As I previously mentioned this morning, we will receive testimony from experienced representatives from other organizations. First, I would like to welcome representatives from the U.S. Naval Sea Systems Command, Mr. Thomas Beckett and Mr. Storm Kauffman. If you would be kind enough to give your names and titles so the stenographer can identify you for the record.

MR. BECKETT: Thank you, Mr. Chairman. Thomas H. Beckett. I'm the Deputy Director for Naval Reactors, a joint Department of the Navy/Department of Energy Program.

MR. KAUFFMAN: Storm Kauffman. I'm the Director of Reactor Safety and Analysis for the Naval Reactors Program.

CHAIRMAN CONWAY: Mr. Beckett.

MR. BECKETT: Thank you, Mr. Chairman, and let me thank you and the other Board Members for giving us the opportunity to testify today as to our oversight practices in support of the Naval Nuclear Propulsion Program. I would like to acknowledge the long and warm relationship we have with this Board and the sharing of ideas back and forth that we've done over the years as one of the key elements as we both execute our responsibilities to the public for nuclear

safety in these very high risk areas.

A little truth in advertising before I start here. We were invited to come as representatives of the Naval Sea Systems Command [NAVSEA] and to talk about NAVSEA oversight. I believe that stems from a recent benchmarking exercise between NASA [National Aeronautics and Space Administration] and the Navy which was overseen as its agent by NAVSEA. It focused on two activities that are both high risk and successful. The first is the Submarine Safety Program, and the second is the Naval Reactors Program.

Today, I will only be talking about the record of the Naval Reactors Program. I would ask you to bear in mind that as we talk about that, the lessons may not transfer from our organization to others due to different missions, cultures, leadership, or experience. I leave it to the Board then to take what lessons that you may be able to glean out of our experience and apply them in this other area.

Many times Admiral Rickover was asked to characterize what it is that he did to make his program successful, and his testimony is legion in this area. Most recently in 1979 post-Three Mile

Island accident, he testified before the Congress as to how his program was organized and how he thought it was successful. It would be difficult for me to capture in a few words or slides the full extent of what I think brings our experience to bear, but let me try nonetheless.

There are a few things that I think are important, and I would like to highlight them first, if you'll bear with me, Mr. Chairman. I know much of this explanation of the Naval Reactors mission is not new to you, but in the interest of some of the people, I would like to proceed.

CHAIRMAN CONWAY: Fine. Excellent.

MR. BECKETT: We do have a focused mission, which is to provide militarily effective nuclear propulsion plants and ensure their safe, reliable, and long-lived operation. That is a very simple and yet elegant statement of our mission, which you will see talks about safety. In executing that, it's been very important that we have clear and total responsibility and accountability to the President and the Congress for all aspects of our mission's success or failure.

Likewise, we are organized in a very simple structure which has been maintained over the

years. Very important to us is the fact that our Director has an eight-year tenure, which was originally specified on Admiral Rickover's retirement by Executive Order from President Reagan and is now embodied in law. Most recently, the NNSA [National Nuclear Safety Administration] Act [Public Law] 106-65.

CHAIRMAN CONWAY: And I think that's a very important fact: that the Director has this relatively long assignment compared with other agencies, and has continuity, and has combined continuity with the experience. I think that's one of the essential requirements, if you will, that the President has given to your organization to assure that continuity for at least the eight-year period. That's excellent.

MR. BECKETT: And if I might, sir, Dr. Mansfield had talked about culture earlier. One of the common definitions out there today about culture is the collective experience of an organization's leadership. It's clear that without collective experience over many years, it's difficult to have a consistent culture.

The fact that we have a small headquarters organization with field activities reporting to us is

important. I would also emphasize that our program specialized in the horizontal organizational structure with few levels reporting up to the senior admiral in this case. That is a very important part of who we are and how we do business.

We affectionately refer to this chart as our "starburst" chart because, no ego intended, but the star in the center is the Naval Reactors headquarters organization. I hope you will see that we're a lean Headquarters with 380 people, roughly half being technical people, engineers with engineering degrees and post-graduate engineering experience, and then the remainder of those 380 being clerical, administrative, and financial experts.

We manage 82 nuclear-powered warships for the Navy, over 40 percent of the nation's major combatants. That comprises 103 operating reactors, which is coincidentally the same operated or overseen by our sister agency in the Nuclear Regulatory Commission. And in the breadth of our responsibilities, we're responsible for the licensing of nuclear work in the nuclear-capable shipyards. We operate schools for the training of our operators. We, in fact, train about 2500 students per year in four operating reactor plants. We manage a

specialized industrial base providing components to the program, and that comprises over 900 individual suppliers.

