this strong commitment by the workers to the
mission, can that become an enabler for poor leadership?
For instance, if leaders don't really understand the
culture underneath, can the strong commitment to the
mission overcompensate for leadership and actually make
it more ineffective rather than more effective?

PROFESSOR MESHKATI: I have seen that in some
cases that I dealt with or I studied that that workers
commitment really could compensate for the bad
technology, bad workstation design, bad procedure or
sometimes bad supervision and leadership. I think
committed workers, they go above and beyond, they
stretch themselves too thin in order to keep system up
and running.

I was doing several projects, a research project
in Mexico with several chemical plants, and I've seen
particularly that the term should be called sacrifice.
That the sacrifice of some of the workers they do in
order to keep the operation going in spite of all the
problems that they have.

I think this is, again, what lends credence to
what I've said before, that really workers are the first
and the last layer of defense, because many times this
first layer of defense is the technological one, they
don't work, and workers, it's by their flesh and blood
that they become the first layer of defense.

MS. ROBERSON: Well, one last question on that
path. In the first session today, our two admirals kind
of laid out a very clear picture of what activities are
undertaken to try to understand the climate, they call
it command climate. We see a lot of surveys that are
done in the industry. Do you think surveys actually
provide a good picture of the climate or culture in an
organization?

PROFESSOR MESHKATI: Depends on the survey and
who does the survey. Again, this is my humble opinion.
I have seen some safety culture surveys done on San
Onofre Nuclear Plant that I would give them a C-, on a
good day, as a professor. However, I've seen some
surveys of safety culture, some of them I think done for
your organization, or DOE, by Dr. Sonja Haber, on
Pantex, on the one in Washington, escaped the name,
Hanford. These are very, very credible surveys. Dr.
Sonja Haber does this work for International Atomic
Energy Agency. Her work is very high quality and solid.
But there are some fly-by-night organizations that they
tell or they claim that they can measure safety culture
to two digits after decimal points, and if they do that,
then I have a bridge also in New York to sell you.

MS. ROBERSON: Thank you, Dr. Meshkati.

DR. WINOKUR: Yes, I want to thank you very
much, Dr. Meshkati, for your presentation, excellent.
We've enjoyed the questions, as you can tell, and now
we're going to move on to Professor and Dr. Sutcliffe.
Welcome.

DR. SUTCLIFFE: Mr. Chairman, Ms. Roberson and
Mr. Sullivan, thank you very much for the opportunity.
I'm honored as well to be here, and as Professor
Meshkati talked about his personal reflections, I am
going to say that I guess I'm going to give you my
professional reflections after having studied safety
culture and worked with organizations over the last 20,
25 years. And I accept full responsibility for not
having any quote from Admiral Rickover, and I just want
to say I apologize for that. I think I might have a
little Naval picture somewhere, but anyway.

DR. WINOKUR: I'm not making that mistake in the
future.

DR. SUTCLIFFE: So, now the question that you've
asked me to discuss relates to leadership and safety
culture, and specifically what's the role of the leader
in establishing and sustaining culture, and I think
today what actually what my presentation is going to do
after having sat here for the whole day in a very
interesting set of sessions is to bring some coherence
to our understanding of what it takes, because I think
the scientific knowledge that we've been gaining over
the last 30 years about safety culture has really been
accumulating.

I think it's a very important and interesting
time in understanding -- in in this kind of work, and so
I think hopefully I'll bring some coherence to what
we've been talking about today.

So, I want to do two things. One is I want to
first talk about my research and knowledge of safety
culture and particularly what leaders, how they can
enable and strengthen safety culture. And I've got
several models I want to present there. And then I want
to, second, spend a little bit of time talking about the
role of leadership in enabling organizational
adaptability, because I think that's a real critical
issue here because we know that organizational disasters
are often the result of pursuing a particular course of
action in the face of evidence suggesting that we should
change course.

And, so, I want to talk about research I've done
in wildland firefighting, suggesting how leaders can
play a role and what we should do. And actually, I think this is really timely because I particularly want to talk about leadership and the role that leaders play in sense making. And Professor Meshkati talked about a recent article in Harvard Business Review about the Daini plant in Japan, and one of my colleagues, Ranjay Gulati and Professor Meshkati's colleague, Charles Casto, just published a paper where sense making was really critical to the success of Daini, and so I want to talk a little bit about that.

But I want to start by highlighting what we know about organizational culture and why it's important, and that is that in part, culture enables this similarity of approach, outlook and priorities that enable people to achieve collective sustained responses in complex organizations. And I know that's a lot of words, but really, you know, we talk a lot about culture, and my fear is that we talk about it like it's a thing, and it's more like a cloud that you put your kind of -- you can put your hand in it. But you can kind of see it, but when you put your hand there, you can't really feel it.

So, there are so many definitions of safety culture. I like this one in particular by Stian Antonsen, and it's pretty similar to what we've been
talking about today, that culture really is these frames
of reference for meaning and action. They encompass the
skills, beliefs and basic assumptions, norms and customs
and language that members of a group develop over time.

