

House Science Committee Holds Hearing on Space Shuttle Columbia Accident Investigation Board Report

BOEHLERT:

Hearing will come to order.

I want to welcome everyone here for the first of what will be an extensive series of hearings on the future of the shuttle program, and of the manned space flight programs in general.

This is a pivotal moment in NASA's history. And this committee intends to lead the way in examining the issues that will enable Congress and the White House to chart NASA's future.

Perhaps I should say, in, quote, "confronting the issues," end quote, because moving forward will require asking tough questions and facing up to tough choices.

We will be better able to do that because of the extraordinary work that has been done by Admiral Gehman and the entire membership and staff of the Columbia Accident Investigation Board.

The board members have been inspiring models, independent, focused, inquiring, tough, candid and accessible. The board report has to be the starting point for setting NASA's future course.

If the shuttle is to return to flight, then -- at a minimum -- every single one of the CAIB's return-to-flight recommendations must be implemented. That includes the recommendation that NASA have a detailed plan for addressing the organizational and cultural deficiencies the CAIB has so convincingly described.

Indeed, Mr. Hall and I wrote to Admiral Gehman back in the early summer suggesting just that sort of recommendation: to help ensure that NASA would act on the central recommendations concerning organization and culture.

I think all of us need to face up to the rather disheartening picture of NASA that has been so painstakingly drawn by the board. If we fail to do so, it's readily apparent that we will just have to go through this same sad exercise again.

NASA's experience may be the ultimate proof of Santayana's famous observation about those who fail to learn from the past being doomed to repeat it.

The sad fact is that the loss of the Columbia and her crew was preventable. This is not even close to being a case in which the problems could only be seen in hindsight. We need to clearly identify and root out each of the systemic and individual failures that led to this accident.

The CAIB report is a blueprint for doing so. The memory of the Columbia crew compels us to do no less.

I have to say that I am concerned about some of the ways NASA has been approaching the return to flight thus far.

BOEHLERT:

I admire Administrator O'Keefe and I'm pleased he has embraced the CAIB report with his words. But deeds are what count. And I'm concerned that NASA may already be rushing to meet unrealistic launch dates instead of examining this report closely and moving deliberately.

I'm also concerned that NASA has been trumpeting changes in its safety organization that do not appear to address any of the problems that have been persuasively identified in the board's report. Delay is not the goal. But if safety is to improve, NASA must

not be judging itself by how quickly it can send the shuttle back into orbit.

And undue haste is ill-advised for another reason too. We as a committee and as a nation need some time to consider our overall space policy. We need to make fundamental decisions about the future of the shuttle program and of the manned space flight program.

We need to get, perhaps for the first time, accurate cost estimates of what it will cost to run the space shuttle and other manned programs safely and accurate descriptions of what they will be able to accomplish. I, for one, am not willing to write NASA a blank check for the shuttle program.

We also need to have a better appraisal of what the risks are of operating the space shuttle because even after implementing the CAIB recommendations, the shuttle will continue to be a risky vehicle. And I'm not willing to see the shuttle fly without regard to the level of risk.

Finally, we need to better define NASA's overarching human space flight vision, something that has been lacking for more than a generation. That won't be easy. And it can only be done after hearings that will enable us to make a clear-eyed appraisal of the costs, benefits and risks of different options.

So I approach today's hearing soberly because of the tragedy that has brought us here and the daunting tasks that lie ahead. But I also approach today with eagerness because we have a rare chance to reshape our nation's space program. And we will be able to benefit from the outstanding work of Admiral Gehman and his team. I look forward to hearing from them.

Mr. Hall?

HALL:

Chairman, thank you for a good opening statement. And I think it's a statement that we all need to keep and to refer back to as we proceed and as we adhere to and recognize the findings of the admiral and his colleagues.

So I say to you, Admiral, again, good morning. And thanks for your openness. Thanks for your being available to anyone who wanted to talk to you about anything. And thanks for the work you've done, you and all of your colleagues. And thanks for the work we'll be expecting you to do and the oversight we'll expect of you in the days that lie ahead.

The nation owes a great debt of gratitude to all of you and to your staff for your very dedicated service. I'm grateful to you. And I think every member up here is.

When you began your work seven months ago, it was not at all clear that we'd ever unravel the physical cause of the accident. There'll be some who are not totally satisfied with the findings, but I think you have a lot of backup material there that they can refer to. And indeed, your report, I think, makes it very clear that a series of reviews over the years since the Challenger had uncovered some of the same sorts of problems that you found during your investigation.

This committee needs to get your best assessment of why these problems have continued to occur and what will be required to keep them from causing another accident.

Your answers will help me shape legislation that I'm developing. It'll help others of us shape legislation that we're developing to provide for continued oversight. In the end of the two-year period, the first really important two-year period, we don't want this thing just to dwindle away like it did after the Challenger. We want to keep it before people and keep the goal in sight. And that goal in sight should be safety, safety, safety.

HALL:

If real estate people say location, location, location, I think the American people today are calling for safety.

I know that there's a lot that want to know who was at fault for the Columbia accident. And maybe they wanted names and things like that. And that's understandable.

But your report makes it clear that the conditions that ultimately led to the accident were not just the result of a few individual actions. I personally am not as interested in assigning the blame as I am to working to fix the problems identified by your investigation.

We're going to need your help in determining the best way to proceed from here on out.

In that regard, I'm very interested in your recommendations for returning the shuttle fleet to flight. This committee needs to know why you included the items you did, and equally important, why some potential tasks were not included in your recommendations.

Mr. Chairman, the Columbia Accident Investigation Board has performed a very important service. Now it's up to Congress, I think, in cooperation with the White House and in cooperation with the NASA administrator to make this report work, to seek and find and ferret out every area of safety that we can, to consider issues that are beyond the board's charter.

And namely, we need to decide on some concrete goals for the human space flight program and be willing to commit the resources necessary to meet those goals.

There'll be those who will say that we should walk away from human space flight as a result of this accident. It's been said. I disagree. The question is not whether we should have a human space flight program. The real question is how to make that program as safe and productive as possible.

My view is that we should complete the international space station as originally planned so that it can be a productive research facility. We need to fix the shuttle. And as part of that effort, take a serious look at how best to protect the crews that are going to flying the shuttle for the next 10 to 20 years.

Finally, we need to get some concrete goals for human exploration beyond the space station. Establishment of human exploration goals would ensure that we make the appropriate investments in our space program, would revitalize the NASA workforce, and would serve as a source of inspiration for both the NASA workforce and the American people.

With respect to crew safety, I'd note that just a month ago, the House of Representatives unanimously approved an amendment that I offered up, that many of us on this committee had offered up at the committee level here. We all agreed on safety. We just couldn't agree exactly on how it was to be done.

So my amendment simply said to launch out onto a program for safety, a study as to how to get that safety and who ought to do it -- not to assess blame, but to be grateful to those that made the program great, that put these people, magnificent men and women into the air and brought them back safely so many, many, many times.

I think we're going to continue to rely on the shuttle for a lot of years to service the space station. We need to do everything we can to ensure that if this shuttle comes under threat in the future, the crew is given every possible opportunity to survive.

I didn't send up that amendment to cause any problems or to nudge anybody. But I sent it up simply to say to the world that we're interested in safety, we care about safety, and we're going to launch a program designating and designing how we can make it safe.

And if we don't do that, we may not have the shuttle as safe as it should be, if we should have another tragedy in the next five years or eight years or six years or six months or 10 months.

But we'd better be on our way, and we better have a program to show the American people that we are trying to make it safe for the men and women who will man the shuttle. We have to do that.

That's our goal. That's my goal. And if we don't have that well under way or completed when we have another tragedy, we can forget about the space program. I don't want to do that.

I yield back my time, Mr. Chairman.

BOEHLERT:

Thank you very much, Mr. Hall.

Mr. Rohrabacher.

ROHRABACHER:

First of all, I'd like to thank Ralph Hall and our Democratic colleagues for their bipartisan spirit that we've had in this committee since this tragedy. This could be a very tumultuous time for us all, but we've worked together and we have kept politics out of it. And we've all been trying our best, as just demonstrated by Ralph Hall's wonderful statement. '

And so we appreciate that, Ralph, and all the work you've done.

Also I'd like to thank Chairman Boehlert for his leadership and Chairman Boehlert for his good judgment during this very vexing time.

ROHRABACHER:

So now it's our time to pick up this job. And Admiral Gehman and his crew have done a terrific job, a wonderful job. Now it's time for us to do our job. So our work actually, you might say our work actually begins today.

Today's hearing is the first step in understanding, on this end of (OFF-MIKE) hearing anyway, what went wrong with the Space Shuttle Columbia and what went wrong with NASA and what choices we have in the future, what type of vision we must have in order to achieve the goals that we set as part of that vision.

We are greatly indebted to Admiral Gehman and the whole Columbia Accident Investigation Board for what they've done and for a terrific and an outstanding job. Their work will be an invaluable resource for us, as we now move forward to solve the problems at NASA and to set a course for NASA in the future.

A key element of NASA's success in the past was a clear national objective and purpose when it came to our space program. Mercury, Gemini, Apollo, all were involved, of course, with beating the Russians to the moon. And all of that was something that Americans understood, all of us as American citizens, of people in the government, people in the legislative branch, people in NASA, we all knew what that goal was and the vision and we were behind it and we were a part of the team.

Our civil space program today suffers from a lack of strategic vision and a lack of broader national goals.

Putting America's space program back on track means more than fixing a flawed piece of shuttle technology. In fact, the shuttle itself remains a major question mark, as we go through the findings of the Gehman report.

The last 30 years, NASA may well have been on the wrong path when it comes to the shuttle. Shuttle has failed miserably to meet its original goals. And our reliance on such a complex, high-risk

technology has drained billions of dollars from our treasury and billions of dollars from other space programs. And it has, regrettably, cost us too much money and cost too many lives.

Now, there have been successes in the shuttle program, as well. I was part of the Reagan administration when the first shuttle landed and I know how important the shuttle was to inspiring the American people at a time when our international spirits needed inspiring.

And who can say what type of a contribution that made, seeing that shuttle land and knowing it was probably one of the most magnificent engineering feats in all of human history. That did inspire us. And how many billions of dollars were added to our economy -- hundreds of billions -- by that inspiration, and that has to be put into the equation as well.

Yet, when focusing on the loss of our bravest astronauts and our brave astronauts, we must want to make sure that we look at human space travel in the future, that we do, as Ralph has just stated, we do our utmost to ensure that we are protecting those astronauts and those people (OFF-MIKE) lives on the line, as well.

But with that in mind, we should not close the door on human space travel. The astronauts who have given their lives would not want us to turn around, would not want us to be earthbound because lives were lost. They knew the risks they were taking, and that's why they are unique among American heroes today and we honor them in this hearing and we honor them by moving forward.

It is a risky venture to move forward into space with human beings. But I would submit today that it is worth the risk. We have the rare opportunity to help NASA today and with Admiral Gehman's help and of his team's help, to break the bureaucratic malaise that has gripped the NASA bureaucracy for too long.

ROHRABACHER:

Our space program should be about expanding American freedom into a new frontier and to carry all of humankind to new heights, into the heavens above and into a better life here on this planet.

It is not the time to turn around. It is the time to move forward and do what is right: to finish the space station and to move forward with new technologies that will carry us to greater heights.

Mr. Chairman, thank you for your leadership, and I look forward to working with you in the weeks ahead.

BOEHLERT:

Thank you very much, Mr. Rohrabacher.

Mr. Gordon?

GORDON:

Thank you, Mr. Chairman. I will be brief, because I think that you did an excellent job in laying out our charge before this committee. And I think that if we'll follow your outline, we'll all be well served.

And let me also say that I think we all should be grateful for Mr. Hall's tenacious efforts before, and I'm sure they're going to be continuing to bring us back to flight, but also in a safe manner.

And I look forward to working with my friend from California as our committee works to oversee the progress of this report.

So, Admiral Gehman, let me join everyone in welcoming you and certainly your board here -- or the members of the board that came today -- and more importantly, I want to thank you for seven long, I'm sure, months. They were longer for you than for a lot of folks. You've done a good job.

Admiral Gehman, your report warrants a thorough public hearing and this hearing will be an important initial step in that regard. And

as I reviewed the report, I found that there were a number of things that were troubling to me. Let me mention just a few.

I'm troubled that NASA failed to heed early reviews that identified many of the same problems you described in your board's report.

I'm troubled by your finding that NASA's safety system has repeatedly fallen short of the mark.

I'm troubled by your conclusion that, in your words, "years of workforce reduction and outsourcing have culled from NASA's workforce the layers of experience and hands-on systems knowledge that once provided a capacity for safety oversight."

I'm troubled by your report's finding that the pressure by NASA's headquarters to meet an artificial space station core complete milestone may have unduly influenced shuttle managers' decisions.

And I'm worried that we've seen echoes of that pressure in some of the headquarters pronouncements on the timetable for shuttle return to flight.

So, Admiral Gehman, fixing the problems identified by your report will take time and money. We should not kid ourselves in that regard. And I would like to get your views on how expensive and how time-consuming that effort is likely to be. When NASA submits its proposed budgets for fixing the problems, we need to know whether they are going to be realistic.

And I'd also like to get your views on what benchmarks this committee should be seeking for NASA to determine whether or not they are complying with your report's finding.

We've got a lot to cover today. I'm anxious to hear what you have to say. And once again, thank you and all of you for being here with us.

BOEHLERT:

I want to thank all my colleagues for their opening statements, and all the members will have leave to insert their opening statements in the record at this juncture.

But now it's important that we get to our distinguished witnesses. And before anything, I want to say once again to Admiral Gehman and to all the members of the board how sincere we are in expressing our appreciation for your thoroughness, for the scope and for the independence you've demonstrated. You have done a great service not just for the program, or for the Congress, but for the nation. And we thank you for that.

With that, let me present Admiral Harold Gehman and members of the Columbia Accident Investigation Board.

And Admiral Gehman, you may wish to introduce your colleagues individually.

GEHMAN:

Thank you, Mr. Chairman, Mr. Hall, the distinguished members of this committee. Thank you very much for the compliments.

GEHMAN:

And on behalf of the board, I accept those kind words for the board members who are not here.

I'll introduce my colleagues here, and then I would ask the chairman to allow me to introduce my opening statement into the record and I'll just say a few words and we can get right to the questions.

BOEHLERT:

Without objection, so ordered.

GEHMAN:

Thank you, sir.

Beside me to my left is Dr. Jim Hallock. Dr. Hallock is the manager of the Department of Transportation's Volpe National Transportation Systems Center from Massachusetts.

Beside him is Major General Ken Hess, the commander of the Air Force Safety Center and the chief of safety of the U.S. Air Force.