The reactor plant design and operation is overseen by dedicated DOE-owned, contractor-operated laboratories: Bettis and Knolls Atomic Power Laboratory [KAPL]. Each of these places has a Headquarters representative in the field who is charged with providing oversight for the individual organization to make sure that the mission is carried out.

The nuclear technology is a high risk, difficult technology. We thank Admiral Rickover for recognizing that up front and realizing that the way to manage an effort like this is through defense-in-depth, starting with a simple, rugged, and redundant design, including in the procurement of components rigorous quality control, operating with a level of formality in both quality control and in operations such that all procedures are documented, and compliance with those procedures is expected. Oversight, as I indicated before, extends beyond the direct field representatives reporting to the Admiral to other field activities that provide oversight and direct reporting to our Director.

But I would have to tell you that if there's one thing that distinguishes us from many of the other high risk organizations, it's the people in the Headquarters organization and in the field. The key is those people that we have working in our Headquarters organization and in the field. Jack Crawford liked to refer to the "demanding customer." I like to refer to it as the "demanding and well-educated customer." We carefully select our people. We train them well. We keep them motivated by giving them responsibility and authority in their area of expertise.

I'm not going to go into great detail on our 55 years of operation other than to indicate that this slide shows some of the metrics of our success with an open record of accomplishment. I would say that continued success is dependent on our maintaining technical excellence in these areas. I would now like to turn it over to Mr. Kauffman to talk in a little more detail about our oversight activities.

CHAIRMAN CONWAY: Mr. Kauffman.

MR. KAUFFMAN: Thank you. I could go on in quite a lot of length and detail regarding our program philosophy and the way that we implement it. But I'm sure the Board is well aware of a lot of those

details. Past and present Board members and technical staff are former program alumni. In fact, some of the things I will talk about should sound quite familiar. Many of them were captured in the Board's own report, *TECH-10 [An Assessment Concerning Safety at Defense Nuclear Facilities--The Technical Personnel Problem]* in 1996, which was written by some former Naval Reactors alumni in part, so I won't dwell on some of those aspects.

In this case, I will go into further detail on the two items shown in dark blue: the centralized technical control and the emphasis on close and frequent technical oversight, because I think those are matters that pertain in particular to the Board's current interest. However, I would like to touch on a few of the other items.

The overarching safety approach is that safety responsibility cannot be delegated to contractors, but we do expect the contractors to take that responsibility as their own and ensure that all safety considerations are satisfied. In other words, they should do the job, maintain safety, as if we weren't there, but we do not delegate that safety responsibility to them. It remains ours.

We have worked very hard to ensure that

all personnel in the organization, not just our Headquarters organization, but also throughout the contractors, the field offices, everyone in the program, we take personal responsibility for technical, safety, radiological controls, environmental matters, basically all aspects of work. A person is supposed to treat the job as if they owned it forever and, therefore, assure that it will operate satisfactorily in the long term. That requires an in-depth technical understanding of all aspects of the work at all levels. You can't know just your own job. You have to know how it fits into the overall whole, understand the right people to talk to and when to talk to them, when to communicate up and down the chain.

Headquarters is involved in really all aspects of Naval Reactors program work, design, operations, procedures, what we refer to as "cradle to grave." We're equipped with the knowledge to handle problems that come up anywhere in that process and carry that information through so that we're aware, when additional problems or issues develop, how they were resolved in the past.

We emphasize prompt reporting, evaluation, and correction of problems. One of the hallmarks of

our organization is communications. We have parallel, multiple paths of communicating information. It's what an electrical engineer might call a "race condition," where you try and beat your equivalent in informing other people of what's going on so that you're sure that everybody who needs to respond to a problem promptly is aware and can get to work on it. That goes all the way up to the Admiral, in that there are multiple direct reports to the Admiral. He has multiple sources of information. I'll get to that in a minute.

As I said, we require personnel to have in-depth technical understanding of all aspects of the job. That requires rigorous and broad but practical training in the aspects of nuclear engineering and other technical details with naval nuclear propulsion. We emphasize continuing training at all levels and through a person's career.

But in particular, we take highly qualified, technical individuals out of college and have a standardized training program that includes a six-month stint, dedicated full-time at our Bettis Reactor Engineering School to bring everybody up to at least an equivalent level of understanding of nuclear engineering as it applies to naval nuclear propulsion.

Then there is a continuing training program after that. Part of this process includes a couple of weeks at a training prototype, where our staff actually gets to see a plan in operation. After that fixed training period, then we continuously look for opportunities to maintain people's proficiency and improve their technical knowledge. Admiral Bowman, as a former Chief of Naval Personnel, continuously emphasizes training and insists that we maximize training opportunities for even the most junior personnel.

DR. MANSFIELD: Mr. Kauffman, can I ask one question on that? Do you have in-house training? Do you have courses within Naval Reactors to which people are assigned to go?