So, in a way, culture is a way of seeing and
acting, and it's simultaneously a way of not seeing and
not acting, so culture can be a source of blindspots,
and we talk about that all the time.

Of course, the idea of culture is simple, that
we just have to be clear about the values and norms and
beliefs and the kinds of things that we want to see
people do, and we know that that's in complex
organizations, complex technologically, complex
sociologically, that's really, really hard to do.

And this morning I think the two admirals really
gave a good sense of how building, shaping a culture
really comes about, and if you think about it, this
particular model, and I'm -- I'm always much better when
I can get up there, but I will try to do it from here.
I mean, essentially, if you think about the story that
Admiral Norton, I think, told this morning about the new
seaman who was helping him take the plane off and they
saw a little bit of oil, and they said, you know, cut it
off, you've got to stop, you're not flying today. And
then the next night, the person was rewarded at a
I think that is reflected in this particular model. The idea is that we know, and this is a model that adapted from Charles O'Reilly, who is a professor at Berkeley, and I think about this as safety culture, you can think about it as culture in general. The idea that leaders have to know what they want, they have to communicate what they want, and they have to do it consistently. It has to be salient. People have to understand it. They have to perceive this is how we want our leaders want us to act, et cetera.

When people are rewarded for those things, they're likely to redo them. So, that is one way that we know leaders shape culture. It is by walking the talk. You know, it is by knowing what you want, saying what you want, making sure that you're rewarding when people act in the ways that you want them to act.

At the same time, what we know from the literature over the last 20 years that has been accumulating, particularly in the area of safety culture, we know that there are other ways that leaders enable culture. This particular model was developed by one of my former doctoral students Tim Vogus, who is a professor at Vanderbilt University, my colleague Karl Weick, at the University of Michigan, and I.
What we did to create this model is we reviewed almost the entire literature on safety culture across industries, and we used a particular form of scholarship called a scholarship of integration. What we wanted to know from the literature was what do we know from that literature? So, this is an analytical model. It is derived from empirical evidence. What we know about the commonalities, the elements, the factors that are associated with strong safety cultures. And what we learned from that analysis is that -- and I think actually what I was really happy to hear this morning in the presentations by the two admirals is they were really talking about how organizations and how leaders build the safety infrastructure.

I think a lot of Admiral Eccles, the idea of the SUBSAFE program, was really oriented to this creating a safety infrastructure, and what I mean by that is, you know, creating a safety management system, an operating management system that is composed of, you know, standard operating procedures, training requirements. And it's very, very complicated when you look at organizations, they create this -- this system, the requirements for how are we going to audit, how are we going to monitor, what are we going to reward people for, what are the leadership and supervision
requirements? All of that goes there.

That is a huge way that people, that culture
gets shaped and reshaped over time. And that, also, is
part of, you know, those actions, how much we're putting
into training, how much -- you know how are we
developing our training programs over time, you know,
what are we doing with respect to audits and all those
kinds of things. Those are visible to people, and that
shows leaders' visible commitment to safety.

The other thing that we know is that leaders in
the organization really want to develop safety
information systems, you know, informations for
collecting and disseminating safety information, and,
you know, that's reporting requirements, statistics, all
of the kinds of things that -- that people talked about
today.

We also know that a big part of the way that
leaders enable safety is by empowering people to speak
up and act in ways that promote safety. And then
there's this issue that we've talked about a couple of
times today, and that is, that -- is there a safety
climate that has developed? And that means that leaders
have to go about and really assess, are people getting
it? And that's -- that's a big part of the way that
leaders go about enabling.
Of course, in our model, you know, as we wanted to show here is that it doesn't stop there. It's that, of course, you have to understand and you have to make sure that people are acting in the ways that you want them to do, that they are following standard operating procedures and policies, that they're disclosing concerns, that they're learning, that they're mindful of risks. That all goes in our enact section here.

And then, finally, we know that strong safety cultures are shaped by learning, and that, you know, learning -- we talk about learning loosely here, but the way that organizations learn is not just about what people carry around in their heads, learning gets institutionalized. The lessons get institutionalized in reshaping policies and procedures, in reshaping the ways that we go about doing things and reshaping the way that we want to go about the work.

So, that's what this model is, and I think it represents, I -- I -- actually quite well, what I heard today, particularly the admirals talking about it and Mr. Griffon as well.

So, what would you see in organizations? Well, you would see that leaders are directing attention to safety. They're doing safety rounds. You would see that they're paying attention to whether people are
speaking up, acting in ways that improve safety, that
they're actively seeking out bad news. Why is that?
Because we know bad news doesn't necessarily travel up,
and we also know that you know about people wanting to
speak up about things that are going wrong.

So, you have to be very active. We're
highlighting threats to safety, that people are
mobilizing resources to resolve those threats, that
people are getting feedback about how things are going
and they're revising their practices and what they're
learning.

So, on that note, I'll take a drink here. Where
am I on time?

DR. WINOKUR: You're good.

