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EVALUATING HUMAN CAPITAL AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

HEARING

BEFORE THE

OVERSIGHT OF GOVERNMENT MANAGEMENT, THE FEDERAL WORKFORCE AND THE DISTRICT OF COLUMBIA SUBCOMMITTEE

OF THE

COMMITTEE ON GOVERNMENTAL AFFAIRS
UNITED STATES SENATE

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EVALUATING HUMAN CAPITAL AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

THURSDAY, MARCH 6, 2003

U.S. SENATE,
OVERSIGHT OF GOVERNMENT MANAGEMENT, THE FEDERAL WORKFORCE, AND THE DISTRICT OF COLUMBIA SUBCOMMITTEE OF THE COMMITTEE ON GOVERNMENTAL AFFAIRS,
Washington, DC.

The Subcommittee met, pursuant to notice, at 10:03 a.m., in room SD–342, Dirksen Senate Office Building, Hon. George V. Voinovich, Chairman of the Subcommittee, presiding.

Present: Senators Voinovich, Akaka, Carper, and Pryor.

OPENING STATEMENT OF SENATOR VOINOVICH

Senator VOINOVICH. The Subcommittee on Oversight of Government Management, the Federal Workforce and the District of Columbia will come to order. Good morning and thank you all for coming to today's hearing, which is titled "Evaluating Human Capital at NASA."

Due to the location of the Glenn Research Center in Cleveland I have always felt close to the NASA family. Through my work as Mayor of Cleveland, Governor of Ohio, and now as a U.S. Senator, I have enjoyed my work with this important Federal agency. Several years ago I had the good fortune of getting to know the crew of STS–70 which was an all-Ohio crew but for one, and I made that person an honorary Ohioan. A picture of that crew hangs in my office here in Washington.

In considering the men and women who have accepted the call of the Nation to participate in manned space flight since the 1960's, I want to take this opportunity to extend my condolences to Administrator O'Keefe and the entire NASA family as they continue to come to terms with the tragic loss of the space shuttle Colombia and its brave crew. At the onset of this hearing let me be clear. I have not asked the administrator to come before the Subcommittee this morning to discuss this tragedy. I believe such questioning is premature as the Accident Investigation Board continues its important work.

Today, however, we will examine an important element of NASA's management—its workforce, a small but very important segment of the Federal Government's 1.8 million civilian employees. Each day 20,000 dedicated individuals at NASA facilities such as the Kennedy Space Center in Florida, the Goddard Space Flight

Center in Maryland, the Glenn Research Center at Lewis Field in Ohio, and the Jet Propulsion Laboratory in California push the limits of science and engineering for the benefit of our Nation and all mankind.

This is the eleventh oversight hearing the Subcommittee has held on the formidable human capital challenges confronting the Federal Government. Some of those hearings took place during the time when Administrator O'Keefe was serving the Nation in his previous appointment as Deputy Director of the Office of Management and Budget. Over the past couple of years we have made great strides in addressing these problems by enacting legislative solutions and implementing administrative changes.

Nevertheless, strategic human capital management remains on GAO's "High-Risk" list. In addition, GAO has identified NASA's contract management system as high risk. It is my understanding that NASA has put together a proposal containing the workforce flexibilities it needs to meet its mission. My hope is that the proposal also addresses the needs of the agency with regard to implementing and overseeing its contract and financial management systems to achieve success and remove the agency from the "High-Risk" list.

During my time as Mayor of Cleveland and Governor of Ohio I worked to address the workforce challenges within our local and State governments. Working with a wide range of stakeholders we successfully empowered our employees while establishing a culture of quality management.

Since coming to the Senate in 1999, I have stressed to my colleagues the urgency of the Federal Government's human capital challenges—the need to get the right people with the right skills in the right jobs at the right time. Robust personnel management includes the ability to recruit the best candidates, hire people in a timely manner, award performance bonuses and other motivational tools to encourage retention, and provide training and professional development opportunities and the flexibilities to shape and empower a balanced workforce. Good management includes the flexibility to act quickly and to compete in today's knowledge-based economy.

I applaud the Bush Administration for its commitment to address these personnel challenges by making human capital one of five government-wide initiatives in the President's Management Agenda. I am also pleased that Congress enacted several important workforce reforms in the legislation to establish the Department of Homeland Security.

Despite these reforms, however, the demographics of NASA's workforce remained a very real concern. For example, 15 percent of its workforce currently is eligible to retire. That number climbs to 25 percent in just 5 short years. Also disconcerting is the fact that scientists and engineers over age 60 outnumber those under age 30 by nearly 3 to 1. With so many eligible for retirement in the next few years, who knows how much institutional knowledge and expertise is going to walk out the door? This places the future of the agency at risk.

I would note that under Administrator O'Keefe's leadership NASA has made headway in addressing its workforce challenges.

The Office of Management and Budget has elevated NASA's overall status from red to yellow on the Management Scorecard for its human capital efforts—one of just a handful of Federal agencies to achieve such an accomplishment. NASA has also earned a green light for its progress for implementing the human capital management reforms outlined in the President's Management Agenda. I am eager to hear what steps NASA has taken to achieve this success. I am also hopeful we will learn what plans NASA has for utilizing the workforce flexibilities Congress enacted last November.

While we have made progress, there is much work for Congress to do, which is why in January I introduced S. 129, the Federal Workforce Flexibility Act. In reviewing Administrator O'Keefe's written testimony I noticed many parallels in the reforms he is seeking for NASA.

For example, both the Federal Workforce Flexibility Act and NASA's proposal would allow more flexibility in offering enhanced recruitment, relocation and retention bonuses, making agencies more competitive in assembling a workforce. NASA is seeking the ability to offer enhanced leave benefits to mid-level professionals from the private sector. After talking with leading national experts I also included this benefit in my legislation. This is key to making the Federal Government an employer of choice and recruiting top talent.

In addition, NASA has included in its proposal the authority to enter into workforce exchanges with the private sector. While these programs have long existed within the Federal Government, just last year Congress enacted the Digital Tech Corps Act. As the chief Senate sponsor of this legislation, I believe its provisions will help agencies tap private sector talent in the IT field. We desperately need these individuals today in the Federal Government. A similar program at NASA would provide a vital tool for the agency to access talent in academia and offer NASA employees an opportunity to gain experience from outside the agency.

I am interested in hearing from Administrator O'Keefe today about his proposals. I am planning to introduce legislation next week to help provide the reforms and flexibility NASA needs for its workforce. I am eager to hear your thoughts, Administrator O'Keefe, why it is so important.

We are very fortunate today to have with us someone I have known a long time and have high regard for, and that is Representative Sherry Boehlert of New York's 24th District. He is chairman of the House Science Committee. Having served since 1983 on the Science Committee, NASA's authorizing committee, and as chairman of that panel beginning in the 107th Congress, Mr. Boehlert has taken a keen interest in NASA's workforce.

The Subcommittee looks forward to gaining the benefit of the chairman's experience and expertise considering NASA. I think it is really significant, Sherry, that you have been working on this since 1983. It is just wonderful to have somebody like you that is chairman of a committee that has such a background. We are so glad to have you here this morning and I welcome your presence, and I am eager to hear your testimony. Thank you.

TESTIMONY OF HON. SHERWOOD BOEHLERT,[1] A MEMBER IN CONGRESS FROM THE STATE OF NEW YORK, AND CHAIRMAN, HOUSE SCIENCE COMMITTEE

Mr. BOEHLERT. Thank you very much, Senator. I will submit my prepared statement for the record and I will try to summarize.

A couple of things I would like to say at the outset. First of all, let me identify with everything you have said in your opening statement. You framed the issue just perfectly. The only possible exception is all honorary Ohioans. Maybe we might include New York because we are your neighbors and friends.

But let me say at the outset that this is something that Administrator O'Keefe and his team and I and my committee, and I know you and your people have been working on for some time. This did not develop overnight. NASA has a human capital challenge I think of the highest order and it is something we have to address. That is not to suggest that the current workforce is not top-notch, cream of the crop, the best, and the brightest. The problem is they are leaving in droves. And as you mention in your opening statement and it bears repeating because it outlines the dimensions of the problem. The over-60 population at NASA in skilled positions outnumbers the under-30 by 3 to 1; 15 percent of their science and engineering workforce are eligible to retire right now, 25 percent over the next 5 years will be eligible to retire. This is something that should raise a red flag in a number of quarters. I know you are paying attention to it, I am, and it is up to both of us to convince our colleagues that this is something they had darn well better pay attention to.

Now we need government-wide reform setting, no doubt about that. But we cannot wait. So we are setting up demonstration projects, we are agency-specific. It is not something permanent that will go on forever. It is a 6-year program. NASA just cannot do whatever it darn well pleases. They have got to present a plan to the Congress. But it gives them flexibility. It gives them incentives. It gives them some of the tools that any management team would want in order to provide the solid management that we have every right to expect of it.

There are recruitment, redesignation, and relocation bonuses. There are retention bonuses. Bottom line, we give them flexibility, and that is very important. Now we did not give them everything they wanted. They wanted something permanent. They wanted—quite frankly, I can understand whether it is this agency or any agency saying, we will let Congress know after we do it, but we are going to go ahead and manage our agency to the best of our ability, and we do not want any outside interference. That is not the attitude of Administrator O'Keefe or the key people at NASA. They have said right along, we want to work with you. We have worked to develop this legislation. I introduced it yesterday and I am glad to hear you are going to be doing the same thing on the Senate side very shortly.

When all is said and done, we have to give to NASA the flexibility, the incentives, the operational authority to retain and attract more of the best and the brightest to add to their already out-

[1] The prepared statement of Hon. Boehlert appears in the Appendix on page 25.

standing and very dedicated workforce. I am going to do my level best on my side of the Capitol to get our committee moving rapidly on this legislation. I know you will do the same on your side of the Capitol. We have had a good partnership over these years, Senator, and I look forward to that partnership continuing for all the right reasons. That is all I have to say.

Senator VOINOVICH. Thank you very much. I cannot help but remember testimony that we had here over a year ago by Lee Hamilton. He was testifying on the great need for scientists and engineers in this country, and how we are really in very bad shape in terms of the availability of those people, and that too often many of them are coming from other countries to study here and then going back to their countries, and that we needed to produce a lot more engineers and scientists. One of the things we sometimes overlook is that NASA has to go out and compete for a limited number of these people, and if they do not have the tools that the private sector has, they are not going to be able to attract them to NASA. I wonder if you would like to comment on that.

Mr. BOEHLERT. There is an Ohio connection here, so you will be pleased.

I point out that the President of the United States signed a historic No Child Left Behind legislation in Ohio in a high-profile ceremony, something that did the Congress, on the bipartisan basis, proud. A key provision of that measure is a science and math partnership, because we have got to do a much better job of developing our own in the science and math disciplines.

We are not doing very well when we are in the international competition. A third annual TIM study, a science and math proficiency study, pointed out that our youngsters do not measure up very well in comparison with youngsters from other nations with whom we are competing. We are 15th and 16th, respectively in science and math proficiency. So we have got to start at the beginning.

We have a limited workforce in these areas. And as you observed, NASA is competing for that limited workforce. And quite frankly, it is very difficult to compete, to come to government in a high-pressure, high-profile agency like that, and look at your counterparts in the private sector and see that they are doing much better in terms of financial remuneration and benefits, etc.

But the people that come to NASA are inspired. But we want to give them more than inspiration and we want to give them fair treatment in terms of their compensation package.

The numbers are startling. And if we do not do a better job, they are not going to be able to keep up. And when these people say bye, I am going off into the sunset, I have served the Nation and the Agency proud for many, many years, but it is my time to sit on the front porch and read a book or lower my golf handicap, or whatever they might decide to do, NASA has to be able to replace those people.

That is what we are talking about today and it is critically important.

Senator VOINOVICH. Thank you for being here today and the only thing I would ask you to do is convince your colleagues in the committee that has jurisdiction that we need to fast track this one.

Mr. BOEHLERT. We will do our best.

Senator VOINOVICH. There is some talk about waiting until we do all the other agencies. I think that the situation at NASA requires speedy action to deal with their personnel problem. And if you could do what you can to influence some of your colleagues that we ought to move this ahead of maybe some of the other requests that have come to us, it would help me a great deal.

Mr. BOEHLERT. I can assure you we will do just that, and I look forward to a continuing partnership with you, Senator.

Senator VOINOVICH. Thank you very much.

I would like to welcome Senator Pryor here this morning. Glad to have you on the Subcommittee.

Senator PRYOR. Thank you.

Senator VOINOVICH. With your background in government and management, I am sure that you are going to be a real asset to the Subcommittee and to the Committee. Would you like to make a statement?

Senator PRYOR. I do not have anything to say. Thank you.

I look forward to working with you on this.

Senator VOINOVICH. Thank you.

I am now delighted to introduce NASA Administrator Sean O'Keefe. Administrator O'Keefe possesses an impressive career of public service to our Nation. Prior to serving as NASA's 10th administrator, Mr. O'Keefe was appointed by President Bush to be the Deputy Director of the Office of Management and Budget. In the 1990's he served on then-Defense Secretary Dick Cheney's team as Comptroller of the Defense Department, and Secretary of the Navy—you must have been 18 when you did this, Sean—during the first Bush Administration.

Mr. O'Keefe began his career with the Federal Government as a Presidential Management Intern, as have two members of my current Subcommittee staff. That is a wonderful program, the Presidential Management Intern Program. We bring some wonderful people into government because of that program. If we had not had it, you might not be here, Sean.

So we are really happy to have you here, and I am looking forward to your testimony.

TESTIMONY OF HON. SEAN O'KEEFE,[1] ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Mr. O'KEEFE. Thank you, Mr. Chairman. Thank you very much, sir. And Senator Pryor, thank you very much for your time here this morning.

I want to thank you again for your opening comments, and those of Chairman Boehlert, as well, and the leadership that you have taken on this very important issue. It is absolutely critical because it is about the future. It is about the consideration of so many, I think, elements of what we have as prospect as a proficient agency in the years ahead. And if we do not think about these kinds of issues now, and were it not for your leadership, we certainly would not have the tools and capability to shape and prepare for that in the time ahead.

[1] The prepared statement of Hon. O'Keefe appears in the Appendix on page 26.

Senator VOINOVICH. Sean, can I just interrupt you a minute? We have a tradition here in this Subcommittee that we swear in our witnesses. If you would stand up.

[Witness sworn.]

Senator VOINOVICH. Let the record show that the witness answered in the affirmative. Mr. O'Keefe, you may resume your testimony.

Mr. O'KEEFE. Thank you, Mr. Chairman. I apologize.

Again, your leadership in this regard is absolutely critical. It is one that I think is an aspect for the future of the Agency, as well as for our competency and capability to deal with the remarkable challenges that the public portfolio that is bequeathed to us of accomplishing, turns on our ability to be able to shape our capabilities and professional talents for the future. And your leadership in that regard is absolutely essential, and that of Chairman Boehlert and his willingness to go forward, as well.

I want to associate myself entirely with the opening statements of both of you. I think you captured exactly the essence of the nature of the challenge. It is not one that is going to be happening some number of years from now. It is looming. It is upon us at this juncture.

We have time now to work with these issues, but not much. So as a result I think it is critical to do so.

If you would, sir, I will quickly summarize my statement because an awful lot of what I had planned to cover here in an opening statement has been handled quite admirably by both of you in your opening commentary, as well. So if you would, sir, I will submit that for the record and do a quick summary of a couple of other highlights.