And beside Ken Hess is Dr. Sheila Widnall, the institute professor and professor of aeronautics and astronautics and engineering systems at the Massachusetts Institute of Technology, and previous secretary of the Air Force.

I know that all the members of this committee feel, as the board does, that the tragic loss that this nation suffered on 1 February of 2003 is a price that we paid that is so dear that it demands that we all do our part to ensure that an accident like this never happens again.

I want to thank this committee and the leadership of this committee for helping this board get over a rough start the first couple of weeks, the first couple of months, to enable us to be at a position where we are right now that we are discussing the merits of our report and not the process by which this board was founded.

We can talk about that too.

But we could not have gotten to this position had it not been for the guidance, cooperation and mentorship of both branches of the Congress, and we appreciate it very much.

Before I begin, Mr. Chairman, I would like to offer my thanks to my 12 colleagues on the board who gave up seven months of their lives to produce this report, the approximately 120 full-time investigators and the thousands of NASA engineers and employees who helped us with this, not to mention the nearly 30,000 volunteers who walked shoulder to shoulder across the state of Texas picking up

84,000 pieces of debris which turned out to be instrumental in our reconstruction and forensic work. And to all of those unnamed and unsung heroes, we owe a great debt.

Let me just make a couple of points.

I committed a long time ago to this committee and to the public that our report would attempt to put this accident into context. And by context I mean any one of several contexts. There's the context of the history of the human space flight program. There's the context of the budget process. There's the context of management and leadership. There is the context of all the previous reviews and investigations that NASA has gone through and whether or not they learned. And then there's the context, as has been mentioned this morning, of what is exactly our nation's vision of what we want to do in space and how does the shuttle program fit into it?

Obviously the first thing we had to do was determine the physical cause of this accident; we did. The foam did it.

For those of you on this committee who may not be intimately familiar with the foam, I'd like to introduce you to it. This is an actual piece of foam. This is the left bipod ramp, the little black line here indicates approximately where it fractured. So this part of it, here, came off. And this is about the right size -- this is the right size. And this is about what it weighs. And so this is the party of the first part here, this is what it looks like in case somebody's not familiar with it.

The board was very deliberate in how we chose our words about saying that the foam did it. We didn't say "most likely," we didn't say, "all evidence supports," we didn't say it was the conclusion of the board. We said the foam did it. And we are quite content with that. And we are quite sure of it. And we would be delighted to discuss that if you want to talk about it some more.

If the foam did it, the board was then interested in answering the following question.

GEHMAN:

If the foam caused this accident, was this a legitimate surprise, an anomalous event that had never happened before? Or, if not, was this something that happened before, and why wasn't it fixed? What was the process by which NASA went through attempts to understand and fix why it happened?

Of course, as has been reported in the press, it was not a surprise, anomalous event. This thing has happened before. And when we got into a deep, comprehensive analysis of how this shuttle program handles unknowns and risks and surprises, how they conduct research and development to understand what's happening, and how they learn as an institution, we were not very pleased with what we found. And that statement takes about 150 pages in our report to document.

Well, being concerned, then, with what we found, we then took two simultaneous paths to come to a set of recommendations.

The first path was a path of academic and theoretical review of how to handle high-risk, high-technology institutions. How do you handle risky activities safely?

The second path was a review of what we called best business practices, or best safety practices, and that's the review of institutions in the United States that actually handle risky enterprises and do a good job of it, and what could we learn from those enterprises.

From these two reviews we took what you might call a sampling, or a recipe, a cookbook of the characteristics that we thought applied to NASA. We then took that template, applied it to NASA, and we're not very pleased with what we found.

We then concluded our report with what we consider to be concrete, specific, actionable recommendations to fix these management

problems that we believe would go a long way toward making the operation of the shuttle more safe in the future.

Let me just close by saying one word about accountability. The board does not believe that accountable persons can hide behind the excuse of bad management or culture or any other subterfuge.

There is a role for personal accountability, and in our report we think that the report is full of evidence of personal performance.

But it's up to either the administrator of NASA, or this committee, if you decide to hold people accountable for their actions. The board decided long ago, announced publicly, and I will defend very strongly the position that we took: it is not our job to sit in judgment over other people.

However, all of the performance factors that you may be interested in are in the report. They're all in there. And if you or the administrator of NASA feels that some accountability is required, we did our job, we laid it out for you, and we don't think that that constitutes dodging the issue of accountability.

Thank you very much, Mr. Chairman, and my panel and I of colleagues here are delighted to be here and ready to answer all your questions.

BOEHLERT:

Thank you very much, Admiral Gehman.

The report states that the board believes that the shuttle is not inherently unsafe. But it also says repeatedly that the shuttle is inherently risky and should be treated as experimental. And parenthetically, if I may say, I couldn't agree more that it should be treated as experimental, when in the view of most it was treated as operational.

But how do you reconcile those two statements? I assume that (OFF-MIKE) likely to lose a shuttle if the vehicle is flying (OFF-MIKE) 10 to 20 years. At what point does something become (OFF-MIKE) risky, that it becomes inherently unsafe? The board ever receive any convincing risk analysis from NASA for the shuttle program?

GEHMAN:

Mr. Chairman, we chose those words very, very carefully. We very carefully used a sentence with two negatives in it. The statement that the shuttle is not inherently unsafe was chosen to allow us to send the signal that we didn't think it's safe, it's not safe, it's risky, and we didn't think it's unsafe.

GEHMAN:

If we thought it was unsafe, we would have recommended that we suspend flying operations. We would have said that. The board was under no pressure to allow NASA to continue to fly this thing. The board completely divorced itself from cost and schedule and international space station requirement. And we do believe that with proper management and proper skill and a good, elegant management scheme that the shuttle can be operated reasonably safely.

But as you said, it is a risky enterprise and it always will be risky.

BOEHLERT:

What level of risk is that?

GEHMAN:

I'm going to let my colleagues in on this one, because we have actually seen numbers -- my own view is that the numbers have little or no validity -- and numbers along the lines of the probability of

a failure in a mission of 1 in 200 are kind of the most commonly accepted numbers.

I'm going to let -- these people have also seen other numbers. And then I have a comment I'd like to make.

Jim, you want to say something?

BOEHLERT:

Dr. Hallock?

HALLOCK:

Yes. There are a lot of numbers that float around that we've been looking at.

NASA has done a job in the sense of trying to look at the various things that could affect the shuttle. For example, the number that Admiral Gehman just mentioned, the 1 in 200, is the chance of actually having a problem due to a micrometeorite or an orbital debris strike and actually cause loss of crew and vehicle.

So the numbers are large. But there are many other types of things that they can run into that can be a problem, too, most of which have been looked at. But once again, it's the compounding of all of these numbers that become important.

Yes, it's a risky venture. But, you know, we have a lot of other risky ventures that we are involved with. In fact, sitting next to an admiral, I think immediately of submarines that go into an environment that is, you know, much like the space environment. When you're well underwater, you're in a place where it's not very easy to escape from to get back to the earth.

HESS:

I obviously agree with the admiral and Dr. Hallock in this issue. And in the course of our seven months, I think we became fairly intimate with the fact that truly quantifying the risk in numeric terms for the shuttle is I think a little bit like dreaming. I don't think you can actually do it.

You can't quantify the risk of the human-factor interfaces in all the different layers that are involved in making management and technical decisions as well as the work that's ongoing every day with the shuttle.

So you can probably estimate, but the air band is fairly wide. And so hanging our hat on a number is, after our study, nothing I would do with the shuttle.

And I'm always reminded that, yes, the technology is risky, and the uncertainty that's involved always causes you to question whether or not it is safe or unsafe to fly.

But the difficulties that we've encountered in both Challenger and Columbia were of the human management decision style, not the technology itself.

So I think the risk in the context is manageable, but it takes some elegant operations to do that.

BOEHLERT:

Dr. Widnall, do you wish to add anything?

WIDNALL:

Sure, I'll add a little bit.

I think I would certainly agree with my colleagues. And the phrase that I would use about trying to put numerical values on risk is that it's perhaps necessary but not sufficient.

If you look at the risk of the shuttle, you can divide it into two parts. There's the physical characteristics of the hardware. You can sort of analyze and dig deep into how the hardware was qualified, what depth of engineering analysis was used, you know, how safe do we feel the actual operation of the hardware is.

But I think obviously more important are the organizational issues: and for me, the issue of how one decides to waive a requirement, how one decides to treat an anomaly and continue flying, the depth of engineering analysis that was applied to the various systems to in some sense certify them, I think these are very important issues, and they are not quantifiable.

BOEHLERT:

Thank you, thank you very much for outstanding answers.

GEHMAN:

Mr. Chairman, may I -- I wanted to add something after they spoke.

To get to your issue, though, it's illustrative, at least was illustrative to me, that when you ask -- the answer to your question depends on who you ask. For example, NASA has a number -- they actually calculate a number for each mission.

GEHMAN:

And if you go, for example, to the U.S. Air Force, which operates the Eastern Range, where they launch it, and you ask them what their risk number is, you find it to be much different than NASA's number. It's very interesting.

And in the case of the Challenger investigation, the famous Dr. Feynman quote at the end, he tried to address this question, too, and he kind of said that kind of the best he could determine was 99 percent, one out of a hundred, which was of course much higher than NASA's.

So the answer to your question depends on who you ask. And if you ask an independent agency, you get a number which is more risky than if you ask NASA.

Thank you, sir.

BOEHLERT:

Thank you very much.

Mr. Hall?

HALL:

Mr. Chairman, thank you.

Admiral, of course, I want to get back to safety. I want to visit with you and the other three of you there. And the word "risk" and "risky" and "risk assessment" and "risk containment" and all that have been voiced and, of course, proper words for this situation and for this report.

And how many times have I heard these brave men and women, astronauts, referred to as the Columbuses and the Magellans of space. And I often wonder how many ships were lost at sea and how many crews were before Columbus or Magellan or Amerigo Vespucci or whoever it was that hit these shores first -- how many we lost and how much risk they were assessing, and a different risk.

But I think we need to think in terms of we do have a risk, and we get the last guess at how to fix it, how to fix that risk. I know that even prior to the Challenger, and prior to Columbia, I know that the president after the Challenger thought we had assessed the risk and had attended to it and had addressed it.

I know the Congress thought we had. I know the NASA administrator, whoever it was at that time, thought we had. But obviously they thought we had a safe shuttle. And now, complying

with your recommendations, we're going to think that we're making it safe, and we're going to think we've addressed the risk.

Now, we were wrong twice. We can't afford to be wrong again. And I think that now is the time to start the journey toward doing something about it if we are wrong again, that we haven't assessed the risk, that we haven't pushed back any risk.

I don't suppose it's possible to say it's absolutely without any question risk-free. No way to do that. I wish we could. But we can certainly, in case we're wrong, we can have a way for those that are aboard that vehicle to survive.

Now, we've asked for that before. I know that we've asked for it for at least 10 years, since the last loss. And each time we've been told that we can't have a vehicle aboard the vehicle. I think the gentleman from California has addressed that a lot of times. And the answer we always got was: "Well, the weight, it's a weight problem. And it's a money problem. And it is both of those problems."

But now, before we send anybody else up, even though we think we've addressed the risk, we've touched every base that we can humanly touch, we need to touch one more base and have them have a way out in case we're wrong again.

So, with that, Admiral, let me say, your report contains some, quote, "observations," unquote, about crew escape systems for the shuttle. And it mentions the fact that the Aerospace Safety Advisory Panel's 2002 report recommended that the NASA consider upgrading the shuttle to include crew escape systems, in view of the shuttle's proposed life extension. That makes sense. That should have been done.

Yet, your report does not actually make a recommendation one way or the other that I can see about adding a crew escape system for the space shuttle. Now, you know that a lot of us feel very strongly

that this is an area that NASA needs to address if this decision is made to fly the shuttle for an extended period.

Without asking the question of why we sent this particular shuttle -- why we sent the oldest one we had, why we sent the one that couldn't dock at the space station, why we sent the one that wouldn't have available the telescope -- all those things are assuming blame to somebody. I'm not interested in that. I'm interested in causation. I'm interested in doing something about it if we're wrong again on our risk assessment.

So we owe it to them to give them a fighting chance. The loss of another shuttle would not -- should not inevitably absolutely mean the loss of the crew.

So let me just ask you directly: If NASA plans to fly the shuttle past 2010, should NASA be required to develop escape systems for the crews that will be flying those shuttle missions.

It's a good "yes" answer, isn't it?

(LAUGHTER)

HALL:

You can't knock that one out...

GEHMAN:

No, as long as you say they should consider, the answer is yes. In my opinion, the answer is yes. The board did not do an in-depth study of that issue, so I'm not speaking for the board here. But we looked at that issue a little bit, and as long as it's couched in the terms of "should they consider it," the answer, in my opinion, is yes.

HALL:

Dr. Hallock, do you have anything to add to that?

HALLOCK:

No, I agree with that in the sense that one needs to always look at possible ways to be able to allow the crew to survive.

HALL:

We don't need to just look at them, we need to do something about them. We need to get under way with it and find people that are more intelligent than those of us in Congress are. All we have to do is come up with the money. But find those of you out there who are givers and are giving your time here today, have given your life to what you're doing, we need you to come up with a way for those people to get out of there if something happens. You can be catapulted out of an F-16 or whatever.

I can't understand why with all the modern technology and all the intelligence and the genius we have here -- lady with MIT and the general that's given his life to this country, Dr. Hallock that's studied all of your life and been smarter than almost everybody else you knew or you were around. Surely to God, you can come up with some way to get people out of there if they say, "Hey, the damn things knocking, there's a rod knocking in it, let's get out of here."

(LAUGHTER)

(CROSSTALK)

HALL:

What? Yes.

Dr. Widnall?

WIDNALL:

Sure. I guess maybe what I need to do is to define the word "consider." Because I think if proceeds down that road, and I think it

is a good idea, it would take a really in-depth engineering analysis and a consideration of, perhaps, design options and the calculation of what this would actually be, what would its characteristics be and, in fact, would it make the shuttle as a vehicle more risky or less risky? And that that is the calculation that has to be done.

HALL:

Sure, weight and structure and strength...

WIDNALL:

Weight, strength, materials. Let me just mention as a ...

HALL:

Jack Kennedy had to have thought of all of those things before he ever launched the first one.

WIDNALL:

Sure. Yes.

Let me just indicate the particularly demanding environment that the shuttle saw when it reentered; reentering at Mach 25, at those altitudes, those kinds of temperatures tend to -- 10,000 degrees, 3,000 degrees Fahrenheit, there are few materials that will withstand those kinds of temperatures. And so it's a very challenging engineering problem. But that would be my definition of the word "consider."

HALL:

Well, we knew the velocity of the foam that you shot into that trial wing. We knew the speed at that time. We knew all those things before the Columbia loss. We knew that could happen.

Why can't we use our genius to come up with a vehicle that will save these people if we're wrong about attending to the risk assessment? Why can't we do that?