MR. KAUFFMAN: Yes, we have multiple different ways of handling training. As I said, there's a six-month dedicated school.

DR. MANSFIELD: I mean in the course of five years after the six-month school.

MR. KAUFFMAN: A lot of those courses are offered, and individuals can sign up for them. We also have all-hands training opportunities on specific subjects. For example, I have a technical manager coming down this afternoon to give a presentation tomorrow on loss of coolant analysis techniques for

the entire Headquarters staff. So we look for brief training presentations.

We offer training courses that include postgraduate courses given through the Naval Post-graduate School. We have Bettis and KAPL, our two laboratories, to provide training for individuals by sending personnel down. So we try and provide a variety of different training opportunities.

DR. MANSFIELD: Thank you.

MR. KAUFFMAN: Moving on to the technical aspects of the design: in designing naval nuclear propulsion plants, we emphasize conservative designs with ample safety margins. The objective is that it's best to prevent the casualties from occurring, but we recognize that we can't prevent every casualty, so we have defense-in-depth, multiple layers of protection, to respond if something does go wrong, either an operator error or an equipment failure.

Rigorous quality assurance of all aspects of our work is highly important to minimize the likelihood of those initial failures or at least minimize their severity should they occur. One thing that has come out in the evaluation of the Columbia loss is the importance of testing. That's always been a foundation of our program: that you test to

determine how the system will behave, test to determine whether or not the design specifications are met, and that thorough testing of equipment goes on outside a ship on initial prototype equipment. It goes on in-ship with extensive test programs, and it even continues after a ship goes into operation as we continue to gather data on the performance of equipment and the reactor plant itself.

DR. MATTHEWS: Excuse me. Can I ask a question on that specific topic? How does Naval Reactors manage safety-related research? You rely on technical knowledge, but research is always evolving, materials, performance and hazard environments, LOCA [loss of coolant accident] tests. How do you manage that so that it's not tied into a mission-deliverable, and how it is applied across that board?

MR. KAUFFMAN: Obviously, there is a lot of applicable research that goes on outside the Naval Reactors program. So we stay as plugged in as possible by sending people to technical conferences and assuring that we are aware of what NRC, in particular, is doing. As far as our own research, we either respond to problems where you have something in-fleet, or you notice that something is not behaving as expected and establish a test program to go

evaluate that condition and further research it, or hopefully you've done that testing up front.

When you initiate the design, you identify those places where you are going to do something different, something new, something beyond the past scope of experience, and establish a test program. Our laboratories are responsible for running that test, and both Bettis and KAPL have extensive test facilities, thermohydraulics and materials testing, and radiation testing.

What happens is the laboratories identify the need for some additional data or Naval Reactors directs them to evaluate the need for additional data. They prepare a recommendation for our approval. It goes to the individual group that has the lead in that area, for example, materials. It's assessed not only by that group but other groups that have an interest in how those materials perform: for example, the reactor engineering section.

Eventually, Naval Reactors will approve that testing, usually a good number of technical comments help guide the prime contractor the way that Headquarters thinks is appropriate. Then we follow the testing. Our field offices follow it on a daily basis. We follow it on a regular basis either with

phone calls, periodic reports, or various trips to actually observe the testing.

DR. MATTHEWS: Thank you.

MR. KAUFFMAN: I'll try to wind up this slide. One thing the Naval Reactors Program is well known for is the principles of formality, discipline, and precision, and also skepticism, frankness, self-criticism, integrity, and attention to detail. All of those are easy to say. They are hard to implement. It's one of the reasons why Naval Reactors has tended to only bring people into the program directly out of college to try and train them in that questioning, open, skeptical attitude right from the start.

Then, once you've taught a person to ask the right questions, it doesn't matter if they move to radiological controls or material science or whatever. They can still be a very effective engineering manager by just making sure that people know what they are doing.

MR. FORTENBERRY: Mr. Kauffman, can I ask a question? One of your points here is this strong central technical presence. I wonder if you would speak a bit about the use of consensus standards as opposed to specific standards determined by this central technical organization.

MR. KAUFFMAN: I guess it's a little hard for me because I don't think we have consensus standards, if I understand what the term is supposed to mean. The way that we handle our technical requirements is that usually they originate through discussions initially between the prime contractors and Naval Reactors headquarters.

The prime contractors then developed them in detail. Those are provided as a formal technical recommendation. That technical recommendation is reviewed again in detail by all of the affected Naval Reactors groups at Headquarters. Naval Reactors frequently has numerous technical comments that go back and have to be resolved by the prime contractors.

Once we finally issue those standards, those are the standards. Those are the requirements. If a plant design, a procedure, something has to deviate from those requirements, in most cases that has to come to Naval Reactors for formal written approval.