DR. SUTCLIFFE: I'm good? Okay.

So, let me turn now to the related issue of how
leaders enable adaptability, because, as I mentioned
earlier, we know that organizational disasters are
oftentimes the result of pursuing a course of action
when we should change direction, and when evidence shows
that we should do something different, and we know that
leaders play a role in that.

And as I said earlier, in part they play a role
because they help people in safety-critical contexts
make sense of what we're facing. And I think that's a
real critical leader role, and if you look at the Harvard Business Review article on Daini, you will see that this, you know, taking the 400 whatever -- the tower, you know, creating this power grid, et cetera, it wasn't just like, oh, let's do that. It was a combination of having to make sense of a lot of different kinds of changing conditions that then led to those particular outcomes, but the leader was really critical here.

And, so, I am going to talk about some studies that I've done with Michelle Barton, who is -- was one of my former doctoral students who is a professor at Boston University, and we know that, you know, you may say, well, does this relate to us in the nuclear business? You know, it is an organizational context that is very dynamic and very complex and where there are lots of different entities that have to come together. We also know that there are cues and indicators of potential problems that exist and that are known, and we know that there are clear performance outcomes. You know your fire can blow up or you can contain it.

And in particular, what I want to talk about is 62 fire incidents that we examined. These incidents varied in their dimensions with respect to size and
outcomes, so the outcomes were sometimes horrific. People died, and, you know, people had to deploy their fire shelters and all these kinds of things, and in some of the other incidents, there were very, very good outcomes.

Now, why am I talking about this? In part because when we looked at these incidents, and there were, they were almost equally split between the incidents that were successful where the fire was contained and where things really blew up, so almost the same numbers of each. What we noticed is in the good incidents that in almost every, in every single one of those incidents, there was a change in the course of action. That we didn't just go down this particular road and, you know, with blinders on.

And in the incidents that went bad, what we found is that in almost every single one of those incidents, people didn't change course. The leaders didn't change course. And, so, we wanted to know what was going on there. And, so, we wanted to know if there were patterns that we could discern. And, so, you know, just to lead up to that, you know, if you think about it, and we have seen this today and Professor Meshkati talked about this, that in interactively complex and tightly coupled systems, small mishaps can concatenate,
and they can build up. We heard that this morning, too.

And, so, we know that safety requires this vigilance. You know, and that part of what safety culture is all about is creating a vigilance so people can see the small things and they can act with safety in mind, they can bring up these cues, and that, you know, we can constantly adapt and redirect what we're doing if necessary.

And, of course, that there is a very big literature and that was developed by Jim Reason and myself and Karl Weick about failing to recognize cues, and that there are weak signals. These weak signals, you want people to pick up on them, and that disasters occur in part because of these accumulation of unnoticed events.

So, the implication is -- is that if we notice these things, we redirect our actions that we will be safe. But there is also a different, I guess, model or a different idea, another possible explanation, and -- and that may be is that people fail to redirect their action, not because they miss cues, signaling the fact that they should change their course, but because they're so embedded in the situation, they're so embedded in what they're doing right now, that they really fail to kind of step back and rethink what's
And, so, we talk about that as dysfunctional momentum, in that they don't really make new sense of what they're facing. And, so, what we need sometimes is to think, perhaps, that we need some kind of interruption, and actually I know if I went through my notes again I would find that somebody today actually talked about this, and perhaps it was one of the admirals. The idea that sometimes you've got to kind of step back, and you've got to think about, what are we facing now? Because we don't oftentimes update in real time, and, so leaders can play a very big role in that.

So, it may be the fact that lack of interruptions threaten safety, and that we get into a momentum. If you think about it, momentum is, you know, it's this idea that we're -- it's a flow of uninterrupted action, and so you kind of have to stop the action. It's not necessarily like inertia where you have to kind of start action. And, so, overcoming momentum requires the slowing or stopping, and dysfunctional momentum implies a continuing with a failing action.

So, what motivates and enables individuals and groups to redirect their action, what prevents it and what are the implications for leadership?
So, let me just talk about what we found. We found, as we expected, that most instances where ongoing action was changed and where there were positive outcomes that it resulted from some re-evaluation of the situation, and in most instances where action continued unchanged, it involved little, if any, re-evaluation. But we also saw, you know, well, we saw this, you know, these people re-evaluated the action, the test fire was satisfactory, we applied a few igniters, it was going bad. I told her I was seeing, you know, we need to shut it down and we did.

These people, we took a test fire. It burned actively, we were kind of anticipating that, but, you know, there were five or six more fires that kind of got lit, and in the end, people got a lot of smoke inhalation and throwing up and headaches, and it was a real mess. They didn't change their actions.

What we found, though, is that noticing cues wasn't sufficient. So, if, you know, we talk a lot about weak signals, noticing cues, not letting these things accumulate. But we found that noticing cues was not sufficient to introduce this re-evaluation of the situation. There were many examples and where individuals recalled, in fact, noticing cues that conditions were dangerous or indicators suggested that
potential problems, but the approach to the fire remained unchanged.