First of all, the point that the Comptroller General and head of GAO, having determined that this is the highest risk issue on the high-risk list that he has prepared of government-wide challenges of human capital management, positively speaks to the years of review that have gone on here. For at least the last 4 or 5 years there has been repeated commentary from both the Comptroller General, as well as, other outside expertise that has pointed to this.

It is what persuaded, I think as you alluded to, the President to make this an essential element of his management agenda. Indeed, it is the top item on that agenda, the strategic management of human capital.

The challenges that each department and agency encounters requires applications of strategic principles. There is not a one size fits all solution to this. Every agency and department has a slightly different set of variations or concerns that need to be accommodated. So there is not a singular solution that can be handled in one sweep.

So as a result, the approach that we are taking at NASA while again adhering to a number of very important strategic human resource principles that we have discussed on several other hearings, as well as in several fora that you have led and hosted, are the kind of things that we have attempted to incorporate in the proposals we sent forward, and that the President proposed last June

as part of a legislative package to deal with human resource challenges.

At NASA, those general patterns are exactly as you have described them. There is, I guess the most polite way to describe this, a maturing workforce. We are positively at a point where the average age, as much as I appreciate the allusion to my age, is nonetheless exactly the average of what the NASA professional capabilities is. I am 47 years old, and that is the average age of the organization.

But as a result, that means there are many more folks on the more senior side of where I am than on the more junior end. And that speaks to a number of changes that have occurred over the course of time.

The looming requirements in the time ahead and the retirements of what we anticipate are exactly as you have alluded. Certainly right now we have a very large percentage of the workforce that are eligible to retire. In the next 5 years, we are looking at better than a third of the workforce, as well.

The unique part, and again it is not unique exclusively to NASA, but it is a characteristic that is rather unusual at our agency, it is a very dominant kind of concentration on science and technology talent. We are the No. 2 agency or department in the Federal Government in terms of hiring of engineers, scientists, and other related technical fields, surpassed only by the Department of Defense. So we are the second largest recruiter and retainer of engineers, scientists, and technical fields.

Like every agency, I think the approach and the circumstances of what we are all confronting is quite telling. As you alluded, and I am delighted to hear the repeat of statistics that have been used often by both yourself as well as Chairman Boehlert, that the overproportion of folks over 60 exceeds by a factor of three the scientists and engineers under 30. So as a consequence, that speaks to a lag in recruiting that occurred in the 1990's that we cannot make up. There is no way that the actuarial tables can be suspended and that we suddenly have folks with greater experience and capability by simply wishing it so.

We have got to look at other creative approaches for mid-level entry and a range of other opportunities that might not otherwise be possible to correct such a deficiency.

But the other aspect of this that you alluded to, I think, in your exchange with Chairman Boehlert, that is equally significant is we are also confronting this particular challenge right now at a time when there is a real diminution, a trend that has been continuing nearly unabated for the past 10 years, on the part of younger folks in the United States in science, math, engineering, and technical-related fields.

Last May and June, universities across the United States conferred more degrees in sports and exercise science than they did in electrical engineering. As a consequence, there is a real drift off of the number of folks who have an interest in this particular area of engineering and technical-related aspects and science and that is the diminishing smaller cohort that we seek to recruit from in order to deal with replacement of this looming prospect in the next 5 years of approaching a third of our workforce retiring.

So as a consequence, these are immediate near-term kinds of propositions and issues we have to deal with.

The solutions, I think again, cannot be a one size fits all approach. I think every agency and department has a different emphasis or approach on what is there. Again, the point I have found most impressive in the manner, Mr. Chairman, in which you have approached this issue, as well as, that of Chairman Boehlert, is to look at what are the overall human resource principles, strategic focuses, that ought to be emphasized and then select from a range of tools that could be provided to uniquely fit the bill in any agency or department that has the specific requirements, ours being, again, not terribly unique but one that is different than what we would have at the Social Security Administration or the Small Business Administration or somewhere else.

The solutions, again, cannot be one size fits all. So the approach that we are recommending, and is part of the President's legislation advanced last June in the Workforce Management Enhancement Act of 2002, at that time, now revised to 2003, as we await congressional action of those considerations. Our approach has been to look at three primary areas.

The first is to examine and to try to correct what has been a decade-long lag in new hires and the capacity to bring in folks not only from undergraduate and graduate backgrounds in science and engineering principally, but also to look at mid-level entry opportunities. So a number of tools that we have proposed are there to attempt to entice folks with some degree of experience in the related fields that may be attracted to public service and government service opportunities and contribute their talents after having gained some level of experience as well in that regard.

So we are looking at both ends of new hires, straight out of graduate and undergraduate programs, as well as looking at trying to entice and attract folks with some degree of experience in related fields that may apply them towards public service opportunities.

The second major area is to look at retention goals. The tools that we proposed and suggested within the Workforce Management Enhancement of Act of 2003, that the President proposed again last June, is to target very specific kinds of capabilities and fields that we see based on the trend analysis that there are certain core competencies or competency management issues that need to be emphasized in certain skill areas, that we would seek to apply those tools selectively in areas in which we seek to enhance our ability to arrest either a retirement rate that would otherwise decimate or dramatically reduce our talent skill in certain areas, or for our ability to retain folks who have a certain set of capabilities that we anticipate will be otherwise promoted or interested in moving on to other private sector opportunities were it not for those tools.

The third area is to use other Federal demonstration and project authorities that have already been enacted that are unique, exclusive to a department or another agency, that seem to have some success rate. So it is in the spirit of, I think picking up on a concept, Mr. Chairman, that you have advanced on several occasions that I have seen or heard in hearings, as well as in several fora that you have hosted, of trying to adapt and use best practices across the Federal Government and adapt them with some track

record for how we may employ them and use those capabilities within our own circumstance at NASA.

Let me conclude, I guess, with a couple of observations. First and foremost, that you and Chairman Boehlert, again, have demonstrated a leadership capacity and interest on this particular topic that is absolutely critical. Chairman Boehlert's introduction of H.R. 1085 yesterday is a major first step in that direction as well. Your initiative of S. 129 and the fast-track approach that you are now looking to proceed with on this particular effort, or a version of it, to adapt specifically to NASA's requirements is not only encouraging, it is positively the break-through we have been seeking and looking for, and are most excited that you would be willing to put that kind of time and energy into.

We do have time, but not much. This is something that, again, the statistics, the actuarial tables are very evident in terms of the direction we are going. We have been talking about these challenges as a government, as a group of public service leaders now for several years.

Indeed, the debate that I find myself currently embroiled in on other aspects is a spirited exchange over folks judging the judgment of the current group of professionals in terms of their capacity, expertise, talents and understanding of operational issues, engineering, scientific, and technical issues that we are wrestling with just today as a consequence of our most recent challenges and the tragedy of the Columbia loss.

That nonetheless tells me that within the next 5 years, as that talent pool moves on, the number of folks with that degree of experience is only going to be less, fewer of them. So that debate will become narrower and narrower and easier to have, about judging the judgments of a smaller group of the folks in the years ahead unless we arrest this challenge right now and begin to work that issue.

The President, I believe, and I very much appreciate your observation, Mr. Chairman, at the opening, has stepped up to this approach. As part of the President's management agenda, this is the No. 1 item on the list of issues that he considers across the entire Federal expanse must be addressed. It has been a part of his agenda since the opening months of this administration.

His legislative proposals specific to NASA that were submitted last June speak to his commitment and interest in assuring that we have the capacity and the tools that long outlive the time we spend in this administration or are privileged to serve ourselves in public service so that future administrations will have an opportunity to continue to see the expertise and talent that NASA can bring.

Again, I think the remarkable distinction about this debate that has been going on now for several years and which we have all identified and come to a blinding flash of the obvious in terms of what the human capital challenges are, the major distinction is you and Chairman Boehlert are doing something about it. In that regard we are most grateful for that attention and your leadership and willingness to take on this important set of issues.

Thank you, sir.

Senator VOINOVICH. Thank you, Administrator O'Keefe.

I would like to welcome Senator Akaka. Senator Akaka and I collaborated over the last couple of years on some human capital improvements and I am very proud that about half of our legislative package was adopted in the Homeland Security Act.

Administrator O'Keefe, you are benefiting from some of those provisions right now. One of them that I have heard more about than any other one is the rule of three that we have had throughout the Federal Government, which is a statute enacted when Ohioan Ulysses Grant served as president and it was decided that there may have been too much cronyism during that administration so they went to a new system of hiring people. We now have a new way of hiring people, a category ranking system where we rate candidates as well qualified, qualified, and not qualified. And then managers can have a better opportunity to choose those people that will make a difference for the agency. And I am hopeful that is going to benefit you.

Senator Akaka, would you like to make a remark or opening statement before we open it up for questions.

OPENING STATEMENT OF SENATOR AKAKA

Senator AKAKA. Yes, Mr. Chairman. I want to thank you for having this hearing. I am very pleased to be here today and also to welcome Administrator O'Keefe.

I will make a brief statement. Unfortunately I cannot stay. I wanted to express my appreciation to you for your efforts in making the Federal Government the employer of choice and not of the last resort. Senator Voinovich is certainly a pioneer and leader in this area of human capital.

Administrator O'Keefe, thank you again for being here. I wanted you to know that I was an early member of the House of Representatives Space Caucus. As a matter of fact, I was chairman of the Caucus. It was a time in the early 1980's when NASA was having difficulties, but brought everything together to bring it back up. I am glad it did.

I view NASA's mission of space exploration as unique within the Federal Government and sincerely believe that its employees are modern-day pioneers.

Despite the headway made through space exploration, NASA faces many of the same workforce management challenges faced by all Federal agencies. The number of employees nearing retirement age is looming and the lack of trained and skilled scientists and technicians poses a great threat to NASA's future. Our national security agencies face a similar threat and next week—and I wanted to mention this—I am reintroducing legislation to strengthen their recruitment and retention efforts in the areas of science and mathematics. I am pleased that we have the opportunity today to review options for NASA was well.

Mr. Chairman, I believe NASA has other management challenges. Nearly 90 percent of its workforce is comprised of contract or grant employees. With such a heavy reliance on contract personnel, it is critical that there be effective and strong contract management. And yet, GAO continues to find that NASA lacks the systems and processes needed to oversee contact activities and control costs effectively.

I am concerned that these outstanding problems with outsourcing, coupled with NASA's need to achieve specific contracting goals, could complicated the steps NASA must take to address its operational, managerial, and safety challenges.

So Mr. Chairman, I look forward to working with you and our colleagues to ensure that all Federal agencies have the tools to put the right people and skills in the right place to serve our Nation. So thank you for this opportunity for me to give my statement, and I ask that my full statement be made a part of the record.

[The prepared statement of Senator Akaka follows:]

PREPARED STATEMENT OF SENATOR AKAKA

Thank you Chairman Voinovich. I am pleased to join you this morning in welcoming NASA Administrator Sean O'Keefe to our subcommittee. Administrator O'Keefe, I thank you for being with us today. I want to express my appreciation to you, Mr. Chairman, for your efforts in making the Federal Government the employer of choice and not the employer of last resort.

As an early member of the House of Representatives Space Caucus, I view NASA's mission of space exploration unique within the Federal Government. NASA employees are modern day pioneers who help uncover the mysteries of the universe and promote technological advancements, such as the wind-shear warning equipment used in commercial airliners. NASA space scientists have harnessed microgravity conditions to make advancements in medicine. Yet, despite the headway made through space exploration, NASA faces many of the same workforce management challenges faced by other Federal agencies.

Senator Voinovich, Representative Boehlert, and Administrator O'Keefe have mentioned the large number of employees nearing retirement age at NASA and the lack of trained and skilled scientists and technicians which poses a great threat to NASA's future. Our national security agencies face a similar threat, and next week I am reintroducing legislation to strengthen their recruitment and retention efforts in the areas of science and mathematics. I am pleased we have the opportunity today to review options for NASA as well.

I would be remiss in mentioning that Senator Voinovich and I worked together last year to amend the Homeland Security Act to provide new government-wide workforce management tools to augment existing flexibilities. Like other agencies, NASA enjoys certain flexibilities to manage its workforce. In fact, the Comptroller General convincingly argues that agencies already have 90 percent of the flexibilities needed to manage more effectively.

But managerial flexibilities alone will not solve the workforce challenges facing NASA or any other agencies. Real solutions call for strong leadership from the top.

Whatever approach is proposed—be it through new government-wide flexibilities or agency—specific measures—there must be a thorough review before any proposals are implemented to alter the way agencies hire, retain, train, or manage their workforces.

Nearly 90 percent of NASA's workforce are contract or grant workers. With such heavy reliance on contract personnel, it is critical that there be effective and strong contract management.

It is important to note that contract management has been identified as a high risk area by GAO since 1990 when GAO's high risk list was first begun. Unfortunately, GAO continues to find that NASA lacks the systems and processes needed to oversee contractor activities and control costs effectively.

I am concerned that these outstanding problems with outsourcing, coupled with NASA's need to achieve specific contracting goals, could complicate the steps NASA must take to address its operational, managerial, and safety challenges.

Last year, the Office of Inspector General at NASA concluded that the lack of proper contract oversight threatened the safety of the space shuttle operations. According to testimony from the Comptroller General, NASA faced staffing shortages that threatened its ability to operate its programs safely. Therefore, I am curious to learn how NASA proposes to balance its outsourcing goals while ensuring operational safety, contract oversight, and sound workforce management.

I look forward to working with my colleagues to ensure that all Federal agencies have the tools to put the right people with the right skills in the right place to serve our Nation.

Thank you Mr. Chairman, and thank you Administrator O'Keefe.

Senator VOINOVICH. Thank you, Senator Akaka.

Senator Pryor, would you like to start the questions? Usually I do, but you did not get a chance to have an opening statement.

Senator PRYOR. Thank you, I would be glad to. If I may, I have just three or four questions, Mr. Chairman, on the retention of employees.

The first question I have is a general question. Are you losing employees to retirement or are you losing them to the private sector?

Mr. O'KEEFE. Predominately it is retirement. In the aerospace industry over all, there is not a vigorous recruiting and hiring activity underway, but it is primarily for retirements.

But NASA is a bit unique in the sense that there is a fair amount of movement at mid-levels, as well as towards private sector opportunities. But in this particular period, given the current state of the aerospace industry over the last 3 years, it has been a less than vigorous recruiting period. But throughout its history there has been a fair amount of movement at mid-levels from NASA directly to private industry, but it is primarily, at this juncture, retirement-related.

Senator PRYOR. With regard to the private sector, I assume the competing interests for most of these highly qualified employees that work for NASA would be mostly the aerospace industry?

Mr. O'KEEFE. Not necessarily. In certain aspects of what we are dealing with, certainly in the flight operations activities for international space station, for the space shuttle program, for some of the test flight centers that we operate, the aerospace industry is a dominant employer. But on the space and earth science functions, for example, it is a wide range of folks with backgrounds in astronomy, geology, you name it, any number of different disciplines in the scientific and engineering-related fields that are not necessarily directly applicable to aerospace industry directly.

Senator PRYOR. Are our salaries competitive? Is that one of the problems, that people get to sort of a plateau in the salary and it is just——

Mr. O'KEEFE. We have really got to do more exhaustive analysis because this is a real spirited debate that goes on constantly. The most recent data I saw from an outfit called the Partnership for Public Service that was quoting and using some Bureau of Labor Statistics data, suggest that it is competitive and that what we are dealing with, on average, for engineers principally, is pretty competitive with private industry.