MR. FORTENBERRY: So if I can just summarize, clearly there would be in existence consensus standards that could be utilized, but in your program, because you believe it's to your benefit and addresses the unique needs of your program, you've

chosen to essentially develop those technical standards yourself and enforce them yourself.

MR. KAUFFMAN: In general, we take public standards and, for example, we follow NRC requirements, but we don't just cross-reference those standards. Instead we review them, determine what is appropriate for our particular design application, sea-going warships, and then adapt those and write them down and implement them for ourselves.

MR. BECKETT: If I could, there's a perfect example of this. That's in ISO 9000, which is the International Standard for Quality Organizations. We looked at that, and as a demanding customer, we concluded that there were some things that we would put on top of that International Standard in order to make it applicable for our business. So we wrote supplementary technical requirements which get invoked in addition to the ISO standard in order to make it applicable to our program.

MR. KAUFFMAN: To wrap on this slide, I could summarize to say that one of our basic approaches is to try and prevent big problems by working on the small ones. Or to refer back to that previous Board report from 1996, it's important to understand that apparently small lapses or

malfunctions can eventually lead to serious safety consequences if they are not resolved and dealt with.

Regarding centralized technical control, that's really what Naval Reactors' program is about. As Mr. Beckett said, Admiral Bowman, our current Director, and all the directors previous, are responsible for all aspects of our work. To do that, the Admiral must receive frequent oral and written reports from all program activities. Those are not cursory reports. They are detailed, technical reports. He understands them. He asks questions about them. He tasks people to respond to him to identify what's going on regarding certain issues.

The Headquarters program itself relies on outstanding personnel, and all the management is technically trained. We do have a financial group, but other than that, everyone of the section heads, even in a project officer or program manager position, has technical training. When we briefed NASA about how we did business, one of the things they just also couldn't get over was the fact that our public affairs officer was technically trained. They just thought that was great because we were talking to technically trained people.

CHAIRMAN CONWAY: Let me ask you a

question now. The U.S. Naval Sea Systems Command is a military organization, is it not?

MR. KAUFFMAN: Yes, sir.

CHAIRMAN CONWAY: You are a civilian, I believe.

MR. KAUFFMAN: Yes.

CHAIRMAN CONWAY: Now, the military officer, a commander or captain, who may be in your organization, does he depending upon his rank make technical decisions in this area? In other words, I guess to say, "Keep the sleeve off the table," if you are in the military in uniform.

MR. KAUFFMAN: One of the things that I was fascinated about when I first came to Naval Reactors -- because I'm one of the few people who came in as a civilian -- was the way Admiral Rickover set it up. You can't tell who is in the Navy. I was never in the Navy.

All the people wear civilian attire, so that there is no inherent rank issues in that you have somebody that's an ensign but the expert on materials arguing with a captain who does not understand material issues. So he took that off the table, but, yes, we do have people ranging all the way from ensign up through captain, and then, of course, the Admiral

himself. They are mixed in and basically indistinguishable in how they perform their job from the majority who are civilians.

Going back here, Headquarters' role is to directly oversee the adequacy of all technical requirements. To do that, we exercise technical approval over contractors, namely, the laboratories. We have a procurement prime contractor in addition. We have private and public shipyards that actually construct and do major overhauls on the naval nuclear powered ships. Then we have the vendor base that Mr. Beckett mentioned.

As I previously noted, there are multiple reporting chains to assure that issues are promptly brought to the attention of cognizant personnel, and that usually means multiple cognizant personnel. For example, a problem on a ship will not only be identified to more than one person at Naval Reactors Headquarters, but to shipyard management, to the field office that represents our Headquarters at that shipyard, and also likely to the prime contractor management. The process assures that we can direct and oversee all aspects of the program operation. To do that, we need to not only monitor but direct personnel actions related to the program. For example,

as is well known, Admiral Rickover set up a process in which he would personally interview all incoming officers to the naval nuclear operating corps, and that is continued. Admiral Bowman still does that. So we have a direct hand in personnel selection. We obviously carefully select personnel for Headquarters, also.

We direct and oversee our own logistics functions within the Navy to assure that nuclear plant parts are available and maintain an adequate stocking level and quality. We control our special nuclear material, including safety analysis for shipments and proper escort procedures for shipments. We're responsible for research and development throughout the life of a plant all the way through to its disposal. As I'm sure the Board knows, we've dismantled on the order of 100 nuclear-powered submarines and cruisers, and about that number of reactor compartments have actually been taken to Hanford and placed there for permanent disposal.

To make all of this work properly, we need not just to put the requirements out there and hope they are met. The old saw is, "You don't get what you expect, you get what you inspect." So we have periodic audits by cognizant technical personnel. The

advantage there is our Headquarters staff who are actually responsible for the technical requirements go out and participate in audits.

