

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

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

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

16 CHAIRMAN CONWAY: Mr. Beckett.

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

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1 safety in these very high risk areas.

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

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

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

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

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

13 CHAIRMAN CONWAY: Fine. Excellent.

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

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

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1 years. Very important to us is the fact that our  
2 Director has an eight-year tenure, which was  
3 originally specified on Admiral Rickover's retirement  
4 by Executive Order from President Reagan and is now  
5 embodied in law. Most recently, the NNSA [National  
6 Nuclear Safety Administration] Act [Public Law] 106-  
7 65.

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

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

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

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

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

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

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

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

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

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

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

21           CHAIRMAN CONWAY: Mr. Kauffman.

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

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

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

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

25 We have worked very hard to ensure that

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

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

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

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

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

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

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

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

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

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

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

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

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

9 DR. MANSFIELD: Thank you.

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

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

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

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

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

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

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

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

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

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

3 DR. MATTHEWS: Thank you.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

25           CHAIRMAN CONWAY: Let me ask you a

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

3 MR. KAUFFMAN: Yes, sir.

4 CHAIRMAN CONWAY: You are a civilian, I  
5 believe.

6 MR. KAUFFMAN: Yes.

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

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

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

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

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

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

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

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

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

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

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

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

25 MR. FORTENBERRY: Mr. Kauffman, another

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

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

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

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

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

14 DR. MANSFIELD: Even on these urgent fleet  
15 requests?

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

21 DR. MANSFIELD: Okay. Thank you.

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

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

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

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

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

20 CHAIRMAN CONWAY: Mr. Kauffman.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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1 actions in place or plans to address those actions.

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

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

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

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

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

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

18 MR. KAUFFMAN: Yes.

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

22 MR. KAUFFMAN: Yes.

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

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

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

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

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

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

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

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

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

4 DR. MANSFIELD: I see. Okay.

5 CHAIRMAN CONWAY: Mr. Kauffman.

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

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

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

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

13           CHAIRMAN CONWAY:       Thank you.     Dr.  
14 Eggenberger.

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

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

9 MR. KAUFFMAN: Thank you.

10 CHAIRMAN CONWAY: Dr. Mansfield.

11 DR. MANSFIELD: I made my comments  
12 already.

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

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

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

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

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

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

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

17 MR. FORTENBERRY: I have a question.

18 CHAIRMAN CONWAY: Thank you. Go ahead.

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

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1 margin. Can you speak to that a little bit?

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

12 DR. MANSFIELD: Incentives.

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

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

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

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

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

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

20 CHAIRMAN CONWAY: And your associate?

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

25 CHAIRMAN CONWAY: And your associate?

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