WIDNALL:

It's perfectly reasonable to start down that road.

HALL:

Wouldn't you be very uncomfortable if you left here today and didn't believe that we were going to start down that road, whether we get down that road or not, that we're under way trying to get down to that road and that we're lucky enough and have enough support from up above that we don't have a tragedy before we get to the end of the road of finding that answer? We better dang well be under way, hadn't we, if we have another tragedy?

WIDNALL:

Yes, it's a completely reasonable path to take.

HALL:

Because I'm going to support the NASA administrator. I'm going to work with him from this point forward. I'm going to try to comply with the admiral's recommendations.

HALL:

I'm going to work with everybody on this committee. But I want us to be under way to find a way in case we're wrong and we're not successful at doing what we think we're doing about risk, that we can get them out, if it happens.

I yield back my time.

BOEHLERT:

Thank you very much.

The chair of the Subcommittee on Space and Aeronautics, Mr. Rohrabacher.

ROHRABACHER:

Thank you very much. And with due respect to Mr. Hall, I'd like to sort of take this from the other side of the coin.

Admiral Gehman, isn't your finding that we should be trying to minimize our reliance on the shuttle rather than trying to invest more into the shuttle so it could be used more in the future?

GEHMAN:

Yes, sir. Our recommendations are a series of recommendations that make the present operation of the shuttle more safe. But our recommendation is to replace the vehicle as soon as possible.

And in our editorializing in Chapter 9, we specify, to get back to Mr. Hall's point, that whatever it is that we replace the shuttle with, that the concept of the operation should be to separate the crew from the cargo, because as long as you keep the crew and the cargo together, you have to suboptimize human safety. And therein is the dilemma.

ROHRABACHER:

So we should do our best to phase out the shuttle and go to a new system rather than trying to bolster the capabilities of the shuttle?

GEHMAN:

The board wrote that the board was surprised and disappointed to find ourselves here at 2003 without a replacement vehicle even on the drawing board.

ROHRABACHER:

In terms of what we have to do and what the shuttle is necessary for in the future, space station is certainly something that will not be completed without the shuttle. And even to make the type of safety upgrades that we are talking about today will take a certain length of time that would go well into station's life span.

Do you have any recommendation at all in terms of whether the shuttle should be used to complete the space station given its current risks?

GEHMAN:

The board report, I believe, speaks very clearly to the subject of operating the shuttle at what we call the midterm. It's like two to 15 years or two to 10 years. And in there, we specify very clearly, I believe, that the present management scheme is not adequate to operate the shuttle safely.

Technically, hardware-wise, as long as you take care of the shuttle and as long as you aggressively investigate every single waiver and every single anomaly, we believe the shuttle can be operated for another 10 years with a degree of safety.

ROHRABACHER:

So if we change one of the central findings and we come to grips with one of the central findings of your commission, which is the culture or attitude of what was going on safety-wise at NASA, that that might in itself enable us to reach a safety threshold in which the shuttle could be used to complete the work on station.

GEHMAN:

That is correct.

Any of the board members want to -- I mean, that is the central core of our recommendation. And that is that the present management scheme tends to hide or overlook or not react to those little tiny signals that something is going wrong. And it's those little tiny signals, like foam coming off and things like that, that you have to go after aggressively. And we can't predict what the next thing to go wrong with the shuttle is, but we do know that the present management scheme is not good enough to catch it.

BOEHLERT:

Mr. Rohrabacher, just let me intervene if I may, and it won't be taken out of your time. But little tiny signals, shuttle after shuttle, debris, foam comes off. They assumed that since it came off, they assumed too much, that it was going to be the size of the previous foam and no larger.

Isn't the basic thrust of your whole report that too much was assumed and they weren't skeptical enough?

GEHMAN:

Absolutely correct. And they didn't have the resources to have a robust research and development department, and the engineers were all funded from the shuttle program, so, you know, they're not going to tell their boss that he's in trouble and et cetera, et cetera.

GEHMAN:

But, yes, sir, you're exactly right.

BOEHLERT:

Thank you, Mr. Rohrabacher.

ROHRABACHER:

That of course is the difference between being proactive and being reactive. And in fact I think your report suggests that the NASA attitude went beyond being reactive, they were actually blase towards some of these signs that Chairman Boehlert has just pointed out.

Let's go to that attitude now.

Did your commission find that this lack of energy or this blase attitude or bad attitude or bad culture, whatever you want to call it, that this was part of the NASA culture in the past, during the Apollo programs and other programs? Or is this something that has just sort of evolved into place in these last 10 to 15 years?

GEHMAN:

We spent a lot of pages trying to answer that question, Mr. Rohrbacher, and it is our conclusion that it appears to us that if you study history and you study the previous reviews of NASA management -- and you know NASA's never not being reviewed by somebody, so there are a lot of data points out there -- that it seems to ebb and flow.

After a big tragedy, like Apollo or Challenger, they take a whole lot of management actions to make the program more safe and make it more sensitive to engineering problems. And then, over the years, forces begin to act on NASA. And some of these forces are external forces, by the way. Some of these forces are budget pressure or schedule pressure put on by both ends of Pennsylvania Avenue. And NASA then starts to -- it starts to migrate or morph its management scheme to be more effective and more efficient, more cost effective.

And we specifically found, for example, that in this particular case that we were looking at so carefully, the space shuttle program, space shuttle program management actually had been squeezed to the point where the program manager had so much authority, so

much responsibility and so much authority, that he could trade schedule against safety upgrades. He could trade costs against research and development. And we found this to be unhealthy,.

ROHRABACHER:

One last (inaudible) here, and that is, this attitude and this evolution in the wrong direction, that does have something to do with a lack of vision and a lack of goals of the whole space program, does it not? We have a saying on top of us here, it says "Where there is no vision, the people perish." And let us note when there is no vision, astronauts perish. And is that not what we're talking about here?

GEHMAN:

We noted in our report that a lack of an agreed national vision causes NASA to have an unclear set of criteria on how to make decisions.

ROHRABACHER:

And leads to that attitude.

GEHMAN:

It absolutely does.

ROHRABACHER:

OK. Thank you very much.

BOEHLERT:

Thank you very much.

Mr. Gordon?

GORDON:

Thank you Mr. Chairman.

And, Chairman Rohrabacher, I hope that you will continue this effort to try to find that vision. I think it is very important.

A couple quick questions, because, as you know, we're caught here with the bells.

As you're well aware, Admiral Gehman, you had to make a variety of changes to the original charter that was set out in this contingency plan to develop a commission that you felt comfortable with. As I understand it, we revert back to that original charter now if there is some problem in the future. Would it be fair to say that this committee ought to review reviewing that original charter, making some changes so that if there is another occasion that we'll be better prepared early on?

GEHMAN:

To my knowledge, the NASA contingency plan which created this board is still in existence, and the words haven't been changed. And if you feel that that contingency plan is not right, yes, it should be reviewed.

GORDON:

Well, you obviously did, because you asked for it to be changed a variety of times.

GEHMAN:

That's correct; that is correct.

GORDON:

OK. Now, as you have said on a variety of occasions, outside the specifics of the foam, a lot of what your work was was rehashing the McDonald report. And if NASA had done a better job of following the

McDonald report, we may or may not be here, but we'd be in a better situation.

GORDON:

I think it's very important, as our chairman pointed out earlier, that, you know, when the crowds diminish and you've gone home, that at least this committee doesn't lose its enthusiasm for oversight and for setting up benchmarks.

And again, as the chairman said, that's more than just good will, it's the deeds.

So what I'm going to, because I think we can't get it all done today, but I'm going to write you and ask that you lay out your thoughts on how, or what kind of benchmarks, what type of processes that we need to set up to see that these things are followed as we had hoped the McDonald would be.

And you can do it more extensively later in that letter, but I'll let you go ahead now, if you would like to give this committee advice as to what kind of benchmarks we need to set up, and if you would help us also talk a little bit about what kind of rough dollar figures that we need to be looking for.

GEHMAN:

The board agreed with me that we would not be doing a thorough job if we did not study history. And we studied history, the history of NASA and the history of the investigations of -- previous investigations in NASA, including what we found in retrospect to be a very, very good report done just three years ago by Harry McDonald.

But also we went back to the Rogers report and the Norm Augustine report and the Kraft report. I mean, in all of these reports, which we carefully documented, you might say we found nothing new.

NASA's been told over and over again that a number of the things they're doing increase the risk to the shuttle.

I think your question, though, is really an excellent one. And that is, two years from now, or three years from now, or four years from now, how do we assure ourselves that the follow-up, that the progress is there and that the follow-up is there, and that this natural migration of these good traits back to bad traits doesn't occur again, like it has happened in the past?

And the board has discussed this a little bit, and we would be delighted to dialogue with you on how you get at that, because I think that is the central question.

GORDON:

I know you're going to be around a little longer. You'll have staff a little bit longer. I will send a letter of request and would welcome your advice as to how we can follow up on that.

There's lots more, Mr. Chairman, but I guess we better go.

BOEHLERT:

Well, I think we can get in one more round. We have eight minutes to go, so we'll go to Mr. Smith of Texas, and then we'll take a brief pause.

We have two votes, and we'll get right back. This is very important.

L. SMITH: Thank you, Mr. Chairman.

Admiral Gehman, let me get directly to my questions. The first is that the report raised a concern about greater priority being given to scheduling demands than to safety. Who or what pushed these scheduling, put these scheduling pressures on the individuals involved?

GEHMAN:

We believe that we got right to the bottom of that in our report, and when you ask senior managers at NASA, to a person, 100 percent of them deny that there was any schedule pressure.

And then when you go down and talk to the worker bees, the project people who are actually working on the shuttle program, to a person they say that there was enormous schedule pressure.

So schedules, of course, are not bad things. I mean, everybody uses schedules as a management...

L. SMITH: Do you think the pressures where more internal than external?

GEHMAN:

I think that there was a great difference of opinion between the senior managers and the junior people. And, of course, anytime you've got the senior managers working on one set of script and the other people working on another one, you've got a dangerous situation.

L. SMITH: So conflicting responses...

GEHMAN:

Complete miscommunications as to what the truth was.

L. SMITH: Admiral Gehman, none of the external advisory groups voiced concerns about the foam, despite the fact, as we know, that foam has been falling off consistently.

What significance do you attach to the fact that none of those concerns were raised?

GEHMAN:

Thank you, sir. And by the way, that, of course, struck the board right in the forehead like a two-by-four, that these wonderful previous panels, including Rogers, missed the significance of the foam coming off.

If we're so brilliant that we can see that foam is a hazard to the shuttle, why didn't all these other people see it? And the way we answered that was that we have to set up a management scheme that can detect this kind of stuff, knowing that it's very hard to detect.

GEHMAN:

And the management scheme that we put in place would be one in which waivers or exceptions or violations to the specifications would be reviewed by a group of people who have no interest in cost and schedule. That's the only way we can see to safely get things like foam -- and oh, by the way, the board felt it's very important that we come up with others, by the way.

We think it's kind of a cheap shot to take to criticize NASA for missing the foam. So we said, "OK, if you're so smart, tell me what the other ones are." And we came up with half a dozen other ones that are very dangerous and which they've decided to waive.

I know, and my panel members -- I know, for example, Dr. Widnall would like to -- might want to comment on the testing of bolt catchers and things like that. So you know, there are others.

So the answer to your question is this independent technical review authority.

L. SMITH: A couple more questions real quickly, Admiral. Let's see, you expressed concern in the report about the drastic reductions in government inspectors and the mandatory points of inspection, which actually started in the early 1990s. Was this intended to shift

greater responsibility to the contractor or was it to meet budgetary constraints?

GEHMAN:

It was both. They assumed -- their belief was...

L. SMITH: And neither of which was good?

GEHMAN:

Neither of which was good. They assumed that the maintenance and preparation for launch of the shuttle, they'd done it so many times they thought it was a routine operation and could be contracted out.

L. SMITH: Lastly, Admiral Gehman, if the shuttle flies again -- and we hope that it does -- is there any reason why it would be limited only to servicing the space station? Is there any reason why it couldn't continue to service other science missions, including the Hubble?

GEHMAN:

No, there is no reason except that the on-orbit inspection repair capability, which we recommended, would be different for the two missions.

L. SMITH: Thank you.

Thank you, Mr. Chairman.

BOEHLERT:

Thank you.

Just let me make an observation. Waivers are something we're going to get into in greater depth a little bit later on. There are over 3,200 waivers been granted; over 1,000 of them hadn't been

reviewed in more than a decade. So that is something you rightly emphasize. And that's something we should focus on.

But before that focus, we have to take leave for a few minutes to go respond to the call of the House. We should be back within 15 minutes. If you would like coffee or -- I can't give you a break to go sailing, Admiral. But we can give you...

(LAUGHTER)

The staff will try to accommodate anything you might want.

(RECESS)

BOEHLERT:

Let's resume.

Mr. Costello?

COSTELLO:

Mr. Chairman, thank you.

Admiral, you answered a question earlier posed to you by my colleague Lamar Smith, and I'd like to follow up on that. On pages 116 through 118 and later in your report you refer to the schedule pressure, the pressure that was put on NASA employees by the schedule that was adopted by the administrator. And I'd like to ask a few questions concerning the pressures that may have been added because of the schedule.

And one is, apparently, according to your report, the board's report, you very carefully evaluated the impact that the schedule pressure may have had on shuttle safety, and that specifically the administrator seems to have laid out a management goal of completing NOD2 (ph), the International Space Station, by February 19, '04.

And my impression is, from reading the report, is that most of the NASA program people believe that that was an unrealistic goal. They also believe that if they didn't meet these arbitrary goals that something bad was going to happen to them.

And I wonder if you might comment what you found regarding the schedule pressure and how that impacted safety?

GEHMAN:

We did find that schedule pressure, undue schedule pressure, excessive schedule pressure was at work on the workforce in NASA, even though, as I indicated in my previous answer, the senior management will deny that, but we did find it present in the workforce.

And as the illustrations in our report indicate, we also were concerned that some of the measures that NASA was taking to stay on schedule appear to be cutting into the safety margin, such things as working on weekends, conducting safety checks in parallel instead of series. They're all listed in those charts in there.

They all appear to support our basic hypothesis that bad traits and bad engineering habits had crept into the NASA organization. We don't think -- we don't say in our report, and I don't think the board feels that schedule pressure caused this accident. That's not what we're suggesting.

COSTELLO (?):

You talk repeatedly in the report about the communication failures at NASA concerning the Columbia disaster. And, you know, it's surprising to me that the administrator and top management never seemed to hear from the people in the program level that the schedule, the core complete goal needed to be adjusted or changed.

Did you find any evidence at all of discussions that may have taken place concerning the core complete goal among the top managers or any consideration of how it impacted safety of the shuttle? I know the top management said that they never heard, but in your investigation...