We don't have professional auditors, per se, that know auditing but don't know the technical aspects of the work. By sending the technical personnel out to do the audits, they get to see their requirements in action, understand what does and doesn't work, and they can provide some expert guidance on what has worked at other sites and may be an appropriate resolution for a problem they uncovered during an audit.

As Mr. Beckett said, our approach is as a knowledgeable and demanding customer. To do that, we have to make sure that the customer is fully qualified to assure nuclear safety. One important aspect of that is without an equivalent level of technical competence at Headquarters within the government staff, we feel we could not effectively engage in a technical dialogue with the expertise that we have at our prime contractors. So we work very hard to assure that our Headquarters people are as much expert in the details of our work as anybody at one of our contractors.

MR. FORTENBERRY: Mr. Kauffman, another

question. A lot of attention is being brought on this strong central technical control in NR, and I certainly don't hear a lot of complaints about glacial speeds of getting things through the system. Apparently, all of your waivers, all of your exceptions, your technical requirements, the approval of those, the enforcement of those, are all funneled through this central technical control organization that you're referring to. I'm trying to get a sense of how you are able to do that where what one would expect would be this huge bottleneck by trying to maintain this kind of control.

MR. KAUFFMAN: I guess the key is prioritization. We deal with some issues where glacial pace may be acceptable and appropriate and other issues where it's an urgent fleet problem and it needs to be resolved now. Our Headquarters personnel understand pretty much from the day they start work that you put in the effort necessary to solve the problem in the timeframe that's required. So if a ship notifies us of an issue, we turn to and make sure that we come through all the technical resolution within the time required to support the ship or come up with an interim action that is safe and acceptable for ship operation while we go off and do the further

research or evaluation that may be necessary if we can't squeeze it in the short time period available.

DR. MANSFIELD: And have you found that you can preserve your principle of differing adverse opinions in an accelerated process like that?

MR. KAUFFMAN: Yes. And people are not shy about expressing differing opinions. Admiral Bowman, in particular, has very strongly emphasized the airing of differing opinions and frequently can't believe it when we bring in an issue saying there are no differing opinions and that we've all agreed, because he pretty much just expects that there is someone out there.

DR. MANSFIELD: Even on these urgent fleet requests?

MR. KAUFFMAN: Yes. Now sometimes that means that we default to a more conservative course than we might on further reflection. Then as we come through the additional evaluation, we may back off somewhat on the initial action.

DR. MANSFIELD: Okay. Thank you.

CHAIRMAN CONWAY: Tom, do you want to say something?

MR. BECKETT: Yes, let me explain in a little more detail the answer to your question. We do

have tracking systems that track every piece of incoming correspondence to Naval Reactors requiring an answer. One of the jobs then of our project managers is to make sure their projects' needs are being met from a scheduler's standpoint. There is that pressure to get the answers out.

You mentioned waivers as one of the things, and I cringe a little because waivers are an anathema to our Headquarters organization. If, in fact, we believe in formality and documenting our requirements and then meeting those, you have no waivers. In fact, our default position is usually, "No waiver will be entertained." That cuts way down on the incoming correspondence.

There are occasions when a waiver may seem appropriate, when in fact what it means is your specification or overarching requirement was too narrow and needs to be broadened. That's more often what we do than waiver approvals themselves.

CHAIRMAN CONWAY: Mr. Kauffman.

MR. KAUFFMAN: And just to recap the discussion, centralized technical control, our approach is that the government provides technical direction, guidance, oversight for organizations, (our prime contractors, our shipyards, our nuclear crews),

who are staffed by highly competent and experienced professionals. All of those people are expected to do their job, as I said, as if we weren't there, but then we provide the additional technical direction, additional oversight, and we have the responsibility for the safety and reliability of program operations.

To close, I'd like to briefly discuss our close, frequent technical oversight. As I said, inspection is the key to make sure that the requirements are actually being met. As Mr. Beckett mentioned, we have onsite field offices at most of our major locations, such as our prime contractor laboratories and shipyards, who do ongoing surveillance and auditing. At shipyards, they may stand monitoring watches where they just spend two hours watching how the crew or the shipyard does something.

Another aspect of our organization mentioned already by the Board this morning is the importance of self-assessment. We have been strongly emphasizing improved self-assessment capability. Our approach is we have an activity perform a self-assessment, and then we go out and do a periodic Headquarters-led review or audit of the activity. One of the things we look at is the quality of their self-

assessment. Is it honest? Is it in-depth? If we find problems with the self-assessment or if we find problems the self-assessment doesn't identify, then that's one of the issues that gets raised.

CHAIRMAN CONWAY: Is this your people's self-assessment or the contractor doing the self-assessment?