Now, these people, we knew it was a bad place to light the fire. It was a steep slope, et cetera. We knew it was going to be a loser, and, in fact, it was. So, again, noticing the cues. But there were two social processes that we found that led to the re-evaluation. Not surprisingly.

One was voicing concerns, and voicing concerns transmits this critical information. But it's not just the voicing, because a lot of times people already knew the information. It was -- it's actually -- I should say it is just the voicing, that the voicing in a way creates something that people have to react to. It's a shared artifact. And, so, the cue may be ephemeral and uncertain, but it creates this interruption, and it creates this idea that it has to be acknowledged or denied and it has to be responded to.

So, and this is an example I told my boss we're experiencing. I didn't feel safe. I guess just by hearing one person saying that, you know, most people didn't feel safe in that example, that it was enough to make him realize that, yeah, this is a safety concern. It was, in a way, it was like he was waiting for somebody to say something.
So, what enables this voice? And we've heard today a lot that, you know, a lot of times people don't speak up because they're fearful, but oddly enough, that's not necessarily what we found, and we were really, really surprised by that. We found that in a lot of cases, people didn't speak up because they assumed that other people knew more than they did. And, so, this perceived expertise also influences voice.

And, so, in this case, for example, you know, I'm not used to questioning him. Nobody is because -- am I running over time?

CHAIRMAN WINOKUR: No, you're fine.

MS. SUTCLIFFE: He's made consistently good decisions in gnarly situations for 30 years, and, you know, I didn't feel comfortable about it, but I had the least experience of anyone there. So, it was like, well, it doesn't look right, but what do I know.

And, so, we found that that, you know, perceived expertise was one reason, but we also found that when people were skeptical of somebody's expertise, regardless of whether it was a lower-level person or their boss, that they were more likely to speak up and voice their concerns, so skepticism was really important. And, so, that was the one issue, this issue of voicing concerns, one social process.
The other social process that we found was a process of seeking disparate perspectives. Karl Weick and I have talked about this as requisite variety, the idea that you've got to seek discontinuities in order to create opportunities for re-evaluation, and that we found that leaders who deliberately sought disparate perspectives were more likely to interrupt and re-evaluate their ongoing actions. And as this person said, you know, I wanted to get input from other people, too, to see if there were different views, to see if anybody had a different idea, because, you know, they have a wealth of experience, and I want to use it all.

And what we found that led to that seeking of disparate perspectives was really something that we've talked about as an attitude of wisdom, and I think this is really important to think about with respect to leadership, that we found that the leaders who had a sense of humility, that they didn't assume that they knew it all, that they were more likely to ask for help from other people.

And, you know, we've talked about, Karl and I, and particularly Karl has written about this attitude of wisdom, that, you know -- you want to be confident but not overcautious. It's this balance between confidence and overcautiousness, that it's this attitude of wisdom,
having seen things a lot. And, you know, as this person said, as old as I am and as experienced as I am in relationship to these large fires, you know, I know I don't know it all, and so the next fire I go on to, I'm not going to go in there full guns blazing.

So, what we found really is that there was likely to be a redirection of ongoing action and a re-evaluation of the situation if people voiced the concerns and if they sought disparate perspectives, and we found that this skepticism of expertise and this attitude of wisdom led to those.

And you can think about it as this opportunity for sense making and this opportunity to create an interruption. But I want to do -- I do want to say two other things, and this goes I guess -- relates to what Mr. Griffon was trying to talk about today, and that is that we did find that there were two factors that kind of interrupted this from happening, and one factor was political pressure, that people were less likely to re-evaluate the situation if there was strong political and power issues going on, and also when people had individual interests, and that they had a little bit of wishful thinking, that they really wanted this fire to go well, you know, they really want it to go well, so they kind of put blinders on, and they were unlikely to
redirect their actions.

So, what do I take away from this? I think safety culture is really critical, and it's critical because it does sensitize us to what we want to pay attention to, but also we know that disasters occur not only because of cultural blindspots, because people miss cues, but also because they get on a course of action, and leaders are important because they help people make sense, and they create interruptions and moments to reflect and to re-assess on the unfolding story to determine now what, what are we going to do, and also to re-orient what they have been doing.

So, I will end there and look forward to your questions. Thank you.

DR. WINOKUR: First of all, I want to thank you very much for the presentation, and I see you've been taking careful notes and you've integrated a lot of these thoughts for us, so we'll try to take advantage of that, and certainly a lot of what you said resonates with me.

I don't know your model well yet, but I can assure you my staff will force us to learn it, and we will become more adept at it.

Let me ask you a question I asked before to see if you can give me some insights. We talked before
about the fact that at different levels of an organization, you had the leaders, you had the mid-level managers, you had the workers. There were different perceptions of the culture and how things were going looking at the situation.

What do you think are the causes for that and what are the causes to start with?

DR. SUTCLIFFE: Well, yeah, I think that's a really good question because I have observed that myself in some studies that I've done, that there are these differences, and I actually think that the question -- the answer to your question has come out a couple of times today.