GEHMAN:

Yes. I'll let General Hess answer that. He's the expert on that area.

HESS:

I think in our investigation of it, and it's documented in some of the charts in the report, we know that the International Space Station managers, as well as the shuttle managers, were briefing the number of days of slack in the schedule. And the briefing charts were -- in the last venue (ph), I think, in December of 2002 -- indicated to the leadership that they were projecting as much as 45 days late -- last line on the chart says -- but we're going hold to the February date.

And so, I think that the discussion was there, that they were telling the NASA leadership that their best estimates were that they were going to be behind, but they were still sticking to the date.

Now, how far the conversations went beyond the briefing chart, I don't think we know. But when we get back and look at the circumstantial evidence, how it unfolded with regards to decisions made on STS-113 and then on-orbit decisions were made with this particular mishap, it looks like it all came together to influence decisions.

COSTELLO (?):

General, a follow-up question, if I can? Do you have any concerns that the return-to-flight goal laid out by the administrator may produce some of the same pressures that NOD2 (ph) did?

HESS:

Well, obviously, I'd have concerns if NASA doesn't have a realistic timeline decided. I think that, perhaps, giving them some credit here, the initial estimates about when they wanted to return- to-flight were done before the full value of the report was laid out before them so they could actually see the recommendations and how long it was going to take them to get from where they are currently to actually the return-to-flight decision. And certainly, some of the key return-to-flight recommendations will establish a timeline that may not have been apparent when the schedule's set. So I think that they have every opportunity to fix a schedule that would be realistic.

BOEHLERT:

Thank you very much.

Let me ask you, Admiral, before I go to Mr. Calvert; NASA has indicated the return-to-flight report will be out next Monday, I think, the 8th, or Tuesday. Will you be in a position to give a sort of an instant evaluation of that plan?

GEHMAN:

Obviously, I'm going to retain a small staff because we have more work to do, and we are at your disposal to do whatever you want to do.

I would say that Mr. O'Keefe indicated in testimony yesterday that the return-to-flight schedule is events-driven, not calendar driven. So he said we'd return to flight when we're ready, not on a date.

BOEHLERT:

And you're due to be testifying before the committee with Mr. O'Keefe on the 10th.

GEHMAN:

That's correct.

BOEHLERT:

And so, I'm sure you'll have some choice words on that.

Mr. Calvert?

CALVERT:

Thank you, Mr. Chairman, and thank you for having this hearing and the hearings we're going to have in the future.

And I want to thank Admiral Gehman and certainly the investigation board for all their hard work, and we certainly appreciate that.

I'd like to spend a little bit of time on the issue that was brought up during your testimony, Admiral, and that's the role of independence. I'm interested in learning more about the board's suggestion that responsibility and authority for decisions involving technical requirements and safety should rest with an independent technical authority.

And I agree with you, I agree with the conclusion and the relating recommendation. NASA needs to utilize independent assessment capabilities that will serve them throughout the life cycle of the space system and human space generally.

And as you know, Admiral, in your career in the United States Navy, some of the oldest and best assessment -- independent assessment work came from the Navy's painful experience in World War II with torpedo fuses, which was well-documented, and the Navy learned their lesson and it created something which is in my district, the NAVSEA, Corona, which I represent, which traces back to that original problem.

CALVERT:

Within your recommendation that NASA stand up on an independent assessment capability, is there room, encouragement, direction for NASA to use that kind of experience and to follow agencies like DOD to establish that authority?

GEHMAN:

Thank you for the question, and the answer is that -- the answer to that question gets right to the core of our recommendation. We tried to devise a practical, a workable recommendation that would fix as many of the problems at one time as we possibly could.

And the traits and the unhappy characteristics that we saw in the ignoring of engineering advice, the e-mail story about the images, many, many of these ills, we thought could be fixed with one management fix, and that management fix is to take the ownership of the level one specifications and requirements and all waivers to them -- and the chairman had mentioned how many, 3,000-some odd waivers we are flying with right now -- invest them in a technical engineering organization which is divorced, isolated, from cost and schedule pressure.

And this is done other places; we found other places where it's done. You mentioned NAVSEA, Corona, which does not only -- now it does missile -- it does all kinds of analysis of weapons effectiveness, and they are completely independent from the guy who has to shell the money out. And so you get an independent assessment.

We find that to be a very attractive methodology for fixing a number of problems.

CALVERT:

And when you say independent of NASA, would they have a separate budget? Would NASA still control their budget? Would you

kind of expand on how that organization will work and the relationship with the shuttle program manager?

HESS:

It is not our intent that they be independent from NASA. It is our intent that they be independent from the shuttle program. They would still be within NASA, as we viewed it.

We were very careful in our report and we discussed among ourselves at great length the issue of not specifying in any great detail how this organization should be set up. Since we're not going to be around to micromanage it or be around to make the fine tuning that are necessary to any management change, we decided instead to specify with great detail and great directness how this organization should work, what its function should be, but not draw the wiring diagram.

So this organization would be within NASA, but it would be independent of the shuttle program.

CALVERT:

Understand.

Dr. Hallock, General Hess, Dr. Widnall, any other comments on that, on the independence of the technical board?

WIDNALL:

Yes, I might make a comment. I think this, as the admiral has indicated, is an extremely important recommendation. And from my way of thinking, what we have given NASA is a template, or as a scientist I might say we've given them a set of boundary conditions.

I believe very strongly that it is in the working out that will take place within the agency of how this will work, what process this will be used, how the interaction and interfaces between the shuttle

program and the independent technical agency, how that will all work I believe will go a long way towards challenging the basic culture of NASA, because it will challenge some of their basic assumptions about, you know, what is true, what is fact, what is analysis, how do you make decisions.

So I look to it to have a really good effect on the agency, the working out of the details within the template.

CALVERT:

Thank you.

Thank you, Mr. Chairman.

BOEHLERT:

Mr. Lampson.

LAMPSON:

Thank you, Mr. Chairman.

Well, Admiral Gehman, I want to join with my colleagues who have passed commendations on to you and the other board members and your staff for all the work that you've done on this report. I, too, remember back when, I guess in February, when Administrator O'Keefe said we may never know the answer.

LAMPSON:

I think that we can feel confident that you've indeed determined the physical cause of this accident.

I read your report to say that NASA must see significant reform, the agency must develop a vision for the future and that the administration and Congress must provide NASA with adequate funding levels. And I see that as a new mantra for us. Let's do what

my senator said yesterday when she said: Let's throw out faster, better, cheaper in the garbage can, let's start looking at reform, vision and funding, and perhaps we can have some different successes.

It seems clear from your report in the area of reform that NASA and the space community are comprised of an enormously talented and dedicated group of men and women who are capable of making the cultural changes that your report indicates. How, specifically, do we continue to support their important efforts as NASA continues the return to flight process and institutionalizes the changes that will support sustained safe operations over the long run?

GEHMAN:

That's a tall question, Mr. Lampson, but I'll give you a couple of answers to that.

First of all, it isn't NASA that needs a vision, it's the country that needs a vision. NASA has got lots of visions, but visions without resources are just dreams. We need an agreed vision, and then NASA can execute that.

The reforms that we call for in our report cannot be instituted by the administrator of NASA alone. He is going to have to have your help.

For example, this independent technical review authority that we just discussed will have a manpower bill associated with it. These are people that are going to have to be hired. They're going to have to be paid. They're going to have to have career paths, et cetera. So the administrator is going to have to come up here and get your assistance on this.

Some of the other reforms are going to require your assistance, too, because they are not solely within the purview of the administrator of NASA. The funding business, the board -- in order that we weren't affected by cost and funding, we kind of isolated ourselves

from cost. And we don't know exactly what it's going to cost to return to flight. I would say that our experience of working this problem for just under seven months indicates that none of the things we've recommended are terrifically expensive. I mean, they aren't show stoppers.

But some of the things that we recommended for the midterm, for example, is completely independent, new technical review authority. An independent safety organization with line authority over safety means more people, more government people. And some of the other recommendations having to do with the oversight of the S-FAH (ph) contract means more government employees. So he's going to have to come up here and explain to you how he's going to go about it and you're going to have to help him.

LAMPSON:

You made the comment about vision. And in the report you also said lack of agreed national vision for human space flight. Would you expand on that finding for just a few seconds, please?

GEHMAN:

Well, we attempted to find everything that we possibly could that contributed to bad habits and bad traits and bad management of NASA, and there were a lot of things that contributed a little tiny bit and some things that contributed largely. This was a contributor.

For lack of an agreed national vision, you don't know how many years to amortize investment in infrastructure. It's hard to argue budgets before Congress if you don't have an agreed vision of where you are going. You don't know when to replace equipment.

We saw in some of their technical laboratories, 1960's era oscilloscopes and things like that, analog meters when everybody is using digital meters, you know. And there are basic infrastructure decisions and basic investment decisions which NASA has a hard

time arguing or justifying because we don't have a complete agreement on how long is the shuttle going to be around, what's it going to be used for in the future. And so, it's very difficult for them to make investment kinds of choices.

LAMPSON:

Thank you very much. I would like to ask -- and I'm not going to because my time is about to run out -- I would like to ask at some point in time for your advice and the board's advice on how to recognize in the future when a lack of resources has pushed the program into an unsafe condition. And that might be something that you may want to think about at a future opportunity we'll have.

But let me take my last couple of seconds and close, if I may. I do believe that we should give NASA the funding that it needs. But first the agency must make necessary reforms and establish a vision. And your report calls on the White House and on Congress and NASA to honor the memory of Columbia's crew by reflecting on the nation's future in space. And I couldn't agree more.

And now that your report has been released, this administration must provide Congress and the American people with a vision and a concrete set of goals for the nation's human space flight program and for the International Space Station. And I'm hopeful that the agency will establish a phased series of goals over the next 20 years, including human visits to the Earth-Sun libration points; Earth orbit crossing asteroids, as we've been reading about; deployment of a human-tended research and habitation facility on the moon and human expeditions to the surface of and moons of Mars.

LAMPSON:

And I attempted to push such legislation, push NASA into the direction of my Space Exploration Act legislation that I introduced in the last Congress. And I'm going to do that again, Mr. Chairman, next week, and I invite all of our colleagues on this panel to please

take a look, please make advice or suggestions to me as to how to make it the kind of legislation that would fit into our discussion today.

And again, I thank you, Admiral Gehman.

I yield back my time.

BOEHLERT:

Thank you very much, Mr. Lampson. I would note a particular passage in the report, on page 209: "NASA has usually failed to receive budgetary support consistent with its ambitions." I would suggest that probably that would apply to any agency of the federal government.

And I'm glad we're focusing so much attention on vision, because we have to have a shared vision, it has to be the executive branch and the legislative branch, and we, and the American people signing on to that vision.

But further on, I would report on page 105 of the report, we're talking about budget reductions. We're all part of this process, but let me just read a couple of things here.

"Reductions have been requested by NASA during the final stages of budget deliberations. After its budget was passed by Congress, NASA further reduced the shuttle budget and the agency's operating plan, the plan by which NASA actually allocates its appropriated budget during the fiscal year to react to changing program needs.

"These released funds were allocated to other activities, both within the human space flight program, and in other parts of the agency."

And then it goes on to a enumerate all the changes that were made.

Of course, we haven't provided NASA or any other agency with every dollar they've requested, and we have to be very mindful of our special responsibilities, but when it's pointed out that we don't provide the budget consistent with an agency's ambitions, I would suggest that the agency better adjust its ambitions. And we better sign on to what we agree on is the vision for a program for the rest of the budget year and beyond.

With that, I go to Mr. Gutknecht, the vice chair.

GUTKNECHT:

Thank you, Mr. Chairman.

And again, I thank all of you for what you've done, and I think your answers today have been very candid and we appreciate that more than you can imagine.

Yesterday, the administrator, Mr. O'Keefe, testified before the Senate Commerce Committee, and he indicated unequivocally that he understood the message and would implement the recommendations of your report.

But, you know, success leaves clues, and good management requires setting benchmarks and finding, you know, as we go forward, how are we doing in terms of implementing that?

And if you were sitting on this side of these desks, what would you look for in terms of benchmarks so that we could actually have a better confidence that they really are implementing the plan, at least as you outline it in your report?

Any particular things we should look for in the next six months to a year?

GEHMAN:

I'll mention a couple of things, and I think I'm going to ask Dr. Widnall, who has some comments about oversight and review and things like that.

First and foremost, of course, is the Stafford-Covey -- the first and foremost is the waiting for the NASA return-to-flight plan. We have got to get it and we have to look at it.

The second of all, I think very prudently, we have a very illustrious, large panel, the Stafford-Covey return-to-flight review group, which is going to provide an opinion, an evaluation, not of our report, but they're going to provide an evaluation of the adequacy of NASA's response to it.

And kind of like the Guy Stever panel did for the solid rocket booster joint review, I think that that's a very, very good step.

But the real core of our recommendations, our recommendations which need to be implemented a year from now, two years from now and three years from now, and I think that the question remains open in my mind as to how to follow up on that effectively.

And setting benchmarks is a good way to do it. There are other ways to do it. And I think that Dr. Widnall wanted to make a comment about the efficacy of some kind of a review panel which might measure those things.

GEHMAN:

So if you'll allow me, I'll recognize Dr. Widnall.

GUTKNECHT:

Please.

WIDNALL:

OK. Well, let me make a couple of remarks.

First of all, I do believe that our recommendation that in the return to flight (inaudible) that NASA should come forward with a plan on reorganization was actually inspired. It's one of those things that happens when a group of people get together and, you know, talk deeply about an issue. And I think it really was an inspired idea.

From our point of view, the organization that we have recommended, the independent technical authority and the safety organization, have specific attributes, and you could almost check them off.

We leave it to NASA to do the details, to figure out where in the organization it's housed, who it reports to and all of that. But the process is the -- the fact of its independence is a specific attribute that can be measured. And there's no fudging up of that. So I think that's identifiable.

As to the issue of oversight, I think there has been a tendency to simply recommend an oversight committee. I think there's a big difference between oversight inside an organization and oversight outside of an organization.

I've not been a fan of standing outside oversight committees because I think with time they tend to atrophy. They lose, you know, the urgency. They have an initial charter. They have an initial mission. And they set out on that mission. But then, over time, it kind of dwindles away.

So I am concerned about establishing yet another, quote, "outside advisory committee." I'm much more in favor of what I would call the sense of urgency, short-time committee, such as we ourselves were. We were a short-time committee, seven months. We had a sense of urgency about what we were doing. We were willing to work real hard for a short period of time.

So those are some of the tradeoffs that you might think about as you look into the issue of how can you get adequate oversight for some of the details that need to be followed up on.

I do believe that safety is a technical discipline so you will need comments from people who basically are safety disciplinarians and people who have had experience at these kind of very intense investigations, such as our board.