Now it is capped, to be sure, and so you will not find the high-end aberrations and I think part of it is skewed by the fact that, again, NASA is the No. 2 employer of engineers in terms of Federal employment across the government.

Part of it, I think, may be a function of an aging and more mature workforce of engineers than what we see in the private sector because there are fewer folks by a long shot in the range and experience that ranges from 10 to 15 years, because there was a real recruiting lag that occurred throughout the 1990's. As a result of that, you see a more high-end average because the folks who are still part of the workforce are in that area.

But it appears to be competitive but it bears a lot more examination to really analyze that carefully.

Senator PRYOR. I just came out of an environment where I was the Attorney General of my State before I came here and we were always competing with the private sector for lawyers.

Mr. O'KEEFE. That is a very difficult task.

Senator PRYOR. And under our State system we were very limited on what we could pay. And literally, we had a situation where a lot of the best and brightest lawyers could come out of law school and within 2 or 3 years they could easily make as much as some of our most highly paid lawyers. At that point you have to rely on trying to find dedicated people than are committed to public service. And there is a lot more than just money for a lot of people.

We were fortunate to have a very high quality staff there, but it was a struggle to try to keep all the pieces together.

It sounds like NASA, that may not really be the primary issue but may be one of many issues. Is that fair to say?

Mr. O'KEEFE. Yes, sir. I think that is a fair assessment. The opportunities we have at our disposal, I think, that is really quite unique is what appears to be a pretty competitive salary range in terms of entry level. To be sure at mid-level.

The other major advantage, and I think we have an opportunity, and it is quite an irony in the sense that this liability is now a virtue in a sense, that when you look at the range of experience and real paucity of folks within that 5- to 15-years range of experience, it means to folks that there are great promotion opportunities if you come in.

So there are a smaller cohort of folks competing for a larger number of opportunities, and so advancement is a very attractive kind of circumstance right now for not only folks coming in but also as an inducement for those who might want to look at a mid-level entry, having spent 5 or 10 years in an engineering firm and coming to the Federal Government with that approach.

Much of what we have proposed in the Workforce Management Enhancement Act that the President sent up last June is designed specifically to provide some real incentives to sign up now, recruiting bonuses, opportunities for travel, coverage, all those kinds of things, the inducements that any company would normally provide, to a much lesser extent, but at least it is there. It is not like gee, we are just appealing to your sense of public service to come aboard. There at least are some competitive advantages.

Overall, can you do better in the private sector? I think indisputably the answer is yes, you can do a lot better there. But in terms of entry-level opportunities and potentially mid-level entry from other experience, it is a very attractive time to be part of an exciting program like NASA has to offer.

Senator PRYOR. Mr. Chairman, the last question I have is when I think of NASA I think obviously of some employment opportunities in the Washington, DC area, and then you have some in Florida and some in Texas. Are there other regions of the country where NASA has major facilities?

Mr. O'KEEFE. Yes, sir. As a matter of fact, the smallest number are here in Washington. The rest are in Texas, Florida, California,

Alabama. Mississippi, Maryland, just up the road here at Goddard, and Ohio, of course.

Senator PRYOR. He left one State out there, though, Arkansas.

Mr. O'KEEFE. No, had to save the absolute punchline for the end there. And throughout Virginia, certainly at the Langley Research Center, as well.

But it is a very expanded effort that you can trace the history of NASA's development from the early NACA days when, the Wright brothers and others all formed together as part of the original Langley efforts to bring about aeronautics as a focus of the Federal establishment and then trace it throughout the history of the development of NASA in 1958. It has grown up in lots of different locations around the country and some places are easier to recruit than others.

Senator PRYOR. I understand that.

That is all I have, Mr. Chairman. Thank you.

Mr. O'KEEFE. Thank you, Senator. I appreciate your questions.

Senator VOINOVICH. Mr. O'Keefe, last year we gathered a lot of experts from around the country to talk about human capital. And as you know, the John F. Kennedy School of Government at Harvard University made human capital the topic of several executive sessions.

I had an opportunity to spend some time with some of the students there at Harvard and I have since then, as a result of that experience, talked to some other students in Ohio about them coming to work for the Federal Government.

One of the issues that came up was that we are not getting as many young people to come to the Federal Government because they see so much of agencies' work being outsourced to third parties. And rather than come to work for the Federal Government they are choosing to go to work for those organizations.

I thought about that at length, and I would like you to comment on whether you believe that one of the reasons we have been competing so much work is that the lack of flexibilities has made it difficult to attract and retain agency employees.

Mr. O'KEEFE. That may be part of it, but I think an overwhelming set of factors as to what has created the present condition, I think at NASA, appears to be again over the course of the past decade a very vigorous effort at transitioning the operational aspects of that we do, the launch services, all the technical work that goes into aerospace-related kinds of activities, rather than maintaining an infrastructure within the Federal establishment for that purpose. Instead looking to contract that specifically with aerospace companies with expertise in the field.

It follows the same pattern I saw at the Defense Department, as a matter of fact, in my prior incarnation in public service, of looking at moving industrial-related activities that could be performed in a variety of other venues, and rather than maintaining a public infrastructure for those capabilities that is duplicative of that commercial set of options, that there was a very clear propensity and trend, certainly over the last decade, at NASA towards transitioning many of those activities over to commercial enterprises in the aerospace industry, specifically.

As it pertains to the management of functions, the engineering capabilities, the design requirements, the decisionmaking about the conduct of operations, all that has been retained within NASA. If anything, I find the opportunities and the enticement for recruiting to an exotic agency like NASA, with very high name recognition among all Americans, to be a much easier kind of magnet, if you will, to attracting interest there.

The problem is we lack some of the tools to bring the deal over the line, if you will, on bringing various folks into the agency because we have used all the tools at our disposal, every capability we have—and we have got many at NASA. It is really quite extraordinary to see the degree of flexibilities, for example, of the 1958 Space Act, and the capabilities that we have that are really quite unique relative to some other agencies and departments, to bring on folks in very limited numbers for capabilities and requirements we may have in an immediate time.

Nonetheless, it is a very limited set of authorities. So much of what you have introduced, and Chairman Boehlert is sponsoring as well, and it was included in the President's original legislation last June, will give us that full expanse of tools to put the deal over the line, if you will, of bringing folks into the agency. Frankly, the name recognition alone is enough to bring folks to the door, at least to listen. Then we have got to have the capability to close the opportunity and actually bring folks in.

Senator VOINOVICH. Of the things that you are suggesting that you need, what do you think is the most important, in terms of bringing them in the door?

Mr. O'KEEFE. The retention tools that we propose, there are three really important ones. The first one is a proposal we put forward a scholarship for service program, which is a very specific effort to try to link the opportunity for future engagement, employment, involvement in public service with undergraduate and graduate students currently engaged in research with principal investigators, professors on faculty at universities who are looking at science and research activities that have direct application to what we are doing at NASA.

That is a golden opportunity to bring in folks who already have an interest, who already have an expertise, have dedicated some of their time as undergraduates and graduates towards the kinds of things we really need the expertise at, and then be able to bring them in, in the scholarship for service program, to offer them an opportunity to be part of the NASA family in the time ahead when they go seeking professional opportunities.

If I had to pick one, that is clearly one of the most attractive. I find every time at a university campus I mention something like that, folks immediately light up and say there is an opportunity that is really quite enhancing.

The other ones, I guess, that are equally critical in other respects are this mid-level entry aspects, of looking at folks with 5 to 10 years of experience in an engineering firm, for example. Having the kind of enticements that would say look, we have the capability to bring you in, maybe not at comparable salary, or at least we can try to be as competitive as possible in that regard given the nature of mid-level and mid-grade kind of salaries that the Federal Gov-

ernment provides. But here are some recruiting enticements for you. There are a series of them that we propose as tools that would open up the chance to not just look at fresh out of new entrant requirements right straight out of an undergraduate or graduate program.

Senator VOINOVICH. One of the things that impressed me, as we moved along with the legislation, and I think you deal with it in your proposal, is the issue of leave accrual for mid-level hires. A lot of people are not aware of this, but when one comes to work for the Federal Government he gets 13 days. If he is here 3 years, he gets 20 days. And if he is here 15 years, he gets 26 days.

Suppose some mid-level person goes to his or her spouse and says I want to go to work for NASA, I am excited about this opportunity. I may not make as much as I am in the private sector, but I want to serve my country. And the spouse asks the question, what kind of vacation will you receive? And then the potential employee explains to them. And after that, he or she may decide not to come because of that situation, because vacation has become so important a fringe benefit, I think, today in our country.

Mr. O'KEEFE. Absolutely.

Senator VOINOVICH. Those are practical things.

Mr. O'KEEFE. You have hit the nail right on the head. Those are the kinds of maddening things that we do to ourselves inadvertently because of the limitations of the way the rules are structured. You have hit it right on. Because sometimes those become the deal breakers. And folks sit back and say gee, do I really want to sign up for this?

We had a gent who just last year began as the Director of the Johnson Space Center, who was a retired 3-star marine. And he had gotten out back 5 years ago, I guess, having had a distinguished career in the Marine Corps all that time, went to work for a private company.

We recruited him to be the director and he got no leave because of the way that the arrangement was structured. Now thank goodness, we were able to compel him to his public service calling, and recalling, and he agreed to do so.

But it was just something he has had to fiddle with for the past year and work his way through, even though this is a gent who has had better than 30 years of public service time. And yet the rules would not permit something like that. You have it right on. That is exactly the problem.

Senator VOINOVICH. How about the repayment of student loans? Do you want to comment on that?

Mr. O'KEEFE. That has some attractiveness to it and it is certainly one of the elements of the pending legislation that can be yet another tool that would put this deal over the line kind of condition where if you have folks with engineering degrees or any scientific degree that would be attractive, they would look at the Federal Government as an employer of attractive alternative if the opportunity for forgiveness of student loans were to be incorporated as part of that.

That is a very creative end approach and one that, again, no one size fits all. If you have that full range of tools in the kit bag, and there is any number of things you can pull out to adapt to the indi-

vidual case in which you are looking for, for individual competencies you seek, and the capabilities of people that may be applying.

Senator VOINOVICH. I was shocked when I found out that if a person comes to work for the Federal Government and the Federal Government pays off his or her loans over a period of time that the payment of those loans is a taxable item for that employee. But if an educational institution repays the loans in return for public service, it is not taxable. That is a little quirk in the law, but again one I think that needs to be taken care of.

Mr. O'KEEFE. Yes, sir.

Senator VOINOVICH. One of the areas that has been outstanding now for 13 years, and I addressed it in my opening statement, is the issue of contract management as a high risk item. For 13 years that has been a high risk area on GAO's list.

I would like to know what are you doing about that issue, so that maybe a year from now David Walker can say it is no longer high risk?

Mr. O'KEEFE. Thank you, Mr. Chairman. That is a very important question and one that I had spent a lot of time working on as soon as I got to NASA because the primary reason why NASA was on the high risk list for contract management was what is referred to as undefinitized contracts.

In other words, it was a case where GAO said you have got too many contracts out there that are aging, they have been out for a long time and they have no real expiration date on them, and all you do is keep amending these contracts for new services or new capabilities or whatever, and just modifying them as you go along.

Absolutely right. This was just a rather frequent practice, apparently, that seemed to go on, and was really an acquisition policy issue that really was a major question because it spoke to the issue of wider liabilities, what are we committing the government to, the public to, for a longer term.

And so we really worked very hard over the course of this past year to fry down the number of undefinitized contracts to an almost decimal dust number. As a matter of fact, in November and December, GAO notified us that we were to be now removed from the high risk list as a consequence of having brought that number down to zero.

What put us back on the list, just recently, is a change in the Federal Accounting Standards Board procedures just about 2 years ago, in which property held by contractors that belongs to the government, if it is not inventoried and accounted for properly, that then poses a high risk issue to GAO.

What they noted in our audit a year ago was a variance by contractors that were reporting the various aerospace companies that we do business with, that were reporting varying numbers that were at odds with what we had valued as being the value of property that was in the hands of contractors for specific functions that we do.

It relates to things like, again, the shuttle program, the international space station, the various space probes or whatever else we do, as well as assets on orbit, as a matter of fact, that may be controlled by a contractor but owned by the government. And the

fact that the valuations were different and not in concert with the new Federal Accounting Standards Board rules put us back on the high risk list.

So the reason we were on the risk for the past dozen years, we beat the parade rest and finally got our way off from that particular list for that set of reasons, on the contract issues. And we now have found ourselves for a new reason on the high risk list, which we have identified as part of our last audit that Price Waterhouse Coopers, our external auditor, came in and gave us some very constructive approaches on how we can police that question over the course of this coming year with all of our major contractors we do business with to get an exactitude of what we value and what they value as the value of government-owned property at contractor facilities.

So I am very confident by this time next year that will not be an issue, and unless something new comes up, we will be once and for all off the high risk list for contract management issues.

Senator VOINOVICH. Good.

I have visited the facility there in Florida on a couple of occasions and I had a very good tour when STS–70 went up, I think it was in 1995, with our Ohio crew. I will never forget it because one of the astronauts was a graduate of Ohio State University and she made it so that the patch that they used featured an Ohio State block O, which she claims that NASA did not know about, but they later figured it out. I was impressed with what I saw.

After the Challenger tragedy we were going through the center and NASA staff was showing us how they were repairing the tiles after the shuttle comes back. They have a lot of tile work that needs to be done after each mission.

The thought occurred to me, are the people who repair those tiles once the shuttles come back on NASA's payroll or is that worked contracted out to somebody else?

Mr. O'KEEFE. There is a combination. This is part of this transition I referred to that appears to have occurred over the course of the past decade of looking at launch services and preparation for operations kind of activities to what is now a consortium arrangement between Boeing and Lockheed-Martin called the United Space Alliance and is a subsidiary of those two primaries that operate all of the launch services activities.

Within the orbiter processing facility that it sounds like you went through, there are some 27,000 tiles on an orbiter. The inspection activity goes on with both United Space Alliance engineers and technical folks, as well as NASA folks. So we have got the better part of about, I want to say about 2,500 NASA employees, but let me give you an exact number for the record of how many folks we have at the Kennedy Space Center. We have Air Force folks that are there from Cape Canaveral Air Force Station that will look at a variety of issues, and the United Space Alliance, as well as the other aerospace companies, that will have folks there that work through a variety of different issues.

So if you go through the orbiter processing facility, chances are one in two that the folk you talk to are either NASA folks directly, U.S. Government personnel who are public servants, or they are United Space Alliance employees. And it depends on whether you

talk to a manager, an inspector, someone who is actually working on some of the issues, it varies.

Senator VOINOVICH. Do you believe that you have the people on board to guarantee that the contractors you have hired are the quality that you want and they are doing the job that you want? Before I was county auditor, we had contracted out our appraising business and we had some real problems, in fact, scandals. And when I became auditor I brought on a small staff of individuals whose main job was to review contractors' work. They were highly competent people who managed the work and made sure that we were getting what the contractor said he was going to do, in terms of quality of the people they hired and the work that came back.

Do you feel that you, at this stage, have enough of those people on board that can make sure that we are getting what we are supposed to be getting from these contractors?

Mr. O'KEEFE. Well, it appears so. But again, much of what I think seems to be a focus of the Columbia Accident Investigation Board efforts, for example, is to look at systems and the management practices, the run up to pre-launch, as well as on-orbit activities, and how that interaction occurs between NASA, the primary contractors, folks who are part of the NASA community overall.