Well, if we think about this work that I just presented, I think one cause of that may be the lack of humility, perhaps, but I think this morning, that one of the admirals talked about the fact that, you know, leaders have a strategic -- they have strategic priorities and strategic goals. And, so, they have a different orientation, and a different perspective on the organization, so that may lead to some overconfidence or confidence that we can achieve what we can do.

And also, their, you know, people on the front lines are seeing more problems day-to-day and the
interruptions and the kinds of things that it takes to
get their work done, so they may be a little less
optimistic.

I also want to highlight that what we know from
sociological studies is that there is something called
positive asymmetry in organizations, meaning that
sociologists have demonstrated that it is very, very
difficult to imagine worst case scenarios, and perhaps
leaders are more subject to that. I don't -- I don't
know about that, but I also think that it may signal
that news is not getting to leaders, and it also may
signal that they're not paying enough attention to the
front line, or they're not really down in the weeds.

So, you know, those -- there may be actual
differences, and -- and those differences may be a
consequence that the leader doesn't really know stuff,
and that the news isn't getting to him or her. And, so,
I think there -- I mean, I would talk about that as the
reasons.

DR. WINOKUR: So, what I take from that, to some
extent, is that one of the values of surveys, especially
from the leader's point of view, is that if you see the
stratification, and if it's strong, and we've seen data
at our previous hearing from NASA about that that
stratification, things typically look a little bit
better at the top than at the bottom. It's a signal to you, a strong signal to you that you may not know the rest of the story, you may not be getting all the news and all the information you need, and it's probably a very natural process that that happens, right?

DR. SUTCLIFFE: I don't know about a natural process, but I think it's -- I think just from what I've seen, it seems to be the pattern that we see in organizations, and I would say that, yeah, that it's a signal that people need to know more, and I would be -- I mean, I would then be wondering about other things. I mean, I would want to dive in, definitely.

DR. WINOKUR: All right, thank you.

Mr. Sullivan?

MR. SULLIVAN: So, thank you for being here today, Doctor, and thank you for waiting very patiently all day to have your turn at bat.

You know, we time constrained you I think to 25 minutes, so I think out of necessity, you went through it rather quickly, but when you go through it quickly, it almost seems kind of simple. It's like, here's a few graphs, and here's a few traits.

DR. SUTCLIFFE: Right.

MR. SULLIVAN: I'm thinking it can't possibly be that simple because there's many examples that we've
heard about today, where we're very smart, very talented people, they've failed at this. So, if I gave you a week, could you be sitting here talking about this for a week? Is it -- it it complex?

DR. SUTCLIFFE: I could be talking about it probably for months. It is extraordinarily complex, and, of course, I mean all -- most models simplify things, just as we did in the enable, enact and elaborate model. You know, it's an analytical model to give -- and I would like to explain it just a little bit more in the sense that the model was derived from looking at the published literature on safety culture, and the findings that we have found, not we, but, you know, the collective "we" of collective scholarship, and the elements that were common to strong safety cultures.

So, you know, if you were going to go and take a look at an organization's safety culture or if you were establishing a new organization, what are the kinds of things that you would want to think about, and that gives you kind of a sense.

So, we created it for that reason, but the other reason is to show that it is a process, that shaping culture is a process. It is shaped and reshaped over time. I mean, you could think about it as being reshaped every moment. You know, every time you're
enacting a new action or taking an action, you're
getting new information, and people are incorporating
it, so it's extraordinary.

I believe in complex technological systems,
sociological systems. It's extraordinarily difficult,
and it takes -- it's very, very, very, very hard work.

MR. SULLIVAN: So, on your one graph that you
did have with traits that leaders should be showing, I
think I saw the word "consistent" there twice, which we
heard earlier about consistency.

DR. SUTCLIFFE: Oh, right, yeah.

MR. SULLIVAN: But, my experience, consistency
can be very hard just because rules are finite,
scenarios can be infinite, and so inevitably, you have a
rule that says this. Something comes along where the
rule doesn't make any sense. Alright. We don't have --
you want to talk about complex socioeconomic situations,
we can just talk about raising my own children, and I
ran into this all the time where now you're faced with
you enforce the rule for consistency purposes or do you
open up that Pandora's box of, okay, now we're going to
start having exceptions to the rule.

So, what do you tell leaders or prospective
leaders about that?

DR. SUTCLIFFE: I think you raise a really
1 important and I think one of the real challenges of
2 leadership, and I guess the way I would think about it
3 is -- and I think that people are pretty careful when
4 they think about culture and building culture, or
5 shaping culture, about that you want a few key values
6 that you really want that are invulnerable. But, yeah,
7 we need to have some -- I mean, there has to be the
8 capability for resilience, and I think Mr. Griffon
9 talked about resilience today, and I think Professor
10 Meshkati would talk about that, too.