But the question of follow-on oversight is a challenging question. And I know that you'll be giving a great deal of thought to this as you proceed.

GUTKNECHT:

And speaking of urgency -- and I know we all have to run and vote - - but I couldn't let you go without at least mentioning, and perhaps you could respond briefly, Homer Hickam wrote a fairly blunt piece in The Wall Street Journal the other day. And he titled the piece, "NASA's Vietnam."

And in it, he says -- and if I could just read this into the record -- he says, "Take a look at the shuttle stack and see what you see: a fragile space plane sitting on the back of a huge propellant tank between two massive solid rocket boosters. The shuttle has to sit right in the middle of all of this turmoil of launch because we once believed that it would be cheaper to bring back those engines and rebuild them rather than to build new ones. That has proved not to be the case, far from it, but it has left the crew sitting in the most vulnerable position possible in terms of design."

Would any of you like to talk about it, because, essentially, what he says is that the whole design is a flawed strategy and that we have to get serious about coming up with a whole new way of launching a returnable vehicle.

Anybody like to comment? And I apologize because our time is short and we don't have time to discuss it in length.

GEHMAN:

We felt so strongly about this that we devoted the whole first chapter in our report to the issue of the compromises that were made when they built this thing, because we felt that the compromises -- the original design compromises left us with what we got. I mean, what we got is what we got. And it's a compromised vehicle.

Now it's an engineering marvel, but I know as an aerodynamicist -- and Dr. Hallock also is a physicist -- we'll constantly scratch our head as to why you have three 400,000 horsepower engines on a glider and why do you put them into orbit.

And we know the answer. I mean, we know the answer. But in retrospect, it is an interesting question.

To make a long story short, we agree with you. And that's why we devoted a whole chapter to the issue of the design compromises that were originally made when the shuttle was originally built.

GUTKNECHT:

And that's why you, essentially, recommend that as soon as possible, this vehicle be replaced.

BOEHLERT:

Thank you. The gentleman's time has expired.

Now we have another vote. But we'll dash over, and I promise you faithfully we'll dash right back. And Mr. Wu will be first up. We'll see who dashes the fastest.

(RECESS)

BOEHLERT:

And I understand when Mr. Gutknecht gets back, Dr. Widnall, you wanted to give some supplementary remarks in response to his question. So while we're waiting for the others to get back, let me bring up a subject that you might not want me to bring up.

But, Admiral Gehman, you indicated that you're not going to be micromanaging and fine tuning everything. But we do need -- and we've got our special oversight responsibilities. And we have to be vigorous with them. And I can assure you we will be.

And I understand, Dr. Widnall, you have said about all these external panels playing new panels, you're not quite certain they all must do the job that they intend to do.

But at the risk of offending you -- this is a compliment to you -- we need some help in evaluating the plan. And would the panel be receptive to sort of a one-year review? Now I don't know how practical that is, because you're constituted under the authority of NASA. Maybe you could be reconstituted under the authority of the Congress.

But I think you provide an invaluable service to the nation. You have expertise. You've brought an awful lot to the table for us to consume and digest. And I would like some help in the process. And I'm wondering if you would be receptive to sort of a one year look back, an evaluation, not micromanaging, not fine tuning, evaluating how NASA has responded to what you have proposed, what the administrator says he embraces, which we are applauding.

Admiral, would you care to comment on that?

GEHMAN:

Yes, sir. I consulted my colleagues about that, and I'm authorized to say on their behalf that if it is requested by the Congress, we would do that.

BOEHLERT:

Thank you very much. And I appreciate that. And I can almost assure you that it will be requested by the Congress.

Now with Mr. Gutknecht back -- but, Dr. Widnall, did you wish to offer some supplementary comments for the record on...

WIDNALL:

Well, let me make two. Let me second what Admiral Gehman said. And I see one of its virtues as providing some continuity. And in some sense, that's a force multiplier for the time that we all put in on this. And so, I think it actually gratifies us, because we will feel that our work is even more effective if we do provide this kind of continuity. So it's certainly something that I welcome.

BOEHLERT:

You know, I've been in Congress 21 years. I started out at the lowest level and the first tier as the junior member. And over these years, I've seen a lot of reports. They're issued. They're produced by dedicated Americans who bring special expertise to the table. And more often than not they gather dust on the shelf. The Rogers Report. Then was immediacy in responding to some of the recommendations. Then the atrophy set in, as you've referred to.

We're going to follow through on this thing. We've got to be vigorous. And we just can't look to NASA and say, "All right now, the problem's been identified, you know how to fix it. Fix it." We've got to be part of the solution. And so we have to look ourselves in the mirror and say, "Are we as vigorous as we should be in connection with our oversight responsibilities."

And so, if Mr. Wu is not back yet, we'll go...

WIDNALL:

Well, the second point I wanted to make, which was really the point that you called on me for, was just as we finished the last round of questions, was really just to point out the time scales involved in these sorts of endeavors in the space field. I mean, when you talk about let's find a replacement shuttle, you're talking 10 years. You're talking a very high level of technology.

It also goes back to the issue that I discussed with Mr. Hall. You know, what is the word consider? The word consider means to do an in-depth engineering analysis of what are the possibilities, what are the trade-offs, what are the options. And that certainly is a process that needs to go forward as we think about replacing the shuttle, new concepts for manned space vehicles, how do we service the space station.

All of these things require an in-depth engineering analysis. And the time scale involved is certainly measured in years, certainly up to 10 years before one would have a new generation of vehicle. So that was really the only point I wanted to make.

BOEHLERT:

Thank you very much. And I see our distinguished colleague, Mr. Wu, is back.

Mr. Wu is recognized for five minutes.

WU: Thank you very much, Mr. Chairman.

Admiral Gehman, always good to see you, members of your board, although one always wishes under other circumstances. Like others, I want to commend you for finding the physical cause of this tragedy, that the RCC panel 8, and also for identifying some of the organizational and one might say cultural factors in NASA that have contributed to this set of tragedies.

I want to encourage the panel here to look forward a bit and focus on something related to the cultural and organizational issues that

you identified, but not exactly those. And that is the recruitment and retention of the best and brightest, especially young people, but people of all ages. In my experience, as I've gotten older, everybody else has gotten younger in various organizations.

My teachers have gotten a lot younger in my eyes. As I've visited NASA sites -- and this is with great respect to NASA personnel -- they seem older than I remember them when I saw them on television when I was a young person watching the Apollo program and the Gemini program and so on.

And I know older folks, whether it's at NASA or on the board or in Congress can make great contributions. But back in the 1960s, there were, you know, NASA was...

(CROSSTALK)

WU: Especially as chairmen of various committees. There were a few places to go. And NASA was probably the place to go if you were really into technology and really hot to go. It was, not only technologically and scientifically the most exciting place to go, but it was also part of this competition with the Soviet Union that made it a part of our national purpose.

Today, the Cold War is over. We were the first to the moon. And in addition to that, we have all these private companies and other places where folks in technology can be drawn off to, whether it's by higher salaries or nimbleness of movement, adeptness of movement in the organization.

What are some of the things that can be done to help NASA recruit and retain people, and some of the negative factors that are there, some of the positive things that can be built in for the future? And I'd just like to engage the panel to discuss that.

GEHMAN:

Absolutely. And the panel has discussed it, and I know as an educator, Dr. Widnall has an opinion about that, as do my other colleagues. I very briefly will list three things.

First and foremost is the mission. And it's not -- a good mission, a good, recognized mission which excites people will overcome low government salaries and a whole bunch of other things.

The second place is, you have to have a really great place to work. And that -- I'm talking about the work attitude, the climate at work and all of that kind of stuff. And I think NASA is a good place to work. It can be made better because of some of the traits that we've talked about.

And the last one would be I would like to see NASA reduce the number of times that they give the top, really good jobs to outsiders. NASA too often, in my mind, takes the top, really best jobs and gives them -- and recruits outsiders rather than moving people up from within. They like to hire admirals and generals for center directors and things like that, instead of taking the best NASA people and make them center directors and things like that. Even though I like admirals and generals, I really think that if you're a career NASA employee and you want to rise to the top, and then you see the top jobs going to outsiders, you have to scratch your head.

As part of that, as part of that, in the space flight operations contract, the SFOC, a lot of very high-level positions, which I thought ought to be government positions, are now contractor positions. And, once again, these are top-level positions which have been contracted out to really competent people. But what it instills in the workforce is that you work for the government for 15 or 18 years, and then if you really want to go into the top jobs, you have to go over to the contractor side to get to the, get to the top job.

I find all three of these things that could make the place a much better place to work. And as an educator and a close student of this, I know that Dr. Widnall may want to comment on it.

WIDNALL:

Yes, I knew this was coming. No. And as an educator, as an aerospace educator, I know that there is something about aerospace that evokes the passion of young people. There is no question about it. There is hardly any other field to which people are drawn because of the real excitement of the field. There's no question about that.

As an aerospace educator, I feel that it's my responsibility to take that passion and turn it into an appreciation for responsible engineering. And I think that that's a challenge. I do think it is no longer the case that NASA is the only place to go. I mean, this committee knows more than any other committee about the broad range of science and technology that our nation is advancing. Work in the biological sciences, work in the computer sciences, in miniaturization, new materials. Science and technology are advancing across a broad front. Space is exciting, but it is not the only exciting thing that we as a nation are doing.

So what I think is that we have to learn to operate in a much more complex environment where young people, in fact, do have a range of options, a range of exciting things to do. And I think we have to ensure that across a broad range of disciplines. And I think it will feed directly into our science and technological strength as a nation.

Young people are excited by the development of new capabilities. And to the extent that NASA moves forward with a vision, a national vision for space and the development of new capabilities, I think young people will naturally be drawn to NASA as a place for employment.

WU: I have a burning follow-up question, but I know better, Mr. Chairman, than to ask if I can ask it under these circumstances. Thank you very much, Mr. Chairman.

ACTING CHAIRMAN:

The gentleman's time has expired. And we see if we can do a second round for burning follow-up questions. I apologize if my question is not relevant or has been answered, because I have been popping in and out of three meetings this morning, all of which, unfortunately, happen to be urgent. And I apologize for that.

But looking toward the future, it seems to me the very first thing that we in the Congress, and frankly, the American people have to decide is whether we want to continue human exploration of space. And I suspect the answer is yes just because, as Dr. Widnall mentioned, there is some magic to aerospace that this is something that we want to do. It's part of our background or ethic that we should be out exploring in every dimension. So assuming the answer is yes, it seems to me that our highest priority has to be to design and develop and build a new type of space vehicle.

My first question is, do you see that? And what do you regard as the characteristics we need? It seems to me that given modern technology that has developed since the design of the Space Shuttle, that we can build it safer and better, more efficient, with less turnaround time and higher efficiency and lower cost. And that, perhaps in the long run, it'll, in fact, save money to have a new vehicle if we can design one that satisfies those criteria. So that's the first question.

And secondly, I'd appreciate just a comment from you on the balance between what one might call scientific research and what one might call human exploration. We all know that dollar for dollar we get much more science done with unmanned experiments, satellites, rovers, than we do with human exploration of space. I am just -- even though this was not your task, I am asking for your

opinion. What is the balance now, and what do you think it should be between those two?

So, two questions. And we'll start with...

GEHMAN:

Well, I'm going to ask Dr. Hallock to take a shot at the first one, sir. And then we'll rearm to take a shot at the second one.

ACTING CHAIRMAN:

Dr. Hallock?

HALLOCK:

When you look back at what we -- this thing that we were studying, the shuttle thing, remember, it came from the 1960s technology. And it also, as we point out particularly in chapter one, when it was being put together, a lot of the requirements were actually given to people. To follow-up on the question that we discussed earlier this morning, you know, why do you put the shuttle where you do where it can get hit by all this material that's out there. Well, the reason is that one of the key requirements that was levied upon these people back then was that you wanted to put together a system that would be reusable.

So things like those big engines and everything that you put on the shuttle in order for them to be reusable, you had to put it on something that came back. So that what I am really saying is I fully agree that one needs to look at trying to come -- look to the future and redesign, come up with a design of a vehicle to get us safely into space, but not burden it with so many things that actually were compromises. And these are the things that I think have led to all of these problems.

For example, if you, you know, if you look at the shuttle and look at some of the earlier designs, you know, you put the shuttle on the

top. So what's going to fall on it? Nothing. If anything, it's shedding material as opposed to having things that could come off and hit it.

So that's my point, is that you really can do it, but you need to have a clean slate. And as part of that clean slate, you can also add in those other issues, which were, what can we do to allow ways for the crew to get out in case there is a real problem. There are a number of things you can add.

ACTING CHAIRMAN:

So in your opinion, do you think we can design something that meets the criteria I mentioned, safer, less expensive, more efficient, less turnaround time?

HALLOCK:

But once again we've got 30 years of technology now behind us at this point. And I firmly believe that you can do that, yes.

ACTING CHAIRMAN:

And can there be a good replacement for the tile system, which is one of the biggest factors in the slow turnaround?

HALLOCK:

Well, they even have an interim thing where they've come up with a tile that is much stronger and can withstand a lot of issue -- you know, strikes more so than the existing. So there is some intermediate technology types of things that can be done, too, yes.

ACTING CHAIRMAN:

And the second question?

GEHMAN:

First of all, I would -- I agree with Dr. Hallock, and I would ask you to factor into your equation of the -- not only the next vehicle, but also the robotics versus the human -- the value of new human space flight program, that as long as the only way that we have to get outside of the earth's gravitational field or to get into orbit or to escape the earth's gravitational field is to sit on top of an enormously explosive chemical reaction, which is -- right now that's the only way we know how to do it -- you are flirting with a very dangerous process. And there is no getting around it. And we should not ever diminish how dangerous that it.

And then when you come home, you have to take every, single kilojoule of that same amount of energy, and you've got to somehow dissipate it in order to slow yourself down from orbital speed. And that is also extraordinarily dangerous.

You've got to figure out a way that you can reenter the earth's atmosphere and dissipate all that energy in the form of heat. You've got to change the speed and the heat, and then you've got to dissipate all of that heat, which puts the humans in a very dangerous situation. And we should not minimize that danger.

And now, the reason I gave that little lecture -- if you'll forgive me -- is because when you start -- that's job one, is to get humans safely up there and back in.

ACTING CHAIRMAN:

May I just interject? That assumes a returnable vehicle. If you decide you're going to have a capsule come back and dispose of the engines...

GEHMAN:

But even if you bring the -- even if you, even if you were using a capsule, you still have the kinetic energy problem. You've got to get up there and you've got to get back here.

ACTING CHAIRMAN:

No, but you don't have as much to dissipate.

GEHMAN:

That's correct.

ACTING CHAIRMAN:

That's considerably less.