They are going to be looking at that question and I am going to be guided by their findings in that regard.

By anecdotal sense of this, though, is it does not matter whether it is a direct U.S. Government personnel or folks associated with a wide range of different companies that we do business with. For example, before every single launch, about 10 days to 2 weeks prior, there is an assembly of folks in a room about this size of anybody and everybody who has anything to do with the launch of that particular mission from the U.S. Government who are NASA personnel, and of the senior folks from the Agency as well as lots of different contract folks who are engaged in pre-launch, on-orbit, etc., activities, senior engineers, and technical folks. Their responsibility is if there is a single anomaly to raise your hand. These flight readiness reviews, go on for the better part of a day to 2 days of beating every single anomaly that is viewed there. There is no one in the room, from the few that I have and the activities that I have seen there, that stops anybody and says wait a minute, you cannot speak because you are a contractor and you are a government employee, or you are not high enough up in the food chain, or whatever. It is anybody who has got an issue is authorized and expected to speak.

It is a very coordinated effort that goes on. That has impressed me in the year or 14 months I have been at the Agency, to see that there is a very close communication, very close coordination of activities, independent of whose payroll is there, in support of those activities. It has little or nothing to do with where you are on the hierarchical chain. It is if you have a responsibility and you are accountable, the expectation is you will speak up. Because if it is not exactly right, we do not fly. And that is an ethos that has really made a strong impression on me, what I have seen in the last 14 months.

Senator VOINOVICH. In other words, they can all contribute. I guess the main thing that I am concerned about is do you have the

people that work for you, that conduct an oversight of contractors to make sure they are giving the agency what is expected? And also to look at the quality of the work that is being done? Do you feel comfortable about that?

Mr. O'KEEFE. In terms of the management of our contract efforts for launch services, etc., it is very evident to me that the senior experience rate, capabilities, et cetera, is really quite impressive. In terms of the NASA employees and their experience rates, the folks who are in the jobs, who are in those capacities have a lot of maturity, to put a very kind diplomatic word to it. They are older folks. That is what scares me, is once they move on, there is not a whole lot there behind it in terms of our capacity. The bench strength is not as deep as it could be.

That is why we have really got to use the tools now to get moving on not only growing a new cadre and core of people with that degree of experience, but we have also got to be looking at bringing in folks who have the capacity and capability.

The good news is that the folks who are on the senior end of this and are the management team that do the contract oversight and our part of the iterative process on all the activities we are engaged in, have an awful lot of knowledge to import. Our experience base is just unsurpassed. All we have to do is get the folks in there who have the capacity to soak up that knowledge before they decided to move on.

Senator VOINOVICH. I would be really interested to have someone in your shop do a survey over the last several years of what work has been competed and the decision on whether to contract it or leave it within the Agency. I have had some complaints from some folks in Cleveland at NASA that too much of their work is being contracted out to third parties.

Mr. O'KEEFE. Yes, sir, we certainly will.

[The material requested for the record by Chairman Voinovich follows:]

INFORMATION SUBMITTED BY MR. O'KEEFE FOR THE RECORD

From early on in its existence, NASA has contracted with the private sector for most of the products and services it uses. Most of the Agency's funding is dispersed widely in the national economy through contracts, grants, and other agreements. Through these expenditures, NASA acquires a variety of scientific, technical, and support services for the civilian aeronautics and space programs. Over the last ten years, the agency-wide ratio of civil servant to contractor has been stable. What has occurred over that time has been the incremental rebalancing of capabilities in the civil service and contractor workforce. NASA has strengthened its in-house core capabilities while contracting out for increasingly available commercial services in a competitive environment, because we found that it is more efficient to contract for those services on an as-needed basis. NASA's limited in-house resources are focused on core mission related activities where possible, leaving routine operations and services for providers in the private sector. This rebalancing was completely accomplished through retraining, reassignment, and attrition.

For example, NASA has implemented large-scale outsourcing of information technology over the last several years as the capabilities of commercial IT service providers have outstripped government capabilities. Specifically, the Outsourcing Desktop Initiative for NASA (ODIN) allowed NASA to focus its limited resources on its core mission. ODIN is a master contract awarded in June 1998 covering headquarters and all the NASA centers. Prior to ODIN, NASA had civil servants and multiple contractors who were responsible for providing administration and support for the Agency's computer and telecommunications systems. The Agency also was responsible for the maintenance and replacement of its approximately 38,000 desk-

top computers; 2,500 servers; and 51,000 phones. With the award of ODIN, the Agency was able to turn all this over to three contractors, each of which is responsible for certain NASA centers and headquarters. This resulted in NASA being able to focus its civil servants on core mission related activities; to provide services to all customers regardless of platform; and to provide consistent and predictable technology refreshment for desktops, while reducing costs and improving cost management and cost containment since the monthly cost per seat is known and the price does not change. Another example of smaller proportions is the Wallops Sounding Rocket Program and Range Operations that was contracted out in 1996. Again, NASA was able to focus its civil servants on core mission related activities while routine operation of sounding rockets and ranges was transferred to contractors.

The actions described above encompass the major activities that had been performed by the Agency and that were transferred to the contractor community in the last several years, even though several thousand civil service jobs were redirected as a result of contract consolidations, which improved Agency efficiency. The Space Flight Operations Contract (SFOC) is probably the prime example of where the Agency utilized contract consolidations to generate savings on one of its major complex technical programs. Prior to 1996, NASA embarked on a series of cost reduction activities to significantly decrease the cost of space flight operations. During this phase, emphasis was placed on consolidation, synergy and productivity improvements within functional areas, and "working smarter" by eliminating low priority products or processes. The next logical step in this process was the SFOC. This contract, which was awarded in 1996, consolidated shuttle operations performed under 12 contracts under this single prime contract. Subsequently, an additional 8 contracts were consolidated into the SFOC.

Additionally, since 1992, NASA eliminated several thousand civil service positions during the downsizing of the workforce, which was a major Federal initiative at that time. NASA accomplished its downsizing through voluntary attrition; there was no associated reduction-in-force.

Senator VOINOVICH. And I am saying to you that if the word gets out around the country that you may go to work for the Federal Government but the work may be outsourced, why bother to go to work for NASA? Why not find a contractor that you probably think will be around for a while and go to work for them and not bother with NASA? You may be competing against yourself in that situation. I would be interested in getting some information back from you on that.

Mr. O'KEEFE. Yes, sir.

Senator VOINOVICH. I am familiar with the legislation, the things that you are promoting. I can assure you that we will be getting the bill introduced. I will be trying to get as many co-sponsors as I can for it. I have been working with the House to try and make sure that they will be willing to move this ahead of some of the other legislation.

We do know we have a human capital problem throughout the Federal Government. We have solved part of it with the amendments to the Homeland Security Act. There is a lot more that needs to be done. The Defense Department is going to be coming in and asking for some more flexibilities. But I think that your situation commands a high priority from us and we ought to move it forward.

Mr. O'KEEFE. I am grateful to you, Mr. Chairman. Thank you.

Senator VOINOVICH. Senator Carper is here. Senator, have you had a chance to vote yet?

Senator CARPER. I have not. I thought we might vote together.

Senator VOINOVICH. I do not have any further comments. Senator Carper, would you like to ask the Administrator a question or two before we go to vote together?

Senator CARPER. Will the hearing adjourn when we go to vote? Is that correct?

Senator VOINOVICH. Yes, it will, unless you want to come back.

Senator CARPER. Let me just say to Mr. O'Keefe, thank you for being here and thank you for your stewardship. We know it has been a tough time for you and for the team that you lead.

My staff has been here. I am sorry that I could not be here earlier. And as we walk over to the Floor, I will be chatting with our Chairman to get the gist of what transpired here.

But I just want you to know that you and the NASA family have been in our thoughts and certainly in our prayers.

Mr. O'KEEFE. Thank you, Senator. You are most kind. We appreciate it. It is a pleasure to see you, too, sir.

Senator VOINOVICH. Before I adjourn the hearing, I want to again thank you for being here today, along with your team.

I would like to indicate that the record is going to remain open until 5 p.m. tomorrow so that my colleagues may submit statements. And also to give them an opportunity to raise questions that will be submitted to you, Mr. O'Keefe.

Again, thank you very much. The hearing is adjourned.

[Whereupon, at 10:43 a.m., the Subcommittee was adjourned.]

APPENDIX

PREPARED STATEMENT OF CONGRESSMAN BOEHLERT (R–NY), CHAIRMAN, COMMITTEE ON SCIENCE

I greatly appreciate your allowing me to appear before you today to discuss the personnel problems facing NASA and how we might address them. As you well know, this issue has been of concern for many years, but is now receiving more attention from all of us because of the tragic loss of the Space Shuttle *Columbia.*

I wanted to come before you today because I think that reform of NASA's workforce policies could be one of the positive changes to result from the demise of STS–107. That is not to say, of course, that different personnel policies would have prevented the loss of the Shuttle. But anything we can do to strengthen NASA as an agency will be valuable at this critical time. In the end, organizations, including Federal agencies, can only be as good as the people they comprise.

That NASA needs to do more to recruit and retain the best people is hardly a secret, nor is it an attack on the current workforce. One of the greatest problems NASA faces is a huge retirement bulge. Within five years, a quarter of the NASA workforce will be eligible to retire. The most recent General Accounting Office (GAO) report on NASA, issued just this past January, noted, "The agency still need[s] to deal with critical losses due to retirements in coming years." This conclusion built on numerous past GAO reports that concluded that NASA had to do more to address its workforce needs.

Now, NASA is not the only agency facing workforce issues, in general, or issues involving its scientific and engineering workforce in particular. But NASA's needs are especially critical. I don't believe we have to wait for massive, wholesale reform of civil service law to take care of NASA's immediate problems. Indeed, there's precedent for helping individual agencies solve their problems. In the 1980's, the Science Committee, working with the civil service committees, got enacted civil service reforms exclusively to help what was then the National Bureau of Standards recruit and retain top scientists.

And there's another reason not to wait for broader reform to help NASA. The changes NASA needs do not amount to any kind of startling break from the existing legal structure. The changes expand or revise existing legal authority in ways that should not raise undue concern.

With this in mind, I commend to you the package of reforms the Science Committee majority negotiated with NASA. These reforms are incorporated in H.R. 1085, which I introduced yesterday. We plan to have a hearing on the bill next Wednesday, and would like to move it before the April recess. At our NASA budget hearing last week, Members on both sides of the aisle expressed interest in passing workforce legislation, and I'm hopeful we'll be able to build consensus for H.R. 1085. With your permission, I'd like to submit the bill for the record.

As I've said, H.R. 1085 builds on existing law. It allows NASA, for example, to offer larger recruitment and retention bonuses than are permitted currently, and to offer bonuses to employees shifting between Federal jobs without relocating. But the language we use parallels existing law and Office of Personnel Management (OPM) regulations.

You'll be pleased to hear that I won't go through all the provisions of H.R. 1085 here, although it's a relatively short bill. I do want to point out, though, that we were very careful to give NASA only temporary authority so that Congress could evaluate the reforms before they became permanent. We also require a plan from NASA before the reforms are in place so that both the Congress and NASA's employees can understand how this new authority will be used. And many of NASA's actions will still require OPM review.

NASA proposed some reforms that we rejected. Most notably we were unwilling to let NASA decide on its own to make permanent any large-scale personnel dem-

onstration projects. And we were unwilling to let NASA run exchange programs in which industry employees would act as NASA staff while being paid by their home companies. Whatever the advantage of such exchanges, that authority seemed like it raised too many conflict-of-interest concerns.

So we think we've taken a cautious, balanced approach to solving some real problems. Working off NASA's own recommendations, we've expanded the utility of current law without throwing the existing system overboard and without abdicating our oversight responsibilities.

We look forward to working with your Committee and with Chairman Davis in the House to come up with a package of reforms that will make NASA stronger without making the civil service system weaker. Thank you.

PREPARED STATEMENT OF SEAN O'KEEFE, ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

I am pleased to appear before the Subcommittee today to discuss NASA's Human Capital challenges. The Agency faces a number of strategic obstacles to our ability to manage our Human Capital effectively and efficiently. The President forwarded legislation to Congress last May to provide our managers the tools they need to reshape and reconstitute a capable world class workforce. We've worked with Chairman Sherwood Boehlert of the House Science Committee to reinvigorate legislative solutions to address our workforce issues, and we appreciate the hard work of Mr. Boehlert and his staff. Mr. Chairman, I know that you are a firm believer that reforms are needed to enable Federal managers to manage their human capital more strategically, and have supported designing flexible tools to make the Federal service desirable. I welcome this opportunity to work with you in these endeavors. We were similarly gratified that the Homeland Security Act included several government-wide human capital provisions, including several that NASA had on its legislative agenda forwarded by the Administration last summer. This is a step in the right direction.

When President Eisenhower and the Congress created NASA. they sought to establish a government agency that could undertake and overcome the Nation's technological challenges in aeronautics and space exploration. Without NASA, there would be no American presence to take up these challenges. During the Cold War, the very best minds of our Nation joined forces to transform the futuristic dreams of our parents' generation into the historic reality our children learn about in today's classrooms. The legacy of that work continues today. Across the Nation, NASA scientists, engineers, researchers, and technicians have made and continue to make remarkable discoveries and advancements that touch the lives of every American. We are an Agency committed to "pioneering the future" as only NASA can.

In the wake of the Columbia tragedy, much has been written and discussed in the public debate about the prospect of future expertise at NASA. One of the greatest challenges before the Agency today is having the people—the human capital—available to forge ahead and make the future breakthroughs tomorrow's everyday reality. NASA's history is celebrated worldwide for having accomplished the things that no one has ever done before. None of those achievements happened by accident. They were the result of management innovation, revolutionary technologies and solid science and research. These three pillars of NASA's achievement were built by the men and women of NASA and without them, the history of achievement that we celebrate in aeronautics and space exploration never would have been possible. History is made everyday at NASA; but to maintain our leadership position, a new generation must be forged to carry our Nation's innovation and exploration forward.

The legislation we will forward to the 108th Congress will be the same as that which the President submitted last year, with the possible inclusion of additional provisions recently developed, and is intended to provide us the flexible management tools to make sure NASA can continue to attract and retain the best and brightest minds and to reconfigure and reconstitute that workforce to meet the changing demands of that future innovation and exploration. The list of tools includes:

To recruit new talent:

Scholarship-for-Service Program
Enhanced recruitment bonuses

- Remove limitation to 25% of base pay for only one year and include locality pay

- Allow more than one method of payment (lump sum). E.g., installments pegged to continued performance.

In addition, Streamlined Hiring Authority has been provided on a government-wide basis by section 1312 of the Homeland Security Act (P.L. 107–296):

- direct hiring for positions in "critical needs" or "severe shortage" categories, and
- category rating system for evaluating candidates (for any position)—able to select from top group, not limited to top three or numerical ratings

To retain existing talent, attract short-term mid-level talent:

1. NASA-Industry Exchange Program
2. Allow extension of IPA Assignments from 4 to 6 years
3. Term Appointments
   - Allow extension of term appointments from 4 up to 6 years
   - Allow conversion to permanent without second round of competition if competitively selected for term appointment

Many NASA projects run more than 4 years and would benefit for retention of these individuals for the duration of the project.

4. Enhanced relocation and retention bonuses
   - Remove limitation to 25% of base pay for only one year and include locality pay
   - Allow more than one method of payment (lump sum). E.g., installments pegged to continued performance.