11 I mean, we saw that in the -- in the, you know,
12 Daini and Daiichi. So, you've got -- I mean, I think
13 you have to think carefully about which things are
14 invulnerable that, you know, can't be penetrated, that
15 this is how they have to be, but also people have to
16 know that you have to be flexible. I mean, doing the
17 same thing in changing conditions, following a procedure
18 just blindly is not -- is in my view stupid. And, so, I
19 think -- I think that it's a balancing act, and I don't
20 know -- I mean, I had my own problems when I was
21 associate dean trying to balance certain things.

22 So, I think it's a challenge, and I don't know
23 that I have a good answer, other than to say that we
24 have to think carefully about what are the things that
25 we really want. If you really want people to speak up,
and they speak up, and then they are punished for it, then that's a huge signal. You know, I mean, if that's not really of that key value, then we shouldn't be touting that as a value.

So, I think we've got to be careful in the kinds of things that we say we want, and we probably don't always do a good job with that.

MR. SULLIVAN: Thank you. Well, if it makes you feel any better, my children always got the best of me.

DR. SUTCLIFFE: Okay.

MR. SULLIVAN: Thank you.

DR. SUTCLIFFE: No, I don't think there's any good answers for that. I mean, think that's a key leadership challenge, right, and what leaders get called on the carpet for is saying, you know, you want this, and then tomorrow you're doing that.

DR. WINOKUR: Ms. Roberson?

MS. ROBERSON: Well, actually, thank you so much for your presentation. I enjoyed it, and you actually -- I had a series of questions, but you actually answered most of them during your presentation.

But, I mean, you're talking to a room full of engineers and scientists, so I've got to ask a little bit deeper. These 60-plus events that were analyzed for the study, I understand the categorization, but were
there any similarities or dissimilarities across the
line? I mean, was it like regional? Was there, you
know, any difference or were there no differences in the
data set in the more successful, less successful?
Anything you can think of? Yeah.

DR. SUTCLIFFE: I mean, we controlled for number
of factors.

MS. ROBERSON: Maybe that's what I mean.

DR. SUTCLIFFE: Yeah, we controlled for some
factors, and I honestly haven't looked at the paper for
on particularly what we controlled for, but we
controlled for several things, to the extent that we
could, given this particular thing.

I mean, we have also done another study, a more
quantitative study that's going to be published in the
Journal of Contingencies and Crisis Management. And in
that paper, we also take a look at sense making. And
the importance of that paper, I think, is that, first of
all, we have 600 observations, so it's a much larger
sample, but what we found there is that leadership sense
making was critical, and that the way that it was
critical is that particularly if people on the line were
trying to hold on to discrepancies, so if people on the
line were socialized to say, we've got to ask each other
questions and, you know, we want to hang onto the
details, and that if leaders were really -- if they were engaging in behaviors suggesting that, you know, we've got to somehow think about what does this mean and let's come together and interpret what's happening here. So, bringing those things together, it was a huge predictor of performance, the outcomes of these fires.

So, that's why I think that leadership modeling these behaviors that -- of inquiry, you know, I think one of the questions that you all asked today, and I can't remember, it might have been Mr. Sullivan. Well, I think several times you've asked about technical competence versus, you know, other competencies, and, I mean, when I think about what a leaders need or how would we make decisions on what leaders we want, I would be thinking about we want leaders who are really going to be inquiring about things, who are learning oriented, who want to know about stuff, who have good relational skills, and as well as deep technical skills, because I think that's important, too, but it's really this inquiring and making that salient that we want to figure this out.

I mean, I think that the challenge for safety critical industries, and we were talking about this at lunch, is that, you know, risks, and one of the admirals actually said this today, and I know I have it in my
notes somewhere, but -- is that safety -- is that risks aren't always objective, and you have to make sense of things as you're going along, and that that's a process of really interpretation and talking and negotiation and stuff like that, and I think we need more skills like that.

MS. ROBERSON: So, where do people get those skills?

DR. SUTCLIFFE: Business schools. No, I'm teasing.

MS. ROBERSON: No, you're not.

DR. SUTCLIFFE: No, you know, I am, because there's this recent book called "Quiet." I don't know if any of you have read it, but about how we're creating a culture of extroverts and that introverts can be very good leaders, but they're not being listened to. But, no, you know, I'd have to think about that, Ms. Roberson, because I haven't really studied it, and so I'm a little reluctant to say anything.

MS. ROBERSON: Thank you.

DR. SUTCLIFFE: You're welcome.

DR. WINOKUR: So, here's some of the things that I'm trying to understand a little bit better today, and I hope you take them home as research projects.

DR. SUTCLIFFE: Okay.
DR. WINOKUR: But I'm not saying we're funding it, but I hope so, and maybe they've been answered and maybe you've heard the answers here today so you can help me.

I'm trying to understand things about leaders in the sense that some people may believe that if you have an effective leader in one organization and you transplant that leader to a different organization, that they're still going to be effective, and yet I read a lot of things in the Wall Street Journal or the press that say, you know, this person was at Xerox and they were super, and then they were hired by Ford Motor Company, and they fell apart.