GEHMAN:

Considerably less, that's right. But if you consider job one to be safely get into orbit and safely get back, then everything else that you add on to, every other requirement, you're going to -- and if you say you want it to be efficient and cost effective and reusable, et cetera, et cetera, et cetera, you are whittling into that safety requirement.

And so, this board with this experience that we've gained from this investigation would say let us not in any way diminish the danger and the physical challenges here and start adding additional requirements into this. Let's just get them safely into orbit and safely home.

Now the robotics for the human thing, I would offer that we didn't really do much of a study in this. But we did educate ourselves into this matter as well as the vision thing so that we could put our report into context.

And my personal view is that every briefing I listened to, every book I read on the subject indicates that no matter what your vision, long range vision is for what we're going to do with interplanetary travel or stations on the moon or whatever it is, all visions -- they all start in low earth orbit.

None of them start on the surface of the earth. And therefore, we have to perfect getting into and out of low earth orbit, no matter what the plan for the future is. That's our view. And that perfecting getting into and out of low earth orbit is a worthy enough goal by itself.

ACTING CHAIRMAN:

OK. I have to excuse myself to go vote so that -- and the chairman has returned. Thank you very much.

BOEHLERT:

The chair recognizes Mr. Bell.

BELL:

Thank you, Mr. Chairman.

And, Admiral Gehman, good to see you again. I want to commend you for the report and also the way you and the committee conducted yourselves throughout the investigation. It was impressive, and I certainly respect the openness that you demonstrated, both with members of this committee, but also with the public throughout the process.

I want to follow-up on something that my colleague, Mr. Wu, was talking about in terms of the cultural and organizational problems that you point out in the report. The day the report came out, I had the opportunity to speak to a group of a group of NASA employees that evening. And while there seemed to be a general acceptance, certainly an expectation that the report would be critical, the one area that they seemed to feel that there will be some difficulty with has to do with changing the culture of NASA.

And in looking at the report and in chapter seven, I wanted to go over some of the statements therein and see if maybe you can expound on them so there will be a clear understanding of what

we're talking about when you say changing the culture. Starting with avoiding over simplification. And I'll just read this particular part.

"The Columbia accident is an unfortunate illustration of how NASA's strong cultural bias and its optimistic organizational thinking undermined effective decision making. Over the course of 22 years, foam strikes were normalized to the point where they were simply a maintenance issue, a concern that did not threaten the mission's success."

And when you read something like that, you point to a cultural bias. But was it so much a cultural problem? Or was it caused by not having a system in place that would help identify that kind of problem and address it?

HESS:

I think the answer to your question is basically yes in both counts. But what we're getting at is in the definition of organizational culture that we adapted is, how (inaudible) even absent rules react to (inaudible) instance of oversimplification what we saw was an almost immediate assumption that there is not a problem (OFF-MIKE). And this is a learned behavior. (inaudible) 22 years for them to learn that perhaps there is not a problem with foam (inaudible).

So when you put down one of the things that you need to avoid if you are a highly reliable organization (inaudible) deals in high risk technology is that don't just assume that there are no problems (inaudible) start by assuming that there is a worse case and by (inaudible).

BELL:

Admiral, did you want to comment on it as well?

GEHMAN:

No. I agree. And we thought long and hard about that particular section. And the relationship to culture is that as we carefully defined in our little, blue side bar in the front of that chapter seven that culture is, as we used in it here, in this report, culture is how the organization acts kind of intrinsically. It's how they act outside the rules. It's how they act when their boss is not in the room. And it's how they think.

And in this particular case, they have an oversimplified view of a complex issue. And they stick to that oversimplified view. They get rigid in it. And they do not realize that these are complex things in which one flaw can affect another system.

BELL:

And please let me be clear. I'm not in any way critical of what is stated. I just think there needs to be a clear direction going forward so that people understand exactly what you mean when we talk about changing the culture.

BELL:

Because I would agree, there are obvious problems that need to be addressed. But they can't be addressed unless there's a clear understanding. In the paragraph above, importance of communication, every manager knew the party line. We'll wait for the analysis. No safety of flight issue expected. In the course of the investigation, the people that you talked to, what was your understanding of how such a, quote, "party line" is developed?

GEHMAN:

There are a number of factors. But the one that I would point to is what I would call -- I like to characterize as an informal chain of command. That is, once the space shuttle program opined on something, then other people, other divisions, other agencies, even

though they are technically independent, were hesitant to move against that opinion. The shuttle program...

BELL:

For fear of reprisal or...

GEHMAN:

For fear of reprisal, for fear of being ridiculed. But mostly the problem was that, even though on paper they had a set of checks and balances, had independent engineers and independent safety, the fact of the matter is the shuttle program over the years had become so powerful. All funding flowed from the shuttle program. All promotions go from the shuttle program. They had become so powerful that independent voices and minority opinions were not welcome.

And in a complex, matrix organization like the shuttle program is, it takes a very elegant communication scheme, carefully managed and carefully nurtured to make a matrix organization work. And they had allowed some of those characteristics to atrophy over time. And I don't know if General Hess, who's the expert on this, wants to comment on it.

BELL:

So the goal would be to develop a system where communication is encouraged rather than discouraged? And from what you're saying, it sounds like perhaps it wasn't discouraged, but people feared.

GEHMAN:

They did. They did. And we think that our fix about having this independent technical review authority which owns all the specifications and requirements which would be full of engineers and safety people who have no relationship to cost and schedule or the program would be free to discuss all of these things, because

they wouldn't be intimidated by the guy who's worried about cost and schedule.

BELL:

Lastly...

GEHMAN:

As a matter of fact, their reward system would be based upon bringing problems up. That's how they get rewarded.

BELL:

Lastly I want to go to the section, commitment to a safety culture, and the last line in that, organizations that successfully deal with high risk technologies create and sustain a disciplined safety system capable of identifying, analyzing and controlling hazards throughout a technology's life cycle. Obviously that system was not in place. How do you accomplish that? Because that has to be the number one goal, that whatever is developed will last throughout a technology's life cycle.

HESS:

I think that the answer to that question also rests in our (OFF-MIKE). That is their job.

BELL:

Thanks.

HESS:

Now as a technical authority, that's going to be their role in life is to bring that life cycle and systems analysis look into the technology that's involved.

The second part of it obviously in this chapter we talk a great deal about the information systems that are there that are supposed to be tracking anomalies and giving trend information and the fact that they really don't.

So, you know, there is a, there is a fix that could happen just in information systems and how you manage the information. But having somebody whose job it is to run risks and do trends and to control the level one requirements and the waivers is going to give you that life cycle that we think is so very important.

BELL:

Thank you, Mr. Chairman.

BOEHLERT:

Proceeding along those lines, because of the many important recommendations that you've made, two of the most important are, one, establish an independent technical engineering authority and have that funded directly from NASA headquarters so it has no connection to or responsibility for schedule or program costs. And the second one is the office of safety and mission assurance should be independently resourced. I think those are highlighted recommendations. And we're got to follow through, and so does NASA.

L. SMITH (?): Mr. Feeney?

FEENEY:

Thank you, Mr. Chairman.

And thank you to Admiral Gehman and your entire commission. I haven't thoroughly read from cover to cover the report yet, but my office staff has several times. And we're going to continue to pay attention to it. I'm impressed by the entire approach you've taken. I want to thank you particularly for being accessible. I got a briefing

just before our break personally from Admiral Gehman. I thank you for that, for the time we spent together at the hangar where we were putting together the shuttle, and several other members of the board were there. It was certainly a quite moving experience.

And I will tell you that, you know, part of the appreciation for the way you've memorialized the astronauts that have passed away in human flight is in the emblem that you've put on the back here. And we're not just talking about the most recent disaster. You include discussions about Apollo One, the Challenger and Columbia as well.

And, of course, the Latin phrase there -- my Latin's a little rusty. I got a D in Latin, had to quit the basketball team because of it. And actually the Latin teacher's wife was the coach of the basketball team. He understood why I had to quit, by the way.

But to the stars despite adversity, always explore. I think that that's the mission that I believe in and that basically was the fundamental mission of your report. I want to pick up where Congressman Bell left off talking about the culture of safety, because it's sort of an amorphous concept to some of us. It's not a technical issue. It's not a precise issue. But it's a cultural issue that's very important. And as a lawyer by background, I understand burdens of proof.

And I'd like you at one point to describe for me the difference between a culture of safety where you presume that everything's OK unless you know otherwise as opposed to a culture that basically tells you that nothing's right unless you can prove that it's functioning.

And I want to ask you as you go through that sort of switch and say a burden of proof approach which is something that I can understand to talk a little bit about NASA's history. NASA originally approached the board in its initial briefings and espoused their confidence that they had developed a culture of safety and were

surrounded by that culture. And yet upon investigation, this board found that simply wasn't accurate.

In the aftermath of Challenger, there were some interesting differences between the approach that NASA took and the lessons it learned and the way it trained its inspectors and the way it dealt with response to the disaster and, say, the Navy took.

The Navy, for example, developed a safer program, the naval reactor program. They trained some 5,000 Navy nuclear propulsion program personnel on the lessons specifically learned from Challenger. And yet it seems like all too quickly NASA for a variety of reasons fell right back into some of the same habits.

And so, I guess I would like you to tell me, number one, whether NASA understands and how they're going to implement this shift in burden of proof. Number two, how they reacted to the lessons of the Challenger disaster. And number three, in a more generic sense, this isn't the only near disaster we've had. We had the Apollo 12 issue. We had the fuel cell explosion on Apollo 13. We've had launch pad aborts on shuttles involving non-personnel craft. We've got the commercial problems we have from time to time, the military launches. How are we on a routine basis going to learn from all of the, not only disasters with people involved, but also the near disasters or situations where people are not involved?

And with that sort of open ended question, Admiral Gehman, if you'll refer the answer to the appropriate people or pick it up.

GEHMAN:

Mr. Feeney, first of all, I'll say something about the culture of safety and something about learning and then turn it over to my colleagues here who studied this more closely than I did. I was quite confident and quite firm in my deliberations with my colleagues about hammering this subject fairly strongly, because of the way we defined culture. We worked very careful in our report to make sure

that for our readers that we didn't confuse management and we didn't confuse leadership with culture.

Culture is what you do rather than what you say. For example, if you say that safety is the most important thing we do, and nothing we do is going to compromise safety, but I want you to come up here to Washington, D.C., every 30 days and give me a brief on how you're doing or making the node 2 complete schedule, that's doing one thing and saying another. And that, of course, trickles down to the workforce. I mean, that word gets out as to what's important.

We studied...

FEENEY:

By the way, if I can, Admiral, just to interrupt briefly, but you have a wonderful definition of culture. It's not like the -- I mean, people that read the report on page 101, it's very specific. And then later throughout the report, but especially 177, you talk about the organizational and cultural problems that exist in NASA today. So you do a great job in the report.

GEHMAN:

Yes, we knew that there would be some misconstruing and blurring of what the terms meant, so we were careful to define them. We also found, if we go back to that list that General Hess was referring to earlier, we tried to put a recipe in there for what we considered to be the characteristics of a high reliability organization, which we would certainly hope that NASA would be a high reliability organization. And one of the characteristics is that the organization is a learning organization. And by that, they not only learn from big disasters, but they learn from the little things.

And just as you point out, in the organizations which we consider to be high reliability organizations, they teach their people from big disasters and little disasters. And they like to keep bringing up

Three Mile Island, and they keep bringing up the Challenger, and they keep bringing up the loss of the submarine Thresher. And they keep bringing these things up to see what we can learn from them.

NASA tends not to do that. And they tend not to do that -- at least our interviews and our experience was they tend not to do that, because for some reason they've gotten the idea that by bringing up all these failures or near misses, that somehow they are tarnishing the image of the employees, or they are diminishing the impression that they're all perfect. And that, of course, is wrong headed. And therefore, we determined, and we wrote in our report that NASA is essentially not a learning organization. And they do not learn from these mistakes. And, of course, that's a very serious problem.

General Hess, do you want to make any further comment on that?

HESS:

No, sir. The point that I would add in the overall construct of how they approach this cultural dynamic that we're trying to get at is just exactly the issue of absent rules, they're going to react and respond in a way that's dedicated to performing the mission reliably. OK?

And in almost any check and balance that we talk about inside the program, these attributes can be enhanced just by some of the organizational changes that are there. But organization alone is not going to fix the problem. You're going to have to lead your way through it. And you're going to have to get managers to understand and buy into this at all levels so that it becomes the way that the organization responds in times of crisis and in times of planning as well.

L. SMITH: The gentleman's time has expired.

Ms. Jackson Lee?

JACKSON LEE:

Thank you very much, Mr. Chairman. And allow me to thank the chairman and the ranking member, the full committee and as well the chairman and ranking member of the subcommittee for what will be, I think, a very effective line of hearings that we will have and as well an ability to be able to follow this line of reasoning that has been so ably played out for us by this very strong report.

Might I say to the board thank you also for your good work? And as I begin my remarks, allow me to put this in the focus that I can recollect was the experience on that fateful day, February 1st. And that is that this whole debate is on the question of lies as well as the mission and vision of this nation on behalf of the American people.

So I'd like to note that what we do today is in tribute to and reflection of the sacrifice that Rick D. Husband made, William C. McCool, Michael P. Anderson, David M. Brown, Kalpana Chawla, Laurel Blair Salton Clark and Ilan Ramon.

Clearly, I think, this is a major tribute, if you will, or a need for a major tribute to their lives that we not allow what has occurred to be repetitious. I do want to also say to the board that this is in no way a cover up. And we thank you for your forthrightness and your instructiveness.

JACKSON LEE:

I will say again referring back to February 1st that since it was post 9/11, you can imagine the various thoughts that occurred. So it was even larger than maybe incidents of the past. But we do not diminish any of the incidences of the past.

You have spoken about the question of a culture of safety, and I want to refer to some of the language that you use in the report. The board found that there is a broken safety culture. You also mentioned that schedule pressure related to the construction of the International Space Station, budget constraints and workforce

reductions also were factors in the question of what caused the Columbia accident.

One of the initiatives that I am going to propose would be enhanced whistle blower legislation specifically for NASA personnel. Because I think that the comment that the ranking member made at the very beginning is so potent. And that is what happened after Challenger and the emotions and the interests and the commitment seemed to peter out.

I'm holding in my hands a series of hearings over 1997, '96, '99 where we discussed the question of safety over and over again. And I would refer you to some words that I offered in 1996. So that there is no mistake, I do have questions and concerns regarding some of the issues regarding NASA, the personnel reductions which continue to take place and the safety of the space shuttle. That was in 1996, March 28th.

And September 23rd, 1999, we want NASA to provide safe vehicles for our brave astronauts. Yet it would be inane of us to demand a strong space shuttle safety policy when we're cutting the very resources that would fund this policy.