MR. KAUFFMAN: It's the contractor doing the self-assessment. The general process, for example, for a shipyard is that the shipyard does their own self-assessment. Our field office does an assessment of self-assessment. The Headquarters team shows up, and they do an assessment of the self-assessment and go out and do the detailed onsite evaluation.

CHAIRMAN CONWAY: Do you do this in parallel or do you do it in series?

MR. KAUFFMAN: Do you mean the contractor self-assessment? It has to be done prior to our team arriving.

CHAIRMAN CONWAY: Okay. So then your person that is at the site, does he or she follow along watching the contractor do his self-assessment, or does he stand apart and let the contractor do it without him participating, and then does it in series?

MR. KAUFFMAN: The general approach is that the activity being evaluated does the self-assessment and provides it to the audit team. However, the audit team may request that they watch the activity, assess a particular job.

CHAIRMAN CONWAY: That's what I'm getting at.

MR. KAUFFMAN: So, for example, in radiological controls, what will frequently be done is: we almost always do a radiological controls drill, and part of the drill is that the activity performing the drill has their own monitors, their own evaluators, who are expected to write up issues that they note in performance of the drill. Part of our team's assessment then is the comprehensiveness, the validity, of the comments by the site's own monitors. So in certain areas, we do that assessment of the assessors.

MR. BECKETT: Let me explain, too, that self-assessment is a 365-day-a-year job. It's not just done prior to a major site audit or a major customer visit. So we expect any day of the year that we could show up sight unseen, unannounced, and be able to look at their self-assessment, see if they know where their weaknesses are, and see if they have

actions in place or plans to address those actions.

MR. FORTENBERRY: Yes, if I can, Mr. Kauffman. What you were describing is layers of what some people would call "duplication." I would call it "redundancy" in terms of assessing. And the Chairman, I believe, was looking into the independence and whether or not that is critical or not.

For example, if you had one of your layers doing its operation jointly or sharing resources, you may, in fact, lose the redundant effect that I think you're trying to get by those various assessments. I believe what I heard was that it is important. You do protect that independence, which is different than saying you might request to watch an assessment, since you are evaluating that assessment. You do those separately is what I think the answer was. Right?

MR. KAUFFMAN: We call it "walking the fine line," which means that at the end of the day, we're responsible for the outcome. So there are times that you need to partner and be with the contractor to make sure that the outcome is successful. But in general, you can walk up to that line of being an effective oversight organization and not cross over. Because at the end of the day, if you're the regulator, you have to be ready to regulate.

MR. McCONNELL: But just to make sure that I understand, when these situations where the Naval Reactors assessor is time-coincident with the contractor's assessor, the reason is because your assessor is evaluating the performance of their assessor. They are not redundantly looking at the same thing.

MR. KAUFFMAN: That's part of it. In fact, if one of our people is evaluating a radiological job, they are assessing the evaluator that the site puts in place, but they are also assessing the job. So they may end up with comments on the actual technical work. They may end up with comments on the quality of the assessment of the technical work. Usually they end up with both.

CHAIRMAN CONWAY: Let me get this point. You have site representatives.

MR. KAUFFMAN: Yes.

CHAIRMAN CONWAY: Does the site representative have the authority to issue a stop order?

MR. KAUFFMAN: Yes.

CHAIRMAN CONWAY: So he or she in that position can stop the job if they think that it's not being done safely?

MR. KAUFFMAN: Yes. And if, for example, one of our prototype site representatives directs that one of our training reactors be shut down because of an issue, it requires Admiral Bowman's agreement, the Director's agreement, in order to start back up. So you have to come and explain to the Admiral what the issue was and why the corrective action is adequate to resume work. Now that's not true for everything. If you just saw a fall protection problem and stopped the job, you wouldn't have to go to the Admiral.

CHAIRMAN CONWAY: You follow the operational readiness reviews. In other words, something has been shut down because of a safety issue. They then, presumably the contractor, correct whatever the deficiency is. Now prior to starting up again, do you require the contractor to go through an operational readiness review to be sure that they have corrected the safety issue and/or the procedures now, and the personnel that will be providing the work know what they are doing?

MR. KAUFFMAN: Generally, yes. It depends on the severity of the issue. If the issue was that you were not following a procedure, and the reason why you weren't following the procedure is you had the wrong procedure, and that's an obvious problem, then

you may not have to do as big a corrective action program as you would if you just found that general performance of the personnel doing the work was substandard and required corrective action. The response varies with the severity of the issue.

Now I don't want to leave the impression that this happens all the time. It's in fact very infrequent. Most stop work situations are in fact initiated by the site itself because they recognize the significance of the Naval Reactors' representative having to step in and take that action. So they are very conscious of monitoring their own operations and taking appropriate corrective actions.

DR. MANSFIELD: And this injection of Naval Reactors management even from Headquarters, it's not particular to purely safety issues, but manufacturing issues in general? I realize that in your business quality is safety, but the manufacturing in general -- do you do stop work if you see that an outcome is not what you expect, paints the wrong color, rust where it's not supposed to be, things like that?