5. Allow increase maximum annual pay for NASA excepted service appointments from $134,000 to $142,500
6. Allow increased pay for critical positions to level of the Vice President.

To try other new, quicker and more effective tools:

Modify current law to allow NASA to request and implement a demonstration project, subject to OPM approval, quicker and without any limitation on the number of employees that would be covered by the project.

I note with appreciation to you, Mr. Chairman, that several of these proposals were enacted into law last year as part of your amendment to the Homeland Security Act.

- In addition, we are working with the Administration on further legislative tools, such as enhanced annual leave, that may be forwarded later this session.

The reduction in NASA's workforce during the 1990's has led to an imbalance of skills; too may in some areas not enough in emerging technologies (e.g., nanotechnology). In addition, NASA is confronted with convergence of three trends:

1. reduction in number of science and engineering graduates;
2. increased competition from traditional aerospace sector and non-aerospace sector for this reduced pool of scientists and engineers; and
3. increasing number of experienced NASA employees eligible for retirement.

NASA needs to have better tools to recruit new hires, retain existing mid-level workforce, and reconfigure the workforce to meet emerging needs.

Vision And Mission

When I assumed the leadership of NASA a little over a year ago, I wanted to ensure that this pathfinder Agency had the means and mission to support that pioneering spirit through the next several decades. NASA has a vital role to play in today's world. My testimony today will touch on the management challenges that NASA must overcome if we are to achieve our mission. NASA is intent on continuing the gains made over 45 years while pushing the edge of the envelope of what appears today to be impossible. We have developed a roadmap to continue our work in a more efficient, collaborative manner. NASA will fulfill its imperative not only for the sake of human knowledge—but also for our future and our security.

In that spirit, we developed a new strategic framework and vision for the Agency. It is a blueprint for the future of exploration and a roadmap for achievement that we hope will improve the lives of everyone in this country and everyone on this planet. Our new vision is to improve life here, to extend life to there, and to find life beyond. This vision frames all that we do and how we do it. NASA will do this by implementing our mission—to understand and protect our home planet; to ex-

plore the Universe and search for life; to inspire the next generation of explorers . . . as only NASA can.

To understand and protect our home planet, NASA will work to develop and employ the technologies that will make our Nation and society a better place. We will work to develop technology to help forecast the impact of storms on one continent upon the crop production on another; we will work to trace and predict the patterns of mosquito-borne diseases, and study climate, geography and the environment—all in an effort to understand the multiple systems of our planet and our impact upon it.

Our mission's second theme is to explore the universe and search for life. NASA will seek to develop the advanced technologies, robotics, and science that eventually will enable us to explore and seek firsthand the answers and the science behind our most fundamental inquiries. If we are to achieve such ambitious objectives, there is much we still must learn and many technical challenges that must be conquered.

For example, today's rockets that have been the engine of exploration since the inception of space travel are today at the limit of what they can deliver. Propulsion is only one of the challenges facing further exploration of space. The physical challenges incurred by our space explorers also must be better defined. We still do not know or understand the long-term effects of radiation and exposure to a microgravity environment upon the human body. The infant steps we have taken via the Space Shuttle and the International Space Station have given us many answers to explore, but they have yielded even more questions for us to consider.

Our third mission objective is to inspire the next generation of explorers. America often looks to NASA to help our Nation build an unequalled pool of scientific and technical talent. NASA accepts that responsibility and in partnership with the U.S. Department of Education, the National Science Foundation, other Federal agencies, and industry and educational partners, we will work to motivate our Nation's youth to embrace the study of mathematics, science and engineering disciplines. To emphasize the important role that education plays at NASA, last year we established a new Education Enterprise. The Education Enterprise will unify the educational programs in NASA's other five enterprises and at our 10 Field Centers under a One NASA Education vision. NASA's Education imperative will permeate and be embedded within all the Agency's initiatives. The dedicated people in this new Enterprise will work to inspire more students to pursue the study of science, technology, engineering, and mathematics, and ultimately to choose careers in aeronautics and space-related fields. Without the scholars to take the study of these disciplines to their next level, the missions we seek to lead remain bound to the launch pad. As the U.S. Department of Labor has reported, the opportunities in the technology sector are expected to quadruple in this decade. Unfortunately, the pool of college students enrolled in mathematics, science and engineering courses continues to decline. NASA faces similar challenges with having the scientific and engineering workforce necessary to fulfill its missions.

Our mission statement concludes with the statement, "as only NASA can." Our Agency is one of the Nation's leading research and technology Federal agencies. We possess some of our Nation's most unique tools, capabilities and expertise. NASA represents a National asset and investment unparalleled in the world. Nonetheless, to achieve success in our mission, our activities must focus on those areas where NASA can make unique contributions. To make the best use of our workforce and other resources, we must also leverage the unique contributions of our partners in academia, industry, and other Federal agencies.

Our commitment to the American taxpayer is to continue providing a direct and very tangible means of improving life on our planet. We will overcome challenges and push on in the name of science and in the pursuit of knowledge to benefit all people. Extending life beyond the reaches of our Earth is not a process driven by any particular destination. Rather it is driven by science that will contribute to the social, economic, and intellectual growth of our society and the people who make that science possible are our greatest asset.

Workforce Challenges

NASA's ability to fulfill its ambitious mission is dependent on the quality of its workforce. An Agency is only as strong as its people. They need to be world-class if they are to be expected to break new ground in science and technology, explore the universe, or pioneer exciting discoveries here on Earth and beyond. Being "good enough" will not suffice; NASA needs the best and the brightest to build a world-class workforce. This means that NASA requires not only a broad pool of scientists and engineers who form the core of our workforce, but also highly competent professionals who can support NASA's technical programs, and address the Agency's fi-

nancial, human capital, acquisition, business management, and equal opportunity challenges.

Today, NASA faces an increasing management challenge in attracting, hiring, and retaining the talented men and women who, inspired by our amazing discoveries and innovations of the past 4 decades, will help mold the future of our Nation's aeronautics and space programs. As a Nation, we must ensure that the Agency continues to have the scientific and technical expertise necessary to preserve our role as the world's leader in aeronautics, space and Earth science, and emerging technology research. The President already has indicated his commitment to the strategic management of human capital in the Federal workforce, by making this imperative, first on in his Management Agenda. In fact, the resident's Management Agenda specifically references the human capital challenge that NASA faces and related skill imbalances. The President's recognition of the human capital challenges faced by NASA and other agencies is shared by the Government Accounting Office, which has placed the management of human capital as one of the items on the government-wide "high-risk list."

At NASA, we are ready to do our part to make sure that we have the best people for the job at hand, and to do that we need to manage this resource efficiently and responsibly, as well as compete favorably in a very competitive market place. We have developed a Strategic Human Capital Plan to establish a systematic, Agency-wide approach to human capital management, aligned with our vision and mission. The Plan assesses NASA's current state with respect to human capital management, then goes on to identify goals, barriers, improvement initiatives, and intended outcomes. The Plan is an integrated approach to address the concerns of the Administration as well as our internal human capital needs. We are making progress, as evidenced by our improved ratings on the President's Management Scorecard.

NASA's ability to implement its mission in science, technology, and exploration depends on our ability to reconfigure and reconstitute a world-class workforce—peopled with skilled workers who are representative of our Nation's strengths. The human capital flexibilities that we are requesting will help us shape the workforce necessary to implement our mission today and in the future.

Today, NASA's ability to maintain a world-class workforce with the talent it needs to perform cutting-edge work is threatened by several converging trends. Each trend in isolation is a concern; in concert, the indicators are alarming. We need to address these trends now by anticipating and mitigating their impact on NASA's workforce in the near-term and beyond. These indicators could lead to a severe workforce crisis if we do not take prompt action. The warning signs are here, and we are paying attention. Many of our planned actions to deal with threats to our human capital are possible without the aid of Congress; but some of the solutions require legislation. We are proposing a number of human capital provisions, which the Administration believes are crucial steps toward averting a workforce crisis.

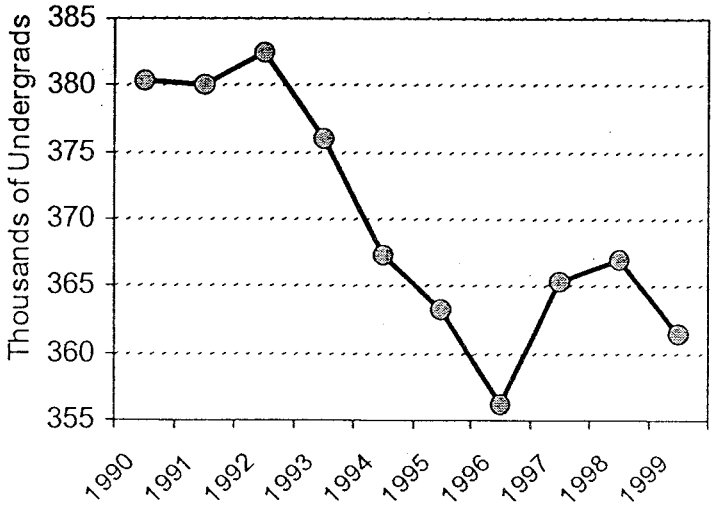
The trends I'd like to discuss with you today fall into two broad categories. First, there are trends that affect the nationwide labor market, and the applicant pool from which we draw our workers. These indicators affect other employers, not just NASA, and point to worsening employee pipeline issues in the future. Secondly, I would like to address a number of NASA—specific demographics. Coupled with the nationwide issues we face, the NASA picture shows us that we need to take action and take it now.

Nationwide Trends

The Shrinking Scientist and Engineer (S&E) Pipeline

There is growing evidence that the pipeline for tomorrow's scientists and engineers is shrinking. We are facing a critical shortage of students pursuing degrees in disciplines of critical importance to NASA—science, mathematics, and engineering. Several recent National Science Foundation reports document a disturbing trend: the science and engineering (S&E) pipeline has been shrinking over the past decade. This trend begins at the undergraduate level and extends through the ranks of doctoral candidates. Here are some statistics that illustrate what currently is happening to the S&E pipeline:

- Undergraduate Engineering Enrollment—The number of students enrolling in *undergraduate* engineering decreased by more than 20% between 1983 and 1999. [*National Science Board, Science and Engineering Indicators-2002, Arlington, VA: National Science Foundation, 2002 (NSB–02–01)*]



Undergraduate Engineering Enrollment Trend

- Graduate S&E Enrollment—Engineering *graduate* enrollment also declined from a high in 1992 of 128,854 to 105,006 in 1999. Graduate enrollment in the physical sciences, earth sciences, and mathematics also showed a downturn between 1993 and 2000. [*National Science Foundation Data Brief. Growth Continued in 2000 in Graduate Enrollment in Science and Engineering Fields (NSF–02–306), December 21, 2001)*]
- Post-Graduate S&E Enrollment—By the year 2000, the number of doctorates awarded annually in engineering had declined by 15% from its mid-decade peak; since 1994, the number of doctorates in physics declined by 22%. Even in mathematics and computer science—where job opportunities are on the rise—the number of doctorates awarded declined in 1999 and 2000. [*National Science Foundation Info Brief. Declines in U.S. Doctorate Awards in Physics and Engineering (NSF–02–316), April 2002*]
- Foreign S&E Enrollment—40% of the graduate students in America's engineering, mathematics, and computer science programs are foreign nationals. In the natural sciences, the number of non-citizens is nearly 1 in 4. When we concentrate on engineering graduate students who are U.S. citizens, the number of enrollees declined precipitously between 1993 and 1999: from more than 77,000 to just over 60,000, a 23% drop in under a decade. [*National Science Board, Science and Engineering Indicators-2002, Arlington, VA: National Science Foundation, 2002 (NSB–02–01)*]
- Aerospace Enrollment—Graduate enrollment in aerospace engineering has declined steadily in recent years—from 4,036 in 1992 to 3,407 in 2000, pointing to a diminishing interest in aerospace as a career. [*National Science Board, Science and Engineering Indicators-2002, Arlington, VA: National Science Foundation, 2002 (NSB–02–01) and National Science Foundation Data Brief. Growth Continued in 2000 in Graduate Enrollment in Science and Engineering Fields (NSF–02–306), December 21, 2001)*]

NASA is not alone in its search for enthusiastic, qualified employees representative of the best that our Nation has to offer. Throughout the Federal Government, as well as the private sector, the challenge faced by a lack of scientists and engineers is real and is growing by the day. The situation is summarized in the Hart-Rudman Commission's Final Report issued last year: "The harsh fact is that the US need for the highest quality human capital in science, mathematics, and engineering is not being met."

The nationwide trends I have described have great significance to NASA since the Agency relies on a highly educated and broad science and engineering workforce: nearly 60% of the total NASA workforce is S&E, and fully half of those employees have Masters or Doctorate degrees.

Increased Competition for Technical Skills

At the same time that the national S&E pipeline is shrinking, *the demand for the technical skills NASA needs is increasing.* The job market in the S&E occupations is projected to increase dramatically over the next ten years. The need for technical expertise no longer is confined to the technical industries that have been traditional competitors. NASA will face competition from new arenas as graduates in the S&E fields now are sought after by the banking industry, entertainment industry, and elsewhere in career fields not traditionally considered as primary choices for technical graduates. In the academic sector, traditionally not a competitor, we find ourselves vying for the same high-level technical workers. America's top schools now offer very competitive salaries to academicians with world-class skills—the same skills NASA seeks. Specifically, here are some of the trends that the Nation is seeing in the job market:

- Increasing S&E Positions—The Bureau of Labor Statistics projects that employment in the fields of science and engineering is expected to increase about 3 times faster than the rate for all occupations between 2000 and 2010, mostly in computer-related occupations. Increases in engineering and the physical sciences are projected at 20% and 15%, respectively. [*National Science Board. Science and Engineering Indicators-20G2, Arlington. VA: National Science Foundation, 2002 (NSB–02–01)*]
- Increasing S&E Retirements—This report also notes that with current retirement patterns, the total number of retirements among S&E-degreed workers will increase dramatically over the next 20 years. More than half of S&E-degreed workers are age 40 or older, and the 40–44 age group is nearly 4 times as large as the 60–64 age group. As employers seek to fill vacancies created by these retirements, *competition for quality S&E workers will intensify.*
- Low Interest in Government Employment—According to an October 2001 Hart-Teeter poll, the lowest levels of interest in government employment were found among college-educated and professional workers. Only 16% of college-educated workers express significant interest in working for the Federal Government, and a like number of professionals and managers would opt for a government job. In contrast, the poll also revealed that positive perceptions of private sector work increased dramatically among those with formal education. This indicates that NASA will face a significant challenge in trying to attract experienced mid and senior level professionals to the Agency.

NASA Demographics and Trends

Current Skills Imbalances, Gaps, and Lack of Depth Within the NASA Workforce

The trends I have just outlined are not unique to NASA; we share them with other employers in the labor market today. Unfortunately, the difficulties they present to NASA's ability to manage our human capital are only exacerbated by several Agency-specific threats, warning us that we need to pay attention to these indicators before they result in a crisis. The challenge of acquiring and retaining the right workforce is not a problem of the future—it exists now. The Agency currently has skill gaps in areas such as nanotechnology, systems engineering, propulsion systems, advanced engineering technology, and information technology. In emerging technology areas, NASA projects the need to employ more civil servants in "hard to fill" areas such as astrobiology, robotics, and fundamental space biology. In other professional areas such as financial management, acquisition, and project management, a lack of depth is becoming detrimental to our ability to manage our resources and programs.