Now you have already shied away somewhat from numbers. But allow me to ask these questions on the safety element. And I applaud this free standing organizational structure that deals with safety and oversight from NASA headquarters.

I want you to comment on the responsibility of NASA headquarters aside from directly the administrator as it relates to your report. I'd like you also to explore the idea of holding managers accountable for errors. Because when we talk about the safety culture, how do we break that line of reasoning?

And you might add your thoughts about whistle blower protection overall. You haven't seen the legislation, so I'd imagine you couldn't comment on that.

And finally, Admiral, would you put yourself and others that might want to comment -- would you put yourself, Admiral, in the position of being an admiral and finding or having an incident such as this occurring under the military structure?

What would be your reaction or your actions as it relates to personnel who were directly associated with the responsibility of ignoring information that came directly to them that questioned whether or not there was a sense of safety?

My last point is for Dr. Widnall, because I was fascinated by your comments with respect to education. How do we retain the bright and the best as we have moved toward outsourcing over the last decade? I remember growing up looking to those bright folk at NASA. And you'd admire them and wanted to be like them. How do you solve that problem? And I thank you very much for your presence here today.

L. SMITH: The gentlelady from Texas' time is expired in asking the question. But we'd now turn it over to the panel.

GEHMAN:

Thank you very much, Ms. Jackson Lee, and thank you for your support during the time of this investigation. We enjoyed talking to you several times about it. The board, while indeed it decided not to make judgments about the responsibility of individuals, the board in no way suggests that our position suggested individuals should not be held accountable for their actions. They should be held accountable. And they should be held accountable by their appropriate supervisory chain of command.

On page 203 of our report, we have a little editorial in there about the role of leaders and the role of managers and their responsibility for setting the conditions for either success or failure. And they are indeed -- we do believe that the top level managers are responsible for setting the conditions. And if they set conditions in which free

and open communications were stifled or engineers were intimidated or safety was shortchanged, then they're responsible for that. And they have to hold responsibility for that.

I believe that we document in our report -- and we were pretty careful to do this. I mean, we wanted to be very careful about this. That these bad traits and these ill characteristics that we're all numbering here came about gradually and slowly over a long period of time due to budget constraints, manpower constraints and lots of other reasons. But these things didn't happen all in one year or one month. They happened over a long period of time. And they happened in response to forces, both internal and external.

I think that we've kind of -- it's all there in the report, I think. And I think I kind of agree with your comment that there probably is some account taking that probably needs to be done by the proper authorities. We just didn't feel we were...

L. SMITH: Admiral Gehman, excuse me for interrupting. I would ask everybody to be brief in reacting to Congresswoman Jackson Lee.

GEHMAN:

Sure.

L. SMITH: And we'll try to get one more five minute series in before we

GEHMAN:

Good.

L. SMITH: ... go forward (ph).

GEHMAN:

Maybe I'll let Dr. Widnall respond to the last point.

WIDNALL:

I pushed the button. I'd like to respond to that question a little more broadly with respect to this question of how do we retain the best and the brightest, because this is the very committee that is charged with that responsibility.

I believe the nation has been richly rewarded by the investments that we've made in science and technology, education and research across a broad range of scientific and engineering disciplines.

Also it isn't just the question of how we retain these individuals in NASA. I think the question goes much deeper. How do we strengthen our science and education system? How do we encourage young people to pursue professional careers in science and engineering? And how do we utilize their talents once they graduate?

I think in order to do that, it really requires a vigorous program of research and technical development across a broad front. And I would certainly include NASA within that. I do think as an aerospace educator that NASA has a built in advantage with what I view as the innate passion that goes along with the exploration of space. But we really need to pursue these issues across a much wider front.

L. SMITH: The gentlelady's time is expired. I'll proceed with my five minutes. And let me start out by suggesting that since the successful Soviet launch of Sputnik in 1957, certainly our country's space program has been an integral part of our excitement as Americans and certainly as stimulus to more students getting into science and math. I think we've lost some of that.

Congress is charged with setting priorities. As some of you may know, I chair the research subcommittee, and we have had testimony in terms suggesting that much of the scientific research could be better accommodated as effectively on unmanned space flight. And some of the research could be accomplished in ground

labs. And so, not only manned versus unmanned flight, but also should some of this research dollars go into NIH to cure cancer rather than man's exploration of outer space.

It would seem to me that we need to analyze the costs and the benefits of this program. And really, as I understand the board -- and congratulations for the time that you sacrificed and the efforts you made to do this, such a good and thorough job. But your charge really was what went wrong, and how do we keep it from going wrong again.

But in terms of the costs and benefits, how do these compare with that of unmanned space flight or other science research that we might conduct? And did the board look at these issues?

GEHMAN:

We did not, Mr. Smith. What we attempted to do, to help you with that question, was to properly characterize the risk and properly characterize the cost of the shuttle program. And we did not look into those other issues. But I'm going to have to defer on that. I don't have any knowledge of the value, the cost value of...

L. SMITH: As I talk to other scientific groups, including JPL, we don't have a good, quantitative evaluation of the science research. Some have suggested, well, once we get the space station up and running and get it fully manned, maybe we can do some really constructive research.

But it would be my opinion -- and for any board member that -- for any of the witnesses that would like to comment -- that manned space flight can contribute a great deal to the additional information of how humans acclimate themselves in outer space.

And maybe part of that is do we intend to put people of this country into outer space for longer periods of time. We've been in this endeavor for quite a while. And with the new technology of, not only

robotics, but of nanotechnology and miniaturization, tremendous potential for unmanned space flight, it seems to me. Would there be any comment from the witnesses?

GEHMAN:

We did not evaluate that. But if anybody wants to comment, help themselves. We did not look into that.

L. SMITH: How might we best -- you know, I think it's exciting to have high school students put in research projects. But in terms of real valuable scientific research, it's probably not substantial in contributing to our research efforts. We're now reducing funding for NIH to develop better research on health. We're now reducing research dollars for the National Science Foundation which I oversee in our Research Subcommittee in terms of basic or fundamental research.

So a tremendous challenge, I think, for this committee and this Congress as we evaluate how quickly do we want to push the program. And maybe a comment that you might react to is NASA projected the March launch before you came out with your final report. It seems like this is pushing more rapidly than NASA's ability to totally react to some of the recommendations in your report.

Admiral Gehman?

GEHMAN:

Yes, sir. I would -- I believe Mr. O'Keefe and I are going to have an opportunity to appear beside each other next week before your committee. But yesterday before the Senate, he reiterated an answer to that question several times in which he said that NASA's return to flight plans are events driven, not calendar driven. And that date out there is just a hypothetical mark on the wall. It's not a firm date. I'll let him answer that question.

L. SMITH: And I just say to Dr. Hallock and General Hess and Dr. Widnall that part of my bias, which I have expressed in my statement, which, without objection will be entered into the record, is my son and daughter both worked at JPL. And so, they led me down the road of the kind of information of how valuable unmanned space flight was and the reductions of budget that limits a tremendous potential in that arena.

Any other comments from the witnesses? If not, the committee stands in recess. Here he is. The committee does not stand in recess. I thought you were one of the upper ranking staff people that said I've only got three minutes left.

ACTING CHAIRMAN:

And he promptly ignored it. I never (inaudible). We're going to have a series of votes all day unfortunately. But let me -- while we waiting for -- Mr. Nethercutt, you're here. Thank you.

NETHERCUTT:

Thank you, Mr. Chairman.

Ladies and gentlemen, thank you for being here.

Admiral, I appreciate all the work you and the board have done. I think you've done a great job of being frank and both personally and privately and giving a clear indication of your independence. I noted that the board noted that, quote, "it is in the nation's interest to replace shuttle as soon as possible as the primary means for transporting humans to and from earth orbit."

And it strikes me as I've listened to the questioners and the chairman and others have an exchange with you witnesses that it seems to me the question of vision has come up a number of times. What do we really want the space program to do? Where do we want to go? How do we invigorate our young scientists to be excited about working at NASA, and so forth? And I have thoughts about a

vision. And that's not necessarily certainly not the point of this hearing.

But I know that you all have become very familiar with the culture at NASA, the process that NASA goes through, the experts that are employed there. And I'm wondering whether you feel that NASA can organizationally be capable of defining its vision, a vision, an adequate, thoughtful vision or the future of the agency.

NETHERCUTT:

Is the organization perhaps too risk averse at this point, given the seriousness of your report to define some sort of a grand, national vision for human space flight?

It's a little theoretical, but I think it's a valuable theoretical question to have answered, because it sort of defines where we're headed with respect to the agency and human space flight.

I mean, my sense is maybe we ought to be looking at the moon and have a sort of lunar expedition policy that guides us. There's great science, I think, that can come from there. But there's Mars, and there's other places.

So I'm wondering if you could answer those questions for the record and for me.

GEHMAN:

I think we ought to ask all four board members. But I'll answer very briefly and say I have confidence in NASA. I think it's a great organization. I think they are capable of proposing and staffing a national vision. But, of course, NASA's vision doesn't count. We were very careful to say it has to be an agreed vision. So it has to be your vision and the White House's vision.

I don't believe NASA is too risk adverse or that they are in any kind of a defensive crouch as a result of this accident. I think they're fully

capable of leading us and proposing us. But they can only propose. My view is that NASA is fully capable of that challenge. I'll ask my colleagues to help.

(UNKNOWN)

I agree, too. The issue, though, is that one can have quite a few visions. There's so many, many things (OFF-MIKE) some of you have already talked about today, whether from the robotics issues to the manned space flight issues as well as is it should we be going to the moon at this point or should we be thinking how about putting space stations further out. Someone mentioned the libration points, too, as being places.

So the hard part is -- I think we can all come up with visions of them. The problem is how do we constrain them? Because there's only so many things we can do. I think it's important for the country to have one, because it really does have a lot of secondary issues, secondary things. And one of the main ones that pops to mind is one we've been talking about here. And that is the education thing (ph). We need to stimulate people to start thinking about these very technical issues and want to go into those fields and work on them. But (ph) picking what the vision should be, boy, I'd like to be a part of picking it. But I'd be very hard to say this is the one and only thing we should be doing.

NETHERCUTT:

General Hess, do you care or Dr. Widnall?

WIDNALL:

Yes. You know, when you raised the issue of vision and NASA constructing a vision, I wrote down the word partner. And then I wrote down the word tough. I think NASA needs a tough partner. If I had to make a comment about NASA, it's not they are risk averse, it's that they have often overreached technologically. They have

been overoptimistic in looking for the leap frog in accomplishing certain goals.

And my board members basically said it before I said it. An unconstrained vision is not a vision. NASA needs a tough partner to rub right up against and get a common agreement about what the vision is that matches the resources that the nation is willing to provide to accomplish this vision. So tough partner.

NETHERCUTT:

Well, I thank you very much.

WIDNALL:

And that would be you guys.

NETHERCUTT:

Yes, I understand. And I think we're willing to be partners. Culturally I'm wanting to be sure. I think we look to the experts there to make these judgments.

Let me ask a question on behalf of the committee for the record that I hope will be helpful to all of us, if I may. The report provides "29 recommendations and 27 observations," quote. Please explain the substantive differences between an observation and a recommendation. And I'm wondering whether NASA can ignore the observations and still be in compliance with your report.

GEHMAN:

Well, we started off with -- the first draft of this report back in June was 1,000 pages. And after some hard negotiating, I got it down to 400 pages. What you see now, 248 is after some more arm twisting. And we had to do some prioritizing. The observations are they're all true, they're all serious, they all are potential danger points for maybe some future accident. But they didn't affect -- they aren't

talking about this accident. And that's kind of how we made the differentiation.

We think that they are offered as serious matters. They are offered as things that we observed and as we saw as we traveled around and talked to people. They are potential problems for NASA. One of them could be the cause of a future accident. So they do need to be addressed by NASA. But they aren't related to this accident. So...

NETHERCUTT:

So you want the recommendations followed up on and responded to, but you want the observations to be noticed and acted upon, I assume, as well?

GEHMAN:

That is correct. That is correct. As a matter of fact, we say in there that NASA must take action on these things.

NETHERCUTT:

Thank you, Mr. Chairman, for the extra time.

BOEHLERT:

Thank you very much. Vision has been thrown out very loosely today. We all want vision. You know? Proverbs. But the vision you've got -- touch partnership is very important, Dr. Widnall. And part of that vision has to include what you hope to accomplish at what cost and at what risk.

So we can talk about vision all day. You know, I still remember Martin Luther King's speech of his vision, a nation where people are judged, not by the color of their skin, but the content of their character. And we're still not there yet. So the vision we need is a vision where the executive branch and the legislative branch are the senior partners. NASA is part of the executive branch.

Well, enough sermonizing. Let me get to a couple of very pertinent questions on my mind. You made some specific recommendations, the board has. And NASA has established a new safety center at Langley. And certainly it was established before the report was out. I know you've had interaction with NASA.

But can you tell us, Admiral, and members of the board, whether you believe that the new center reflects any of the changes you've recommended in report? Admiral?

GEHMAN:

The way I would answer that is that I would suggest that if one were to write down the specifics of our recommendation for this independent technical review authority, and make out a checklist or a template, that the emerging and still changing engineering and safety center at Langley does not match up, not exactly. That doesn't mean that it's not good and they shouldn't do it. But it does not match up exactly.

And, board members, have we got it right? Yes. I don't want to speak for them, but I think we're in agreement on that.

BOEHLERT:

Have you had any conversations with Administrator O'Keefe? Should this be considered, as I feel it should be, a work in progress?

GEHMAN:

Yes.

BOEHLERT:

And...

GEHMAN:

That's my understanding, that they haven't even agreed on their charter. They haven't even agreed on their...

BOEHLERT:

OK, fine. So this is not the be all and end all? This is...

GEHMAN:

That's correct.

BOEHLERT:

All right. The next question I want to ask is...

GEHMAN:

Mr. Chairman? Mr. Chairman? Can Dr. Widnall...

BOEHLERT:

Oh, by all means. I'd never silence Dr. Widnall.

WIDNALL:

All right. Let me just add something.

No. Just let me add that I consider safety to be a professional or technical discipline. And it would be not a bad idea to have an organization -- the one described at Langley I would view as almost like a research organization to look at the fundamentals of safety as a technical discipline. That is independent from the line organization that we have suggested that would have a function in the actual conduct of operations. So both organizations could exist and be mutually supportive.

BOEHLERT:

Thank you. And I just want to make sure we have the record clear so we don't have a presentation from NASA that says well, look at what we're doing at Langley. Boy, we've addressed the problem. That's only a very small part of the problem.

This is a quickie, Admiral Gehman. I want to get it on the record.

In the section of the space flight operations contract between NASA and USA, there's a section of the contract dealing with the fee reduction for catastrophic loss. That provision requires the NASA contracting officer, in conjunction with a board of investigation to make a determination as to the cause of the loss.