What do you think was going on there? Was it a culture they could not deal with? I mean, they're obviously great leaders. They led big corporations and companies with hundreds of thousands of people sometimes, and yet they were not successful.

DR. SUTCLIFFE: Right. You know, that's a really great question, and actually there's a lot of research that's developing on that right now, not necessarily directly related to leaders but related to taking stars, for example, star financial analysts and taking them from one organization and putting them in another where they fail. And so I think there's a role
to the context that really -- and maybe this goes back
to what Professor Meshkati was talking about, you know,
that you've got this bottom-up, top-down kinds of thing
going on and that there is -- the context matters.

So I don't believe that you can just take a
leader, and, you know, any leader, and transplant them,
and that they will be successful because there's a lot
of reasons, there's a lot of contextual reasons, a lot
of infrastructure things, a lot of what they learned in
that particular organization that makes them successful,
and, you know, sometimes people can be adaptable, but
sometimes I would say that leaders kind of take a
mindset that they have from one organization, take it to
the other, and that is a totally different culture that
they're entering.

You know, at the same time, I think you raise a
really important point because, you know, in order to be
credible, leaders have to kind of look like the people
that they're joining, but at the same time, they want
you to know -- generally organizations hire new leaders
because they want them to do different things, and so
you've also got to do different things, but, you there,
there has to be some kind of balance there, if you're
kind of -- if I'm making sense.

DR. WINOKUR: You are. I mean, so the skills
have to kind of be aligned to the organization. You need to be the right person for the organization at that time, and I think what you're saying is there's no universal leader. There's no super-universal leader out there who can just do anything, who could head a naval reactors program and then necessarily turn around and run the Department of Energy or turn around and run Apple Computer. I mean, it's not likely to happen, right?

DR. SUTCLIFFE: Yes, I agree with you, and I also think about equifinality, that there are many ways to the same end, so I think that's important to think about, too.

If I can add on one thing to your question though, and that is that that isn't to say that outsiders aren't useful to organizations because I think organizations can use outsiders in very valuable ways. I mean, other people bring new insight to organizations, new ways of doing things.

In fact, Jim March, who is a brilliant organization theorist from Stanford University, you know, he talks about the value of slow learners in organizations, meaning when new people come into an organization and they don't adapt to the culture right away, that that's a good thing, and that because --
because what it does is it leads organizations to
question some of their assumptions and some of what
they've been doing. So it's a way to introduce new ways
of doing things.

DR. WINOKUR: So the other thing I've been
struggling with today is to try to understand whether or
not the culture of safety of one organization can be
transplanted to another. And that's why the Navy is so
valuable to us because they are so capable at what they
do, I think they are, and they have built a very good
culture of safety, maybe even, you know, really
outstanding in the submarine forces. And, you know,
could that culture be transplanted to a very different
diverse organization, which is how I view the Department
of Energy, or maybe some other organization that's also
complex? How do you do that? Can it be done? So, can
it be done?

DR. SUTCLIFFE: If you took all of those same
people and all the things they were doing and
everything, maybe, but, no, I don't think so. I mean,
my own view of culture is that organizations are
cultures, and so I don't think you can transplant them.
If you're thinking about transplanting, though, or if
you're thinking about benchmarking or best practices or
thinking about taking of adapting or adopting another
organization's safety management system or, you know, practices, you might be able to do that. But the way that I understand culture, it is the organization. The organization is a culture.

I mean, you know, and it's an interesting way of thinking about it. People talk about organizations having cultures or organizations are cultures, and I think that they're both -- that, you know, through the -- I mean, if you think about what I talked about with respect to enabling, through the routines, the daily routines and practices, through the training systems, through the kinds of education people have, through the daily experiences that they have, that is how culture is shaped and built and that means that then we are a culture. And there are multiple -- I mean, I think today we heard multiple times that no organization has one single integrated culture.

I mean, there are oftentimes -- there may be some values and norms and ideas and beliefs that are similar across the whole organization, but they're definitely subcultures within any organization.

DR. WINOKUR: I mean, the way I think about it in an analogy is that we're a democracy in America, but transplanting democracy to the Middle East is not the same thing. Democracy does not -- is never going to
1 look the same in the Middle East as it does in America.
2 There's no way to transplant our system, per se, into
3 their culture.
4 DR. SUTCLIFFE: No, because they have a culture.
5 DR. WINOKUR: That's right.
6 DR. SUTCLIFFE: I mean, they are a culture
7 already, yes. So you can't transfer it. Yeah, I just
8 don't think about it that way.
9 DR. WINOKUR: Thank you. Appreciate it.
10 DR. SUTCLIFFE: You're welcome.
11 DR. WINOKUR: Ms. Roberson?
12 MS. ROBERSON: I don't think I have any
13 questions.
14 DR. WINOKUR: You don't? Mr. Sullivan?
15 MR. SULLIVAN: So I would just like to ask our
16 standard question, whether you have any suggestions for
17 us other than I heard we need to read the book "Quiet"?
18 Do you have any other suggestions?
19 DR. SUTCLIFFE: Oh, I can give you lots, no.
20 Yeah, you have asked the question before about, you
21 know, how if we have suggestions -- and I don't want
22 to -- I guess I would go back to Admiral Eccles'
23 comments this morning and I think Mr. Mark talked about
24 this, too, is that I'm not quite sure about your
25 relationship with the DNFSB. Oh, no, you are the DNFSB
-- with the DOE. But two things, I do have two
thoughts, though, you can see I have many thoughts.
One is that just by doing this I think it's a
signal, and it is a signal that safety is important, and
so I think that's important, just by itself.