NASA has undergone significant downsizing over the past decade, reducing its workforce from approximately 25,000 civil servants in FY 1993 to approximately 19,000 today. NASA made every effort to retain key skills, but in order to avoid involuntary separations in achieving those reductions, it was not always possible to control the nature of the attrition. Inevitably, we lost some individuals with skills we couldn't afford to lose, and now these skills need to be replaced. Through downsizing and the normal attrition process, we lost key areas of our institutional knowledge base.

The 2001 report of the Aerospace Safety Advisory Panel made specific references to NASA's skills deficiencies when they noted the following:

- NASA faces a critical skills challenge in the Shuttle and International Space Station programs despite resumption of active recruitment.

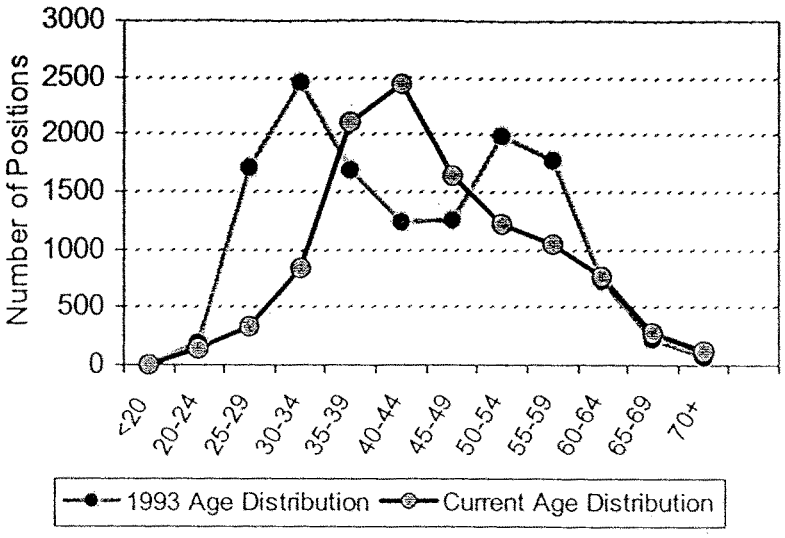
- The Agency must ensure the availability of critical skills, using appropriate incentives when necessary to recruit and retain employees.
- Recent downsizing and hiring limitations by the Agency may cause a future shortage of experienced leadership.
- The shortage of experienced, highly skilled workers has contributed to increases in workforce stress.

Unfortunately, NASA's need to reinvigorate the workforce with the right skills and abilities is occurring at the very time in which competition for workers with those skills is intense.

Potential Significant Loss of Knowledge Due to Retirements within the S&E Workforce

I have just discussed the skills imbalances that NASA faces today. The situation promises to worsen with time. New skills imbalances will occur over the next several years as the aging workforce reaches retirement eligibility. Approximately 15% of NASA's S&E employees are eligible to retire now. Within 5 years, almost 25% of the current workforce will be eligible to retire. Historical attrition patterns suggest that the percentage of those eligible for retirement should remain level at around 15–16% each year. In an Agency where the expertise is not as deep as we would like it to be, even a few retirements can be critical. Everywhere I go across the NASA Centers, I hear the same story: "We're only one-deep. We can't afford to lose that skill." Clearly the Agency must begin preparing for its projected workforce needs now since a quarter of its senior engineers and scientists will depart this decade and the job market is far more competitive than in the past.

Another way to look at the potential loss of knowledge is to examine NASA's current S&E profile. At this time, within the S&E workforce, NASA's over-60 population outnumbers its under-30 population by nearly 3 to 1. The age contrast is even more dramatic at some NASA Centers, at 5 to 1I! By comparison, in 1993 the under-30 S&E workforce was nearly double the number of over-60 workers. This is an alarming trend that demands our immediate attention with decisive action if we are to preserve NASA's aeronautics and space capabilities.



Increased Recruitment and Retention Problems

The last NASA trend I want to discuss with you today involves the evidence of increased difficulty of recruiting and retaining employees. Historically, NASA has enjoyed unusually low attrition rates, due in part to the attraction of our unique mission and the fact that our employees simply love their work and stay on the job longer than the typical worker. However, one recent trend is of concern. We have noted a change in the attrition pattern among NASA's most recent hires. Compared to an overall attrition rate of just under 4% for all S&E's, the departure rate for

S&E's hired since 1993 is nearly double—despite the fact that in the fall of 2000 the Agency completed downsizing.

Our challenge continues once we manage to hire personnel. Although our historical attrition rates are low, we notice an alarming development among our youngest S&E population. After factoring out the 55+-retirement eligibility group, attrition among the S&E workforce is highest in the 25–39 age group. This phenomenon has a multi-faceted impact on NASA. It represents a lost investment for the Agency; shrinks the potential pool of future leaders and managers; and skews the average age of S&E workforce toward retirement eligibility age.

Help is Needed

All of these trends provide immediate warning signals that significant measures must be taken to address workforce imperatives that ultimately impact mission capability. We cannot resolve these new and emerging problems with past solutions, nor are current personnel flexibilities adequate.

To address the human capital challenges I have outlined for you today, NASA needs additional tools. We have used the ones we have and we have been innovative and imaginative but we need the Congress' assistance. Specifically, we need to:

- Encourage students to pursue careers in science and technology
- Compete successfully with the private sector to attract and retain a world-class workforce.
- Reshape the workforce to address skills imbalances and gaps, and
- Leverage outside expertise to address skills gaps and strengthen NASA's mission capability.

Each request in the legislative proposal will be carefully crafted to enhance NASA's ability to manage our human capital efficiently and effectively, in concert with the mandate of the President's Management Agenda—and plain old-fashioned good, sound management. Many of these provisions have been implemented by other agencies (such as the Department of Defense in their demonstration projects, and the Internal Revenue Service through their reform legislation). Without these legislative tools, NASA's challenges will soon become its crisis in human capital management.

Legislative Proposals

We are proposing several legislative provisions to address the threat to the S&E pipeline. The *Scholarship for Service* program would offer college scholarships to students pursuing undergraduate and graduate degrees in science, engineering, mathematics, or technology. In return, the students would fulfill a service requirement with NASA following their graduation, thus providing a return on our investment. Current statutes do not allow a service obligation for scholarship recipients.

The *NASA Industry Exchange Program*, modeled on the very successful Intergovernmental Personnel Act authority, introduces a means for NASA to engage in mutually beneficial, collaborate ventures with industry to infuse new ideas and perspectives into the Agency, develop new skills within the workforce, and strengthen mission capabilities. Without such an authority, talented individuals from industry remain an untapped resource for the Agency since the salaries and benefits of the Federal sector are not competitive with the compensation packages offered to industry's most talented workers. Assignments would be limited to 2 years, with a 2-year extension, and would be subject to the full range of Federal criminal laws in title 18, including public corruption offenses, and adhere to current statutes covering government ethics, conflicts of interest, and procurement integrity. The Information Technology Exchange Program, established in the E-Government Act of 2002, which was passed by the House during the last Congress, represents a similar endeavor to establish an exchange program between the Federal Government and the private sector in order to promote the development of expertise in information technology management, and for other purposes.

Enhancing the *Intergovernmental Personnel Act* authority to permit assignments up to 6 years (rather than 4) is another tool that will facilitate knowledge transfer—an important goal of an Agency that must sustain its intellectual capital. This flexibility will allow individuals from academia or other institutions to continue working in support of long-term projects or programs when the need for continuity is critical.

Enhanced recruitment, relocation, and retention bonuses will help us with enhanced authority to offer financial incentives to individuals to come to work for us, to relocate to take on a new assignment, or to remain with the Agency instead of leaving to pursue a more lucrative job opportunity or retiring. Current bonus authority offers up to 25% of basic pay, and has proved useful—to a point. Our pro-

posal would base bonuses on the higher locality pay salaries, allow greater amounts when coupled with longer service agreements, and make more flexible payment options available (such as a choice between up front payments, installments, and payments at the conclusion of an assignment). These payment options could be tailored to the situation at hand, and tie payment of the incentive to actual performance.

The *enhanced annual leave provisions* are targeted particularly to mid-career hires, who likely would give up attractive vacation packages to become first-time Federal employees. Rather than starting out with the minimal annual leave benefits available in current law, these provisions would permit all senior executives to accrue annual leave at the maximum rate; and permit crediting new employees with up to 10 days of annual leave as a recruitment incentive. These flexibilities help NASA to compete with the compensation packages available to private sector employers.

The *term appointment authority* is used extensively within the Agency to support many NASA programs and projects. It is useful for work of a time-limited duration, and it allows the Agency to terminate employment without adverse action when the need for the work/competencies wanes. The bill's provision to allow a limited number of term appointments to be extended up to 6 years, rather than 4, will enhance its usefulness by accommodating the length of some NASA programs and projects. In addition, the bill provides that a term employee may be converted to a permanent position in the same line of work without further competition, provided the employee was initially hired under a competitive process and the public notice specified the potential for conversion. This provision does not alter any feature or principle of the competitive process, but eliminates the need for duplicative competition. Ultimately it may make the concept of term appointments more attractive to potential applicants and thereby provide a more robust labor pool for NASA management to consider. Conversions of term employees to permanent positions that differ from the position for which the employee initially competed would require internal competition.

In order to attract world-class talent into NASA's most essential positions, we propose changes to the authority to pay employees in *critical positions.* We seek authority to grant critical pay for up to 10 positions per year, subject to approval by the NASA Administrator, with pay up to that of the Vice President (currently $198,600). These enhancements will help us compete in an enormously competitive job market. The provisions raising the annual *compensation cap for NASA excepted employees* appointed under the Space Act from Level IV of the Executive Schedule to Level III will address this need as well. Based on the current pay scale, this would allow an increase from $134,000 to $142,500.

Separation incentives (*"buyouts"*) are a valuable tool to encourage voluntary attrition as the Agency rebalances skills and reshapes its workforce. NASA needs the tools to encourage targeted attrition in areas in which the need for certain skills has diminished so that it can recruit and reshape a workforce that is aligned to current and future mission needs. The Homeland Security Act provides authority to pay up to $25,000. However, we have found that this amount is not always enough to entice highly paid NASA professionals to leave; the typical NASA employee stays on the job longer than average and is dedicated to the work. Our proposal would allow NASA to pay buyouts up to *50% of base salary* to a limited number of employees, under circumstances outlined in our Agency plan.

Finally, the *streamlined demonstration authority* provision provides the Agency with an effective and extensively tested mechanism for pursuing additional human resources innovations in response to changing workforce needs. A number of agencies, notably the Department of Defense and Department of Agriculture, have operated highly successful projects. Unfortunately, the legal requirements to initiate a demonstration project are daunting. Current law limits "demo" projects to 5,000 employees, requires multiple Federal Register notices, a public hearing, and a 180-day notice to affected employees. Once an agency successfully tests a system, it must seek additional legislation to make that system permanent. The authority we are seeking would remove the coverage limit to allow widespread testing of new ideas, and shorten the steps to implement a project. Once a project proves successful, the Office of Personnel Management could approve conversion from a demo to a permanent *alternative personnel system* without further legislation.

Mr. Chairman and Members of the Subcommittee, each of these legislative provisions when taken individually will only help NASA deal with its human capital strategic threats to a limited degree. However, when taken together as an integrated package they form a strong nucleus in support of the Agency's Strategic Human Capital Plan and the President's Management Agenda, and will be invaluable as we deal with a diminishing pipeline, recruitment and retention of a world-class work-

force, and skills imbalances. With these tools in hand, we will be able to avert a serious human capital crisis at NASA.

The missions we seek to lead and make possible are the visions that we all have for our future—new launch systems, innovations in high-performance computing, advances in biological research and exploration of our cosmos that extend our lives and way of life out there. Those things can only happen if we have the people that can make them happen. Technology and exploration will go nowhere without the human know-how and presence to make today's impossible into tomorrow's reality. After meeting and working with many of the men and women of NASA during the past year, I know we can do those things and I look forward to working with you and sharing the rewards of your investment and trust in us.

RESPONSES TO WRITTEN QUESTIONS SUBMITTED BY SEN. AKAKA FROM ADMINISTRATOR O'KEEFE

Question 1:

The National Aeronautics and Space Administration's (NASA) workforce proposals include flexibilities relating to the recruitment, compensation, and management of its workforce. One of these proposals would provide the broad authority to establish a new demonstration personnel system for the entire NASA workforce. Under current law, agencies are authorized to implement demonstration projects for up to 5,000 employees. NASA's in-house workforce currently consists of about 20,000 workers.

What type of authority would you test under this new personnel system that is not included along with your other workforce proposals?

Answer 1:

Specific proposals would be developed in collaboration with employees, unions, and managers—focusing on those flexibilities that are most needed to address NASA's human capital challenges and achieve the Agency's strategic and programmatic goals. We have learned from the positive experiences other agencies (including the Department of Defense, the National Institute of Standards and Technology, Department of Commerce, and the Department of Agriculture) have had with their demonstration projects. We may find it beneficial initially to develop proposals similar to some of the successfully tested flexibilities implemented in past and current demonstration projects, tailoring them to meet the specific workforce challenges NASA faces. We are likely to look closely at various compensation and hiring tools that have been used in those demonstration projects.

Question 2:

Last year, the General Accounting Office (GAO) completed a study on the effective use of managerial flexibilities. GAO noted that the manner in which agencies utilize these flexibilities is just as important as which flexibilities are made available. In fact, the report concluded that inefficient and ineffective use of personnel flexibilities can significantly hinder the ability of Federal agencies to recruit, hire, retain, and manage their workforce.

How will you ensure that NASA uses the additional flexibilities you have requested effectively?

Answer 2:

The GAO study provides very sound recommended practices for implementing human capital flexibilities effectively; these recommendations have served as a useful guide in our planning for the use of additional tools.

The study notes the importance of ensuring that the use of flexibilities is part of an overall human capital strategy clearly linked to an agency's program goals, along with a plan for using and funding the authorities. NASA places great importance on the need to have an effective human capital strategy. On OMB's most recent Executive Management Scorecard for strategic management of human capital, NASA was one of only six Federal agencies rated "yellow", and received an assessment of "green" in recognition of successful progress made in this area.

Our use of such flexibilities would be aligned with our human capital strategy—which is documented in our approved Strategic Human Capital Plan and its companion Strategic Human Capital Implementation Plan. These plans represent an integrated, systematic, Agency wide approach to human capital management, and identify our human capital goals, challenges, improvement initiatives and intended outcomes. In developing these plans, we identified flexibilities and authorities that the Agency may need to pursue through legislation in order to most effectively achieve our human capital goals and outcomes; they are included as an appendix

to the Implementation Plan and many of them are incorporated into S. 610, the NASA Workforce Flexibility Act of 2003.

Appropriate and successful use of new flexibilities must be based on analysis of current workforce needs. We are developing an Agency wide, integrated workforce planning and analysis system, with a competency management system component. This component will facilitate a more comprehensive identification of our workforce competency strengths and weaknesses so that we can more effectively align our workforce to the mission. The analyses generated from these tools will enable NASA to use new flexibilities in a strategic way.