There has been some confusion about whether the Columbia accident investigation board is the board of investigation referenced in the SFOC. Is the Columbia accident investigation board the board of investigation referenced?

GEHMAN:

No, sir.

BOEHLERT:

All right. Thank you. That was the easy one. In chapter nine, the board talks about designing the shuttle replacement without regard to cost. But isn't that just a recipe for getting into the same problem we did with the shuttle? Does it make sense to design something without cost parameters and then reassess it once we know real budget projections? Doesn't that just encourage the disconnect between ambition and resources that you cite in the report?

GEHMAN:

I'm sorry we didn't make ourselves more clear. What we are suggesting -- we actually were -- what we were doing there is criticizing their current process of our wonderful democratic institutions of trying to design the next vehicle with a start and stop

kind of a process before there was complete agreement on what the vehicle is supposed to do.

And what we suggested is that the right process would be we have a good healthy debate on what we want to do in space, we agree on what it is we want this vehicle to do, then you go into the design process and the cost process.

And what we suggest is that it would be a wonderful leap forward if you agreed that what it is we want to do is to get into and out of orbit safely. And even that would be a giant leap forward.

And then once you decide what it is you want to do, then the design and the cost of the vehicle follows that. I'm sorry we weren't clear on that.

But we recommend that you and the Senate and the White House first of all agree on what it is you want this vehicle to do, then go into the design process. We are hearing things about people have even got pictures of this vehicle, and we haven't even decided what it's going to do yet. And that the process is reversed.

BOEHLERT:

Thank you very much for that clarification. Now here's the deal. We have promised our very distinguished panelists that we would have them out by two o'clock.

Mr. Rohrabacher, you're next, followed by Ms. Jackson Lee.

Mr. Nethercutt, do you have anything more? All right.

Mr. Rohrabacher is recognized.

ROHRABACHER:

As we move forward with certain decisions that need to be made and our discussions with NASA, it will be helpful to us to have

certain issues totally clarified. And I think this is pretty clear, but I want to ask you very specifically. Is it the recommendation of the commission that if the space station can be supplied by an alternate system rather than the space shuttle that it should be supplied by the alternate system?

GEHMAN:

It is our recommendation that we separate the people from the cargo as soon as possible.

ROHRABACHER:

As soon as possible?

Mr. Chairman, I'd like you to note that answer.

BOEHLERT:

Duly noted.

ROHRABACHER:

That's something that we've been receiving a lot of resistance from from NASA. For safety reasons and every other reason, it sounds like (inaudible) to us. In terms of using the shuttle, would the commission agree that the shuttle would be necessary to finish the construction of space station?

GEHMAN:

We believe that the shuttle can be operated in a more safe manner than it is now easily for another decade.

ROHRABACHER:

I guess, Mr. Chairman, in making a decision as to whether to move forward in finishing the space station, the shuttle, the commission is deciding that it would be safe -- or at least we can change and

develop the situation so that the shuttle is safe in completing the mission of building the space station.

BOEHLERT:

That opinion is duly noted.

ROHRABACHER:

Right. Finally, is it the finding of the commission that funding was not a major cause of the Columbia tragedy? Is it your finding that even if we would have funded the shuttle at a higher level that the complacency that you have spoken about in your testimony may well have continued and that that was an issue at least as big if not bigger than any funding issue at hand?

GEHMAN:

The board did not evaluate the relative contribution of the factors that we listed. But constrained and squeezed budgets was a factor. It was a contributing factor to this tragedy.

ROHRABACHER:

OK. So funding was a contributory factor as was, of course, what you've been saying...

GEHMAN:

A lot of other things.

ROHRABACHER:

Other than complacency within the attitude, et cetera?

GEHMAN:

That's correct.

BOEHLERT:

If the gentleman will yield?

ROHRABACHER:

Certainly.

BOEHLERT:

There's always culpability. We're all partners to this venture. We all have to share our part of the responsibility.

But let me tell you if we had written a blank check to NASA, that wouldn't have changed the decision and the manner in which the request for imagery was treated. If we had written a blank check to NASA, that wouldn't have changed the manner in which they responded to the repeated instances of foam debris falling.

So while we are not going to just swipe our slate clean in the legislative branch, as I enumerated earlier and your report put out very specifically, it was within NASA that decisions were made to transfer funding out of the program.

GEHMAN:

Right.

BOEHLERT:

It's within NASA that the decision was made to sort of not give the proper responsibility authority and independence to the safety function. So I don't want this to be misinterpreted by anybody as this is an apology for the Congress. We share part of the responsibility. We have all got to stand up to that. But the fact of the matter is changes are needed. They are needed, and they are clearly articulated in your report. And I'll have some closing comments in a moment, and then we'll go to Ms. Jackson Lee.

ROHRABACHER:

Mr. Chairman, and finishing up on that area, the institutional process of funding may well be what you were looking at in terms of the way we fund NASA, not necessarily the specific funding decisions made by the Congress. Just for the record as well, there are numerous occasions which I have heard members on this committee on both sides of the aisle talk to people who are sitting right in the spot that you're in right now and say anything that in any way affects safety should be taken care of without regard to budget and that we will back you up if you tell us that this is the reason you need that money.

However, Mr. Chairman, sometime there are internal deadlines that are made based on funding that's already agreed to. And those internal deadlines of NASA sometime are reflected in the decisions we've made at funding certain projects.

BOEHLERT:

Thank you very much, Mr. Rohrabacher.

Ms. Jackson Lee?

JACKSON LEE:

Thank you very much, Mr. Chairman. And the importance of this warranted me staying with you, Admiral and the board. I don't want to keep you away from tasty cuisine. And I thank you very much for your patience.

I want to just reinforce my earlier remarks with respect to reciting the names of those who lost their lives in Columbia Seven, because this is about them and their families. And particularly, it's about them, because there are how many in line following them.

Meaning, astronauts in training who would do it at a drop of a hat. Meaning, go into space, ready, courageous. And I hope that my

colleagues will join me in sponsoring the congressional gold medal that we have now filed to be able to honor them.

But I believe it's important to restate their names and to note their families, because I don't think one family member publicly did anything to suggest that we should not continue whatever our vision and our mission is. And I think this question of probing responsibility is not simply finger pointing.

And I think the chairman has just said we all can stand in line right now. And I want to put on the record that when I made the comment about safety, it was in 1999 where there was a billion dollar cut through the appropriations process out of this Congress for the NASA budget.

I might suggest that the belt tightening was their way of saying we can handle it. And I want to get back to you were in the middle of saying the word accounting. And I'd like to be able to have you answer that along the lines of your role militarily on how you would deal with that.

And I'd like Major Hess to comment that if a tragedy of this moment occurred -- I am recalling the submarine issue with the Japanese fishing boat and the sort of scenario that occurred. I'd appreciate your comment on that.

I also would appreciate a comment as to whether or not we should be concerned about the International Space Station. Is that susceptible to the same management problems that tragically helped, if you will, result in the Columbia Seven tragedy?

And I'd also like to find out -- as I look at this report globally, you're not condemning human space flight. There is vitality to humans going in space. I didn't see that in the report. I don't want to miss it. And I would appreciate you commenting on the value of that through your work and interviews with individuals.

Admiral, you were in the middle of the accountability question.

GEHMAN:

Right.

JACKSON LEE:

And who we should hold -- how we should hold individuals responsible.

GEHMAN:

Right. I'll let General Hess who has conducted many, many safety accident investigations into aircraft accidents comment on that. But generally speaking in our military experience, we conduct two separate investigations.

And one investigation does have an accountability responsibility kind of a goal. And the other one is an investigation to really find out no kidding what happened and every, single contributing cause that may have contributed to that accident in which we assure people that no accountability will be -- there'll be no punishment, no intimidation of any witnesses or anything like that.

And what we tried to do in this investigation is to roll those two kinds of investigations into one in which we brought out the performance of people. We documented it in our report. And if the proper authorities want to hold those people accountable, I think they should. We are not escaping the issue of accountability. We just decided that we aren't the judges. But we were the investigators. We put it all in the report.

Ms. Jackson Lee, we did not examine the International Space Station program, but I suspect that many of the things that we unearthed in this investigation probably might be good to look at in that program also. Not that it's not well run and not well managed. I have no evidence whatsoever to indicate that it isn't well run and

well managed. But if we have cultural problems with communications and openness and the role of engineers and things like that, it probably is in more than one program.

General Hess, do you want to comment on the military, how military would handle a loss of life like this?

HESS:

Yes. I think that there is -- a good way to approach the answer to your question is that when we investigate accidents, it's very likely that outcomes can kind of fall in three general areas.

One, if you find culpability on the part of leadership, the removal from position is not an unheard of event.

Two, if you find that in the case of, let's say, a pilot flying an airplane, and he flew it outside the rules, that pilot going to a flight evaluation board to determine whether or not he retains his wings as a result of that event is not unheard of.

In the cases where, for example, there is a mechanical failure, for example, F-16s being a single engine airplane. We were dropping them out of the sky left and right in the late '90s because of mechanical failures. Those are problems that you go back and you fix logistically where there's not any personal culpability in the operation. So accountability is part of what we do. And we think it's very, very important, because it helps us continue to follow the rules.

BOEHLERT:

General, you have had the last word. The gentlelady's time is expired.

JACKSON LEE:

Thank you, Mr. Chairman.

BOEHLERT:

And we're going to be faithful to our promise to our distinguished panelists who have them permitted to exit.

And incidentally the fine cuisine -- they each grabbed half a sandwich.

JACKSON LEE:

That you provided, Mr. Chairman?

BOEHLERT:

Yes.

JACKSON LEE:

Mr. Chairman, would you yield for a moment so that he could have the last word? I'll pose it to you.

BOEHLERT:

Who is he going to have the last word?

JACKSON LEE:

You indicated this witness. But I'll pose it to you. I assume (OFF-MIKE) Admiral Gehman say that we would be able to speak with them directly one on one and have the opportunity to visit with at least Admiral Gehman and maybe some of the board members.

BOEHLERT:

You mean right now? Not right now.

I mean, let me tell you it's been my experience -- and we're finished now, because we're going to be faithful to our promise to the

panelists. It's been my experience that this board, Admiral Gehman, every, single member of the board has been accessible.

JACKSON LEE:

Great. That's all I need.

BOEHLERT:

And very receptive to any requests we've made of them.

JACKSON LEE:

Great.

BOEHLERT:

Let me tell you, I just want to stand and applaud you for what you have done for us and for America.

(APPLAUSE)

We are now adjourned.

CQ Transcriptions, Sept. 4, 2003

List of Speakers

U.S. REPRESENTATIVE SHERWOOD L. BOEHLERT (R-NY)
CHAIRMAN

U.S. REPRESENTATIVE LAMAR S. SMITH (R-TX)

U.S. REPRESENTATIVE CURT WELDON (R-PA)

U.S. REPRESENTATIVE DANA ROHRBACHER (R-CA)

U.S. REPRESENTATIVE JOE BARTON (R-TX)

U.S. REPRESENTATIVE KEN CALVERT (R-CA)

U.S. REPRESENTATIVE NICK SMITH (R-MI)

U.S. REPRESENTATIVE ROSCOE G. BARTLETT (R-MD)

U.S. REPRESENTATIVE VERNON J. EHLERS (R-MI)

U.S. REPRESENTATIVE GIL GUTKNECHT (R-MN)

U.S. REPRESENTATIVE GEORGE NETHERCUTT (R-WA)

U.S. REPRESENTATIVE FRANK D. LUCAS (R-OK)

U.S. REPRESENTATIVE JUDY BIGGERT (R-IL)

U.S. REPRESENTATIVE WAYNE GILCHREST (R-MD)

U.S. REPRESENTATIVE W. TODD AKIN (R-MO)

U.S. REPRESENTATIVE TIMOTHY V. JOHNSON (R-IL)

U.S. REPRESENTATIVE MELISSA A. HART (R-PA)

U.S. REPRESENTATIVE JOHN SULLIVAN (R-OK)

U.S. REPRESENTATIVE J. RANDY FORBES (R-VA)

U.S. REPRESENTATIVE PHIL GINGREY (R-GA)

U.S. REPRESENTATIVE ROB BISHOP (R-UT)

U.S. REPRESENTATIVE MICHAEL C. BURGESS (R-TX)

U.S. REPRESENTATIVE JO BONNER (R-AL)

U.S. REPRESENTATIVE TOM FEENEY (R-FL)

U.S. REPRESENTATIVE RALPH M. HALL (D-TX) RANKING
MEMBER

U.S. REPRESENTATIVE BART GORDON (D-TN)

U.S. REPRESENTATIVE JERRY F. COSTELLO (D-MI)
U.S. REPRESENTATIVE EDDIE BERNICE JOHNSON (D-TX)
U.S. REPRESENTATIVE LYNN C. WOOLSEY (D-CA)
U.S. REPRESENTATIVE NICK LAMPSON (D-TX)
U.S. REPRESENTATIVE JOHN B. LARSON (D-CT)
U.S. REPRESENTATIVE MARK UDALL (D-CO)
U.S. REPRESENTATIVE DAVID WU (D-OR)
U.S. REPRESENTATIVE MICHAEL M. HONDA (D-CA)
U.S. REPRESENTATIVE CHRIS BELL (D-TX)
U.S. REPRESENTATIVE BRAD MILLER (D-NC)
U.S. REPRESENTATIVE LINCOLN DAVIS (D-TN)
U.S. REPRESENTATIVE SHEILA JACKSON LEE (D-TX)
U.S. REPRESENTATIVE ZOE LOFGREN (D-CA)
U.S. REPRESENTATIVE BRAD SHERMAN (D-CA)
U.S. REPRESENTATIVE BRIAN BAIRD (D-WA)
U.S. REPRESENTATIVE DENNIS MOORE (D-KS)
U.S. REPRESENTATIVE ANTHONY WEINER (D-NY)
U.S. REPRESENTATIVE JIM MATHESON (D-UT)
U.S. REPRESENTATIVE DENNIS CARDOZA (D-CA)
WITNESSES:

ADM. HAROLD W. GEHMAN JR., CHAIRMAN, COLUMBIA
ACCIDENT INVESTIGATION BOARD

DR. JIM HALLOCK, CHIEF, AVIATION SAFETY DIVISION,
DEPARTMENT OF TRANSPORTATION

MAJ. GEN. KEN HESS, COMMANDER, AIR FORCE SAFETY
CENTER

DR. SHEILA WIDNALL, VICE PRESIDENT, NATIONAL ACADEMY
OF ENGINEERING

Source: **CQ Transcriptions**

All materials herein are protected by United States copyright law and may not be reproduced, distributed, transmitted, displayed, published or broadcast without the prior written permission of CQ Transcriptions. You may not alter or remove any trademark, copyright or other notice from copies of the content.

© 2003 CQ Roll Call All Rights Reserved.