I think the second thing is that I would be
thinking about -- you know, you talked today about
metrics and ways to assess safety culture, and if I
could say anything, I would say that we need a myriad of
ways to assess culture, that it's not just a safety
survey. Surveys are important to assess the safety
culture. I mean, surveys are a good -- you know, a good
indicator of the surface culture, but I think you've got
to think about other things.

And, so, I guess I would be thinking about how
you can give the DOE more tools to not only assess but
to evaluate because what do they do with the data then?
So, you know, are there ways that you can help them
figure out, Well, you know, what does this all mean, and
then also, you know, what are they going to do about it
because sometimes we do these assessments but then we
don't go further. And I think change -- and I know, Ms.
Roberson, you brought change up a couple times, you
know, change, and I've taught change to executive MBA
students for the last 20 years at Michigan before I
joined Hopkins, and it's darn hard.

And I've studied change, and, you know, it takes -- it can take a long time, especially in open systems. In closed systems where you have more control over things, and I think Admiral Eccles made this point this morning -- that in closed systems it might be more easy to make change, but in open systems that are more complex, it's really hard. And I'll end on that note.

DR. WINOKUR: Thank you.

DR. SUTCLIFFE: You're welcome.

DR. WINOKUR: Thank you. I want to thank you, Dr. Sutcliffe. I want to thank all three panelists, Mr. Griffon, Dr. Meshkati, Dr. Sutcliffe for your valuable insights into the role of the leaders in organizations conducting hazardous operations.

At this time, it's the Board's practice as stated in the Federal Register notice to welcome comments from interested members of the public. Once again, I understand there are no -- nobody has signed up to make a public comment. I want to turn to the audience now and ask if anybody would like to make a comment.

All right, seeing none, I'm going to turn to the Board Members for their closing comments, and then I will end with my comments, so let's begin with Ms.
MS. ROBERSON: I just want to thank you three for participating. I actually really learned a lot. I enjoyed it greatly, and I'm sure it's going to contribute to our evaluation of any actions we take, so thank you very much.

DR. WINOKUR: Mr. Sullivan?

MR. SULLIVAN: I just want to thank you all again, and I have two books to read. Mark, you need to pony one up.

DR. WINOKUR: Thank you, Mr. Sullivan. Before I comment on this meeting, I'd like to thank our witnesses and their organizations for supporting this meeting, and I want to thank all the members of the public who participated in this meeting. I want to thank any Congressional staffers, whether they're here or listening online, elected officials and other representatives of state and local organizations that were able to find the time to join us today. An active community with engaged leaders is a vital part of any successful program of this nature.

The expert witnesses that appeared before us today illustrate the wide recognition that an organization's culture is the key to its ability to conduct hazardous operations safely and reliably. Our
first session demonstrated that the Navy clearly has put a significant amount of effort and resources into creating a culture of safety and using that culture to improve its operations.

Our second session demonstrated that the quality of an organization's culture has a dominant influence on its ability to successfully conduct hazardous operations and that the organization's leaders have an essential role in establishing and sustaining that culture.

Culture is real and culture is really important. And I want to emphasize this, we have also learned that establishing and maintaining a robust culture of safety is not easy. It requires dedication and commitment from all members of the organization, in particular from its senior leaders. Creating a robust culture of safety must not be viewed as another item on a checklist. It is a long, slow journey that never ends, and there are many side roads that can easily mislead the unaware.

Finally, culture is unique to an organization. A culture cannot be transplanted from one organization to another. The Navy's culture is not the same as the National Aeronautic and Space Administration's or the Department of Energy's culture. The organizations and missions are very different, and consequently the cultures that develop to satisfy those missions are also
very different.

Hopefully one can identify those attributes of a culture that makes it safer and embed those attributes into other cultures. Those basic attributes may apply across all organizations, but the devil is in the details, and those details may vary widely.

Our goal for the first two meetings in this series has been to learn about how different organizations create, sustain and implement the robust culture of safety.

Our goal for the next meeting in this series is to discuss with the Department of Energy how this understanding may be applied to its organization and activities as we continue in our joint journey to improve and sustain the safety of the Department of Energy's Defense Nuclear Facilities.

I look forward to those discussions, 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 September 27, 2014. I would 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 or 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're now
adjourned. Thank you all for attending.

(Whereupon, at 5:08 p.m., the hearing was
concluded.)
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