The GAO report also notes the importance of streamlining and improving administrative processes for using flexibilities. NASA's actions demonstrate commitment to this objective. Over a year ago NASA launched a "Freedom to Manage" initiative to solicit ideas from the workforce for removing bureaucratic barriers and giving managers and employees more flexibility to do their jobs. Employees were encouraged to identify practices, internal regulations, government regulations, and statutes that impose needless impediments. This on-going effort has resulted in streamlining Agency procedures and delegating more authorities, wherever the changes could be effected by modifying Agency practices, policies, and regulations. In those instances in which removing impediments to effective management required changes to Federal regulations or statutes, we assessed whether such changes should be pursued. Many of the provisions in our human capital legislative package were developed through this process, in response to the input we received from the Freedom to Manage effort.

The Freedom to Manage initiative actively seeks input from the Agency workforce at all levels. Town Hall meetings have been held at all Centers to stimulate discussion and encourage suggestions. NASA created a website devoted exclusively to the Freedom to Manage initiative, with a mechanism for submitting suggestions easily and anonymously.

This effort led to other benefits. It encouraged employees at all levels to become engaged in reviewing and suggesting improvements to policies and procedures. In addition, the on-going discussions served to educate managers and employees on existing authorities and their use. These are practices the GAO study indicated are also necessary to successful implementation of human capital flexibilities. If NASA is authorized to use additional flexibilities, we will build upon these approaches in working with employees, unions, and managers in implementing changes.

Also critical to effective implementation of new flexibilities is ensuring that there are clear and equitable guidelines for using the tools—while ensuring that managers are accountable for their use. We would engage appropriate stakeholders from all Centers in developing internal policies and procedures for their use. A change management strategy, incorporating communications strategies, will be developed to ensure that the workforce understands the reasons for, and nature of, the changes. As suggested above, this dialogue has been initiated to a limited extent through the Freedom to Manage actions; many of the legislative provisions we seek were proposed through the Freedom to Manage discussions at our Centers.

Question 3:

During the 1990's, NASA underwent significant downsizing, which has contributed to overall staffing shortages. According to the Comptroller General's testimony before the House Science Committee last year, "many key areas were not sufficiently staffed by quality workers, and the remaining workforce showed signs of overwork and fatigue." Just this year, GAO reported that staffing shortages remain a concern and threaten NASA's operational safety and effectiveness.

Would you recommend increasing overall in-house staff levels at NASA, and if not, why?

Answer 3:

In 1999 the Agency conducted a NASA-wide Core Capability Assessment, a center-by-center analysis to identify workforce and infrastructure requirements. One of the objectives of the review was to help chart a strategy that would provide the OSF Centers with the requisite flexibility to attract and retain the critical skills necessary to ensure safe mission and program success. Over the past few years, the OSF Centers have been able to hire additional personnel to fill some of those critical areas. Additional personnel may be required if the Columbia Accident Investigation Board recommends new Shuttle program requirements.

Question 4:

Staffing levels and contractor oversight has been a concern at NASA for sometime. In 1995, your predecessor, Dan Goldin, stated that NASA staffing levels were the same as they were in 1961. GAO reported this year that staffing shortages

threaten NASA's operational safety and that NASA does not have the processes and mechanisms in place to oversee contracted operations.

Do you believe NASA has the staffing levels required to inspect and oversee the operations of its contractor workforce effectively?

Answer 4:

We have a complement of skilled and dedicated civil servants and contractors who are fully able to perform the work required to ensure the continued safety and viability of our space program. Additional personnel may be required if the Columbia Accident Investigation Board recommends new Shuttle program requirements.

Question 5:

On February 3, 2003, a NASA spokesman said that findings from the Rand Corporation report entitled Alternate Trajectories: Options for Competitive Sourcing of the Space Shuttle Program would be considered only after the investigation into the Columbia disaster was complete. Competitive sourcing is not a NASA-only objective, but part of the President's Management Agenda and NASA progress with meeting the milestones in the agenda is determined by Office of Management and Budget (OMB). According to the Management Agenda, the administration will, identify mismanaged, wasteful, or duplicative government programs, with an eye to cutting their funding, redesigning them, or eliminating them altogether NASA received a green light on progress made for competitive sourcing but received a red for overall status.

Answer 5:

As of this date, NASA has exercised a 2-year extension option to the current Space Flight Operations Contract (SFOC), which carries the contract through October 2004. NASA's FY 2004 budget does not provide for "privatization alternatives," but rather assumes continued exploration of alternatives for competitive sourcing of Space Shuttle flight operations. Further examination of Shuttle competitive sourcing options is being held in abeyance until the Gehman Board recommendations are received and assessed. It would be premature for NASA to propose any detailed plans for Shuttle competitive sourcing prior to receipt of the Columbia Accident Investigation Board conclusions.

Question 6:

Do you believe that a delay in implementing a long-term outsourcing plan will hurt NASA's future OMB rating, thus leading to budget cuts in the coming years? Have you received assurances from OMB that any delays in competitive sourcing policies would not be held against NASA?

Answer 6:

A delay in incorporating the Space Shuttle in NASA's competitive sourcing plan is unlikely to be held against the agency. Even without the Space Shuttle, NASA has already developed an interim competitive sourcing plan that achieves the President's government-wide, 15 percent, near-term competitive sourcing goal. And NASA's final competitive sourcing plan to achieve the government-wide, 40 percent, long-term competitive sourcing goal is under development.

Question 7:

Once NASA decides on a competitive sourcing option and begins to move more jobs to the private sector, what do you believe will be the key metric used by OMB to determine success? Do you believe it will be the number of jobs moved, overall financial savings, or increased safety?

Answer 7:

It is not clear at this time that the Space Shuttle competitive sourcing decision will move more jobs to the private sector. It is still early in the process and NASA intends to move cautiously and prudently in developing a Space Shuttle competitive sourcing plan. A key metric used by NASA and OMB to measure success is not the number of jobs moved but the number of jobs exposed to competition. The competitive sourcing initiative is not about downsizing or outsourcing but about exposing the government's commercial activities to competition in order to cause the government to operate more effectively and efficiently. Safety is of paramount concern to NASA and has been and will be the most important consideration in the development of any competitive sourcing plan for the Shuttle program. However, it is important to note that Space Shuttle contractors have no less incentive than the civil servant workforce for ensuring safe Shuttle flight operations.

Question 8:

The RAND Corporation's 2002 report on options for competitive sources of the Space Shuttle Program proposed a three-key safety process whereby the launch of

a space shuttle could not take place without the concurrence of NASA, an Independent Safety Assurance Office, and the contractor.

How will you ensure that NASA maintains the expertise necessary for proper oversight if more operational responsibilities are shifted to private contractors? Will NASA be an informed party to a three-key safety process?

Answer 8:

The idea of an Independent Safety Assurance Office was a concept proposed by the RAND-led Task Force, should NASA decide to further reduce our role in Shuttle operations. NASA currently accomplishes the independent safety assurance function through the Office of Safety and Mission Assurance, and recognizes the importance of maintaining an independent safety assurance function for the future. Should there be a decision in the future to shift more operational responsibilities to private contractors, one of the key factors for developing such a plan will be to assure that there is sufficient expertise to fulfill the oversight role. NASA is still evaluating the best course of action to take for the future of the Shuttle Program and has not made any final decisions in this regard.

Question 9:

Making the Independent Safety Assurance Office a partner in a three-key safety process shows the importance that independent assessment plays in terms of ensuring safety, free of either launch pressures or concerns of profitability. Indeed, an Independent Safety Assurance Office would provide an added dimension to shuttle safety, provide oversight of both NASA and contractor safety practices, and help design practices to continually improve shuttle safety.

Is there room in the NASA budget for such an office?

Answer 9:

The NASA Office of Safety and Mission Assurance was structured to provide just such an independent safety assurance function. This organization is headed by the Associate Administrator for Safety and Mission Assurance, who reports directly to the NASA Administrator. The Associate Administrator for Safety and Mission Assurance is free of both launch schedule and Program budgetary pressures, and participates directly in the review and concurrence process for each Shuttle launch.

Question 10:

In addition to the four outsourcing options and two privatization options noted in the RAND report, RAND also examined using a national Space Authority to ensure safety in the Space Shuttle Program while moving ahead with management reform. In its report, RAND stated, "an authority typically is established in circumstances where inherent barriers to competition, or other flaws in the market setting make the ideal of purely commercial supply unachievable." For example, authorities are seen in municipal or regional transportation entities and finance and service industries. Often an authority is viewed as a pseudo-governmental institution as a result its creation might be construed as a step backwards from the notion of competitive sourcing.

Are you considering this option even though it may conflict with the President's Management Agenda?

Answer 10:

The RAND-led Task Force offered a broad array of possible organizational structures to accomplish Shuttle competitive sourcing. The report indicates that the concept of a Space Authority would be the most challenging to implement. NASA has reviewed the findings and recommendations of the RAND report along with other studies and reports, which have also addressed this subject. In addition, we anticipate that the Columbia Accident Investigation Board may also offer findings and recommendations on how NASA should structure the future of the Shuttle Program. NASA will consider all of this data and information as it formulates planning for the future operation of the Space Shuttle Program in coordination with the Administration and Congress.

RESPONSES TO WRITTEN QUESTIONS SUBMITTED BY SEN. CARPER FROM ADMINISTRATOR O'KEEFE

Question 1:

In your legislative proposal, you ask for increased authority to hire certain kinds of workers on a temporary basis without going through the competitive hiring process laid out in current law. As you know, Congress, through the Homeland Security Act, gave Federal managers government-wide the option of abandoning current competitive hiring procedures in favor of a categorical hiring system. This system has

been tested at the Department of Agriculture and has allowed managers to make new hires quicker than they can under the current system. Does NASA plan to make use of the new hiring authority granted them under the Homeland Security Act? How? Finally, how is this new authority inadequate in meeting NASA's hiring needs?

Answer 1:

NASA has been very supportive of the concept of a category rating system as an approach that streamlines the hiring process while preserving veterans' preference. We certainly will use this methodology and we are assessing the changes that need to be made in our automated staffing system and our internal regulations to use it effectively.

Although the category rating approach represents a valuable flexibility in the hiring process, additional tools are needed to address specific workforce issues facing NASA. The proposals regarding *term appointments* and the *Distinguished Scholar Appointment Authority* illustrate this point.

Term Appointment Authority

Many of NASA's scientific and technical projects are of limited duration (e.g., 3–6 years), so the Agency may hire term employees for the anticipated time of the project. These term employees are hired under the same rules and procedures of competition as permanent employees. However, term employees cannot be converted to permanent status without going through exactly the same competitive application, evaluation and selection process they underwent when being hired for the term positions. This is true even in those situations in which a permanent position becomes available in the same line of work and the same organization as the term position for which initially hired. Requiring the term employee to apply for an essentially identical permanent position in the same organization is a duplicative effort that wastes time and is frustrating to the employee.

For that reason, we propose permitting a term employee to be converted to a career-conditional appointment, without further competition, if certain conditions are met. The employee must have been selected for the term position under competitive examining procedures; the competitive announcement must have stated that there is potential for conversion to permanent status; and the conversion must be to a position in the same occupation, same location, and with the same promotion potential. If the position is not essentially identical, then the term employee must apply for consideration under internal merit promotion competition.

Although a category rating system will streamline the competitive hiring process, we believe that under the very specific circumstances described above it is not necessary to make a term employee re-apply through the competitive examining process at all, since it is duplicative of the process he/she already underwent.

Distinguished Scholar Appointment Authority

The Distinguished Scholar Appointment authority is a hiring authority that could be used only in appointing individuals to positions identified by OPM as requiring education and training in the principles, concepts, and theories of the occupation that typically can be gained only through completion of a specified curriculum at a college or university. These are commonly referred to as positions that have a "positive education requirement." For some scientist and engineer positions within NASA, the Agency seeks candidates who are recent, exceptional graduates with a specific degree (undergraduate or graduate) directly related to the position. Often such candidates have no professional work experience in the field for which they are being hired since they have just graduated—but their academic accomplishments make them highly desirable candidates for the position.

Traditional examining methods may unintentionally favor candidates with experience, failing to give due weight to academic accomplishments. The Distinguished Scholar recruitment authority would appear to be an appropriate way to make qualitative distinctions among graduating engineers and scientists who lack work experience but have impressive academic credentials. It could be used in those situations in which NASA is targeting its recruitment toward fresh out science and engineering graduates, rather than experienced scientists and engineers.

The category rating methodology would continue to be used in external hiring for many scientists and engineering positions—particularly those in which experience is desired.

Question 2:

In your legislative proposal, you ask for the authority to offer significantly more in recruitment, retention and relocation bonuses than you can under current law. Has NASA made use of these bonuses in the past? How have they been used? Why

is the amount you are allowed to offer today insufficient? If you are given the authority to offer more, how will this authority be used?

Answer 2:

NASA has utilized "the 3 R's" when appropriate to recruit and retain high quality individuals, when salary just isn't enough. For example, recruitment bonuses may be used at the entry level to entice "fresh out" engineers who are receiving competing offers from private companies that far exceed what NASA can pay in base salary. In other cases, the recruitment bonus may be offered to a mid-level engineer or scientist from the private sector as a means of offering a compensation package that is competitive with the individual's current employer. Generally, such a bonus is combined with a salary offer at an advanced step on the General Schedule pay scale, based on the qualifications of the candidate. The bonus is an attractive incentive to sweeten the offer, and is a one-time cost to NASA.

Relocation bonuses have been useful in compensating NASA employees who relocate between our Centers. Over the past decade, several hundred employees changed geographic locations to accommodate program changes, downsizing, and more effective distribution of skills. Such movements serve the Agency's need to broaden the perspective of its workers and managers, as well as enhance the capabilities of the individual. Many employees find it difficult to uproot family and move to a new area in mid-career, especially when moving to a higher cost area. Although travel and transportation costs are provided, the government travel reimbursements do not completely cover the actual costs of some high-cost moves. Relocation bonuses have made the difference to facilitate moves of employees—including senior managers—between geographic locations. Without the option of providing this bonus, it is doubtful that many of these employees would have agreed to relocate to accept these jobs.

In an Agency with a "mature" workforce, it is vital to sustain our critical knowledge base and essential competencies. Retention allowances have proven a valuable tool to convince valuable employees who are contemplating retirement or being wooed by the private sector to stay on at NASA if program needs require their continued knowledge and leadership. For example, one NASA Center has used a retention allowance to retain a senior executive in supercomputing and intelligent systems that had been offered numerous attractive job offers, including Vice-President for Engineering at a high-tech company and Vice Chancellor positions at *two* universities.

Despite the use of these incentives, there are cases where the current authority is not sufficient to meet our needs. Here are a few compelling examples of NASA recruitment and retention problems:

- A NASA Center lost a key individual last year—the head of an Advanced Supercomputing Division—to the Los Alamos National Laboratory. The lab offered a salary increase of almost $40,000 and, in addition, the job was located in a much lower cost of living area. This was a significant loss to the Agency; the employee had been with the Agency since 1986, had experience at two Centers, and was highly respected.
- A NASA Center attempted to recruit an impressive candidate for nanotechnology research. He had a Ph.D. in chemistry from Scripps Research Institute and three years of Postdoctoral Fellow research at Harvard University in which he specialized in the development of micro fabrication techniques using mesoscale self-assembly. These were competencies highly desired by that Center. Despite being offered a salary at an advanced step of his grade, *along with a recruitment bonus,* he declined the offer due to the high cost of living in that area. NASA's compensation package simply wasn't adequate.
- One NASA Center is in danger of losing one of their brightest recruits in the last two years. The employee has a Ph.D. from Yale University School of Medicine and conducted Postdoctoral Fellow research in DNA sequencing at the Stanford Genome Technology Center. He conducts nanotechnology and DNA/genome research with application to NASA missions such as the development of medical diagnostics, in vivo gene detection and astronaut health monitoring. He is heavily recruited by organizations such as Intel Corporation and by Yale University with starting salaries at approximately $150,000—or more than one and a halftimes his current salary.
- A fresh out Ph.D. candidate from the University of California at Berkeley declined a job offer from a NASA Center that included a salary at the top step of the grade *and a recruitment bonus.* He was offered a position at Lawrence Livermore Laboratories at a salary almost $20,000 more than this Center could offer.