MR. KAUFFMAN: Yes, although it's secondary to your vendors. We don't necessarily have immediate visibility of that. So somebody making a

small valve is handled differently than the shipbuilder who is actually assembling the ship in the shipyard.

DR. MANSFIELD: I see. Okay.

CHAIRMAN CONWAY: Mr. Kauffman.

MR. KAUFFMAN: To try and wind this up, I've already talked about direct reports to the Director, Admiral Bowman, and top Headquarters' staff on issues. Again, I would like to emphasize that those letters are not just filed, aren't read and burned. Frequently, those generate actions either at the initiative of the cognizant technical personnel who see them or fairly frequently at the initiative of Admiral Bowman himself, who will request further information or immediate action to resolve some issue discussed with him or covered in one of his periodic letters.

Part of the whole process is reporting any deviations from normal operations. We try to train all of our program personnel and, in particular, commanding officers of warships that if you see something that is unexpected, that's odd, don't assume that we know about it. Don't assume it's okay. Ask the question. Questioning attitude is again one of the principal philosophies in our program.

As we've already touched on, we pretty much require Headquarters' technical approval for just about every detail of design and procedure. That's a way not only of assuring that they are right and they are thoroughly reviewed, but also that we're fully aware of what's going on.

To finish up, our program feels that we've established high standards, but to maintain those high standards, you need constant vigilance. You need to take actions to assure performance, that those standards are actually met. We work very hard at that. It's a full time job.

CHAIRMAN CONWAY: Thank you. Dr. Eggenberger.

VICE CHAIRMAN EGGENBERGER: I'd just like to comment. I've heard all this many times as a 12-year former contractor to the program. That's the way it worked then, and I see it still works the same way. The thing that always impressed me was you always told me what you wanted. You always asked me how I was going to do it. Then you always asked me what standards I was going to use to achieve it. You always asked how long is it going to take, how much money is it going to cost, and go execute it. By the way, we'll watch you do that. It was very effective.

Things got done on time, generally under budget, and successfully. My involvement was basically with the General Electric [GE] and the Combustion Engineering [CE] prototypes. We don't have very many of those left anymore. So I enjoyed being with the program. The lesson that I know I learned and that we are still learning from your program is the correct way to do things.

MR. KAUFFMAN: Thank you.

CHAIRMAN CONWAY: Dr. Mansfield.

DR. MANSFIELD: I made my comments already.

DR. MATTHEWS: I'm not quite sure how to phrase this question, but you've described a very rigorous process that obviously is valuable, and I agree with Dr. Eggenberger's comments. Without repeating your presentation, can you give me thoughts on how you keep your comfort level on those rare random events that surprise us all through our careers? Do you know what I'm asking you? It's one that you didn't expect. How do you sleep at night, I guess, against that type of thing?

MR. KAUFFMAN: Well, as Tom's pointing out in the box on the bottom, we try to prevent the big problems by working on the small ones. When you asked

the question, the thing that immediately popped in my mind was an analogy that the predecessor to Tom used to always make, which is: "Naval Reactors is a lot like a duck. It looks placid and very calm above the surface, but it's frantically paddling if you look underneath."

That's sometimes our method of operation in that a fleet problem is identified to us, and we reassure the ship that we'll evaluate it, and we'll get back to you. We basically go to battle stations. We work very hard. We assess it. We ask all the "what if" questions. It can be a very frantic process. Fortunately, it's not frequent, but with those ones that are really surprising, we just marshal the resources that are necessary. We keep people at the prime contractors, at the shipyards, long hours evaluating and doing detailed technical assessments until we come through a determination as to whether or not it's okay because we've evaluated the unexpected condition and shown it's acceptable, or we have to take some kind of action.

For example, we had a case earlier this year where there was an issue about a particular circuit in a particular set of equipment. We spent about 36 hours frankly evaluating it, put out a

procedural restriction for plant operations, and then worked people overtime in order to develop a permanent equipment fix to eliminate the need for the procedural restriction.

MR. BECKETT: Let me explain, too. We have a lot of confidence in the process we use when things go wrong. That involves putting all the facts down on the table to make sure you understand the full depth of what really happened, and then trying to come up with the root cause and corrective action. If you have confidence in that process, and then when you come up with a list of corrective actions and have smart people preparing them, and then smart people second guessing and overseeing them, you know you have the full universe of corrective actions down, and it's a matter of executing to that written formal plan.

MR. FORTENBERRY: I have a question.

CHAIRMAN CONWAY: Thank you. Go ahead.

MR. FORTENBERRY: You do make a point that conservative designs imply safety margins. Do you ever get pressure to examine, for example, "Are we safer than we need to be?" I'm interested in what kind of pressure, where it comes from, and how you deal with it. Maybe you are going overboard here, and you have too much conservatism, too much safety

margin. Can you speak to that a little bit?

MR. KAUFFMAN: We have internal discussions regarding those balances as to whether or not this safety feature, this safety requirement really is appropriate and is necessary. One of the things that we wrestle with is that we're really dealing with four safeties. We're dealing with reactor safety, ship safety, personnel safety, and public safety. You can't solve all four of those with one set of requirements. You have to maintain a balance.

Fortunately, a lot of the things that you do for ship safety and reliability go a long way to enhancing reactor safety. So our approach is to try and make the requirements that are necessary to implement for reactor safety something that is a win-win type situation: figure out how to serve a dual purpose that actually improves the operational capability of the ship.

Not always is that the case. Sometimes you have to make trade-offs. In those cases, we engage in those sort of discussions, but we negotiate them internally -- get the agreement of the Director of the program. We may have a minority opinion that has to be aired, but eventually come to an agreement

that really is not too far off. Those minority opinions are very minor differences in most cases.

MR. FORTENBERRY: And you're describing a situation where your organization is relatively free of such pressure. You just have internal discussion about the optimum or best way to approach things. Is that a fair statement?

MR. BECKETT: I wouldn't say that's true. In today's climate, it's always a reality that you need to do more with less, and we're not immune to that ourselves. The safest reactor is the shutdown reactor, but it's not very productive. So there's always a balance between productivity and safety. We try to balance that with a detailed understanding of the trade-offs and then make our best judgment.

The example is the S1W prototype reactor which was first started up with the first power reactor in this country back in the early `50s. It had so many safety interlocks that it couldn't run. It stayed shut down. So Admiral Rickover decided that some trade-offs were necessary, disabled some of those safety features, and the rest is history. We've had a very success program.

MR. FORTENBERRY: And could I offer that again, this centralized technical control, is that

what you think allows you to deal effectively with that pressure because those decisions are being made by this technical competence and experience?

MR. BECKETT: Absolutely, the ultimate responsibility and authority rests with our Director. So decisions get bubbled up to the top and get made at that level.

DR. MATTHEWS: Can I follow up to that question? You have contractors that you fund to do work, and presumably they're partly in the business of making money. I'm curious how they make that trade that Kent just asked that question about. Do you watch that? How do you watch that?

MR. BECKETT: We have a unique contracting arrangement. The fee that the contractor earns is predetermined based on the level of effort that's in the contract. That level of effort is essentially written to a very simple specification: "Do what it is we ask you to do," as Dr. Eggenberger had indicated. So he doesn't have a financial interest in cutting corners. He has a financial interest only in providing long-term quality service to the program so those contracts can be renewed at the five- and ten-year intervals. We expect them to be as rigorous as we are in evaluating those trade-offs and making the

decisions that are in the best long-term interest of the program and not in the short-term interest of the company or of whatever other pressure there is out there.

DR. MANSFIELD: So you don't have multiple performance incentives in the contract like, "Get this particular piece of work done by next June." You don't have imperatives that the contractor gets paid for if he achieves them on time.

CHAIRMAN CONWAY: Incentive awards is what he's asking.

DR. MANSFIELD: Incentives.

MR. BECKETT: With our DOE laboratories, we do not. There are some incentive features in shipbuilding, which is a necessary feature in something that's that complicated. There is an incentive to do better and a disincentive to do worse on both schedule and cost. Those are features of shipbuilding contracts but not of our design and laboratory operation contracts.

CHAIRMAN CONWAY: I might say that the Board receives each year your annual reports. We read them very carefully and try to learn from them. Also, your recent exchange program with NASA, that report, which is two volumes, we've gone through very

carefully, also. In fact, I would like to put in the record at this point a letter that the Board sent to Admiral Bowman complimenting him on those reports, because we find them very helpful. Thank you. Any other questions?

DR. MANSFIELD: I second that: especially the radiological safety reports and environmental reports.

CHAIRMAN CONWAY: Yes, very important, and we thank you. We thank you for your assistance here today. Thank you very much. Now we have the experienced representatives from the Nuclear Regulatory Commission, Ms. Cynthia Carpenter and Dr. Edwin Hackett. If you would each introduce yourselves for the record.

MS. CARPENTER: Good morning. My name is Cynthia Carpenter. I'm the Deputy Director of the Division of Inspection Program Management from the Nuclear Regulatory Commission.

CHAIRMAN CONWAY: And your associate?

DR. HACKETT: Good morning. My name is Ed Hackett. I'm the Project Director for NRC's Project Directorate II, which oversees the plants in NRC's Region II, Southeastern United States.

CHAIRMAN CONWAY: And your associate?