- Recently, a NASA Center attempted to hire a fresh out Ph.D. from MIT who had a background in nanotechnology computing. Despite NASA's salary offer at an advanced rate, *combined with a recruitment bonus,* he declined the offer to accept a position with a small start-up company in one of the Boston high-tech communities.
- A NASA Center lost a high quality employee at the GS–14 level to the private sector. The company raised the person's salary by over 50%, bought his house, moved him to corporate housing, helped him buy a new house, gave him stock options, and other perks.

These examples may sound unusual, but they are real cases. NASA needs more flexibility to pay recruitment, relocation, and retention bonuses so that we do not lose individuals of this caliber. The current authority works in most cases; but when you deal with people with world-class skills who are in high demand by companies and organizations who can offer generous and flexible compensation packages, it's not enough. Our proposal would allow for payment of higher bonuses, with flexible payment methods to meet a variety of needs.

NASA's proposal for a more generous, flexible recruitment/retention/relocation bonus authority is an enhancement to the existing government-wide authority, which NASA has used for many years. The Agency's use of the new authority would not differ from the manner in which it implements the current authority. Our Centers would continue to make judicious use of the bonuses, taking into account the need to attract and retain the very best talent and the need to balance the costs associated with bonuses against competing needs.

Question 3:

On average, how much more can a graduate with a doctorate in science or engineering earn in the private sector than they can at NASA? How will the new pay authority you ask for in your legislative proposal help close the gap? If, as you say, interest in aerospace work among qualified graduates is fading, how will NASA's ability to pay them more enable you to recruit the kind of talent you need?

Answer 3:

According to the recent National Association of Colleges and Employers (NACE) Salary Survey for 2001–2002, the average "beginning offers" to doctoral graduates for specific engineering disciplines were as follows:

Aerospace/Aeronautical/Astronautical Engineering Electrical $70,506
Electrical/Electronics/Communications Engineering $77,316
Computer Engineering $59,211

By comparison, in 2002, the Federal Government salary rates for fresh out graduates with doctorates in engineering were:

Aerospace Engineer (non-research) $47,240 to $59,741
Aerospace Engineer (research) $51,624 to $66,609
Electrical/Electronics Engineer (non-research) $48,629 to $61,130
Electrical/Electronics Engineer (research) $54,954 to $69,939
Computer Engineer (non-research) $49,187 to $63,939*
Computer Engineer (research) $56,454 to $73,387*

The Federal salaries are shown as a range, since there are ten steps within each grade level. An applicant can be offered a salary at the higher end of the range, if he/she possesses superior qualifications for the job. Also, the salary scale for computer engineers differs by geographic region. The salary range for computer engineer positions reflects most geographic regions in the U.S.; however, the salary scales are higher in large metropolitan areas such as San Francisco, New York, Houston, Los Angeles, Boston, Denver, Chicago, Philadelphia, and Washington, D.C.

According to the NACE Salary Survey for 2001–2002, the average salary representing "beginning offers" to doctoral students in the sciences in 2002 were as follows:

Chemistry $63,168
Mathematics $54,219
Physics $51,936

By comparison, in 2002, the Federal Government salary rates for fresh out graduates with doctorates in the sciences ranged from $45,285 to $58,867 for non-research positions, and $54,275 to $70,555 for research positions. Again, the ranges would be higher in certain metropolitan areas.

It is important to note that the above figures represent starting salaries for "fresh out" graduates—not salaries for engineers and scientists who have experience in

their field subsequent to receiving the doctorate. Attracting (and retaining) the experienced scientists and engineers is one of NASA's most difficult human capital challenges. Our legislative proposals contain several provisions that are intended to address that challenge.

In addition to the enhanced *recruitment/relocation/retention bonuses,* we propose to raise the cap on the salary associated with the critical pay authority and the NASA Excepted (NEX) authority. Typically, the NEX authority is used to hire individuals with unique, exceptional talent needed for critical programs; similarly, the *critical position authority* is used in filling positions that require expertise of an extremely high level in a technical or professional field, critical to successful accomplishment of our mission. These are the circumstances in which we need to be able to compensate an individual at a level commensurate with his/her expertise and at a level competitive with the private sector.

The provision regarding *enhanced travel benefits for new hires,* which would provide new hires with the same travel and relocation benefits that permanent employees receive when they transfer, would be particularly beneficial in attracting the mid-career and senior-level candidates. These employees often are reluctant to accept positions in different geographic areas—particularly high cost areas—if they cannot receive reimbursement for many of the costs associated with the relocation. The ability to offer competitive relocation benefits would be a great help in attracting talented experienced individuals.

A more generous *annual leave benefit for new hires* would constitute a different type of incentive that would be useful in attracting mid-career and senior-level candidates. Typically, employees at those levels have accrued substantial vacation benefits in the private sector, which they would forfeit in coming to the Federal Government. Many regard this benefit as an important part of the total "compensation package" when considering competing job offers.

We recognize that providing a more competitive compensation package is only part of the solution in addressing the challenge of attracting high-quality engineers and scientists to the Agency. We must address one of the underlying causes of the intense competition for technical talent: the shrinking science and engineering applicant pool. As a long-term solution we want to guide U.S. students toward science and engineering careers. Our proposed "Scholarship for Service" proposal—along with our many other education initiatives—is intended to do this.

Question 4:

You say that downsizing that occurred at NASA during the 1990's left you with a surplus of talent in some areas but with a shortage of other, more critical workers. Explain to me the nature of the downsizing effort NASA undertook in the 1990's. Was it a part of a comprehensive personnel plan? Why did it occur? What kinds of workers were let go? What kind of work do the surplus workers do?

Answer 4:

During the 1990's, NASA was an agency in transition. NASA embraced a philosophy of reinvention that extended beyond mandated reductions and focused on maximizing the efficiency, effectiveness, and vitality of the Agency. Our managers used these cuts to become more efficient and more relevant and to make real changes in our thinking, culture, and products. One of the major changes was a transition away from operational work and an increased focus on research and development within NASA.

NASA developed a Human Resources Management Plan designed to take advantage of available options to meet or exceed current year downsizing targets and posture the Agency for known future reductions. NASA was able to achieve its workforce reductions through normal attrition, hiring restrictions, and several uses of time-limited buyout offerings, coupled with early retirement incentives. To help our employees find new jobs in the private sector, we opened Career Transition Assistance Program (CTAP) Centers at Field locations, offering help with career planning, skills assessment, interview techniques, and resume preparation. NASA's downsizing effort was accomplished without a single involuntary separation, and in that regard, served as a model for other agencies.

In the early stages of downsizing, NASA offered voluntary separation incentives to employees in all skill groups, since the targeted reductions were quite large. After several years, incentives were sharply restricted, targeted to specific locations, organizations, and/or job skills, as we came closer to our numerical goals and began to be concerned about maintaining adequate skill levels in key areas. For example, one buyout program at Langley Research Center was focused on engineering technicians, particularly in wind tunnel operations, where the need for that skill was sharply reduced; but buyouts were not available to professional engineers who were still needed for ongoing aeronautics research. In another instance, operation and

maintenance of aircraft was transitioned from the Ames Research Center to the Dryden Flight Research Center; employees impacted by this action who could not be absorbed into the Ames workforce and did not wish to relocate were offered separation incentives.

At this point, we know that we have workforce imbalances, resulting partly from downsizing, but also from changing technology and program needs, compounded by normal attrition. We know that we need people with backgrounds in information technology, nuclear engineering, human factors engineering, space physics, astronomy and astrophysics, program and project management, and contract management. We are developing and refining tools to facilitate workforce analysis and competency assessments to lend consistency and structure to decisions regarding the skills NASA needs today and in the future.

RESPONSES TO WRITTEN QUESTIONS SUBMITTED BY SEN. DURBIN FROM ADMINISTRATOR O'KEEFE

Nearly three years ago, joined by Senators Voinovich and Akaka, I offered an amendment to the FY 2001 Defense Authorization bill to address concerns I had that Federal agencies were not taking advantage of one of the many recruitment and retention options made available to them by Congress. That particular tool is the use of student loan repayments of up to $6,000 per year for qualified employees. My amendment, adopted by the Senate, was made part of the final conference package signed into law on October 30, 2000.

In July of 2001, OPM published amendments to those regulations to reflect changes in the law as a result of passage of my amendment. These changes addressed removal of the incentive to only professional, technical or administrative personnel and the limitation of the incentive to employees covered under General Schedule pay rates. The rules also broaden the types of loans that qualify for repayment, as my amendment provided. Finally, the new rules require that agencies report to OPM their use of the incentive and require that OPM report to Congress on the agencies' use of the incentive.

Question 1:
Has NASA implemented the student loan repayment program for its employees? With what results?

Answer 1:
Yes, NASA has implemented the student loan repayment program. During FY 2002, eight employees received student loan repayments. NASA considers this incentive to be a valuable tool in recruiting or retaining high-quality individuals to the agency who might otherwise accept positions with competing employers.

Question 2:
Which specific skills have been particularly difficult for NASA to either recruit or develop?

Answer 2:
Recruiting top talent in information technology and engineering continues to be a challenge for NASA because the competition from the private sector (including academic institutions) for these skills is intense. In large part, this is due to the shrinking domestic pipeline of engineers and scientists that this country faces, so we anticipate that recruiting for these technical skills—particularly computer engineering and computer science—will be very difficult in the coming years.

Within the broad field of engineering, aerospace engineering is an area of particular concern since aerospace engineers comprise 35% of NASA's scientist and engineering workforce. In the past decade, the number of students choosing that field of study has declined, making recruitment more difficult. (To illustrate, as reported in the National Science Board's *Science and Engineering Indicators 2002* report, graduate enrollment in aerospace engineering declined from over 4,000 in 1992 to only 3,400 in 2000.)

Some of the specialized technical areas that have been especially difficult to fill during the past few years include: nanotechnology computing, DNA/genome research, and astrobiology.

Recruitment challenges are, to some extent, a function of location as well. For example, NASA Centers in high-cost areas—such as the Ames Research Center in the Silicon Valley—may encounter difficulty in recruiting a wide range of occupations since Federal salaries in many instances are not sufficiently competitive to attract individuals to that area.

From a development perspective, NASA has maintained a strong focus on providing continuous learning opportunities for the workforce. Employees are encour-

aged to enhance technical skills through academic training, as well as conferences and symposia to ensure state of the art capacity in such skills as engineering, science, and information technology. In addition, to supplement technical skills and competency development, a comprehensive array of opportunities for development and enhancement of competencies in leadership and management development, program and project leadership, acquisition, and business acumen are available to the workforce.

Question 3:
Which recruits or new hires does NASA tend to lose to the private sector? For what reasons?

Answer 3:
Although we maintain data on losses of new hires for reasons other than retirement, the database does not capture the specific reason an employee left NASA. We know that many left to accept jobs in the private sector, while others may have left for different reasons—e.g., to attend graduate school. Data for 1998 through 2002 shows that among the engineering and science workforce, the highest number of losses among those with under five years of Federal service were in the following categories, listed in order of frequency:

Aerospace Engineer
Electronics Engineer
Computer Engineer
Space Flight Operations Engineer
General Engineer—Management
Data Systems and Analysis Engineer
Facilities and Environmental Factors Engineer
Electrical Engineer

The pattern is very similar among hires with five to nine years of Federal experience. The highest numbers of losses were in the following categories, listed in order of frequency:

Aerospace Engineer
Computer Engineer
Electronics Engineer
General Engineer—Management
Space Flight Operations Engineer
Facilities and Environmental Factors Engineer
Data Systems and Analysis Engineer
Materials Engineer
Electrical Engineer

NASA has an initiative underway to develop an Employee Preference Survey to better understand "turnover risk" in the Agency. Since this initiative is in the developmental stage at this time, meaningful Agencywide data is not yet available.

However, in connection with our National Recruitment Initiative study conducted in 2001, focus groups were held at all NASA Centers with new and recent science and engineering hires to gather information that would be helpful in developing effective recruitment and retention strategies. These employees were asked to address why they came to work for NASA, the critical factors in retaining a top quality science and engineering workforce at NASA, and their recommendations for attracting scientists and engineers to NASA in the future. Their responses showed that the most important factors influencing their decision to accept a job were challenging work and growth potential, followed by developmental opportunities, job stability, and benefits.

The National Association of Colleges and Employers (NACE) found similar results when they conducted a survey in 2000 on what employees value in an employer. The responses were: room for advancement (52%), good benefits (46%), continuing education and training (41%), geographic location (39%), and job security/stability (34%).

Question 4:
What would be the specific components of an effective Scholarship for Service Program that would meet NASA's needs?

Answer 4:
The desired components of proposed NASA Science and Technology Scholarship Program are outlined below:

Enrollment/Eligibility

—U.S. Citizenship
—Full Time Student or Pending Graduate at Accredited 2-year or 4-year University/College/Community College
—Rising Sophomore or Junior (Pilot Year); Add Graduate Continuance Eligibility Over Time
—Clearly established articulation agreement with or matriculation letter from fully accredited 4-year college/university
—Minimum Cumulative GPA of 3.0/4.0
—Academic Coursework/Curriculum Highlighting NASA Critical Skill Areas (Engineering, Physical/Natural/Life Sciences, Computer Science, Mathematics)

Scholarship Provisions
—Student Eligibility for up to 4 Academic Years
—Tuition paid directly to academic institution
—Covers Tuition, Fees, and Other Expenses, as determined
—Student Academic Program Approved and Progress Reviewed/Approved Annually by NASA
—Student Must Maintain Academic Standing As Required By College/University

Service Obligation
—One Year of NASA Service for Each Full Academic Year of Scholarship Enrollment
—Service Obligation To Begin Within 60 Days of Graduation
—Deferral Option for Graduate Studies (NASA Approval)
—NASA-sponsored Summer Internship
—Obligation Can Be Served As Temp, Term, Career Conditional Employee (NASA Decision)

Penalties For Breach of Contract
—First Year Under Scholarship: Considered "Under Probation" (No Penalty for Withdrawal)
—Renewal Year(s): Repayment of Scholarship Tuition Costs If Academic Year is Not Completed (Repay Year's Tuition)
—Upon Graduation: Repayment of Scholarship Tuition Costs If Service Obligation Not Met (Repay 3 Times Total Scholarship Expenses)

Program Partner & Scope
—Seek An Experienced Program Partner to Help Structure, Market and Coordinate Scholarship Program
—Anticipate 150–200 Students First Year: 50–100 Rising Sophomores; 50–100 Rising Juniors
—Grow to Full Complement of –300, Adjusting Intake with Graduations/Withdrawals/NASA Workforce Requirements
—NASA to Establish Target Academic Disciplines/Goals (% in Engineering, NaturaI/Life Sciences, etc.)

RESPONSES TO WRITTEN QUESTIONS SUBMITTED BY SEN. LAUTENBERG FROM ADMINISTRATOR O'KEEFE

Question 1:
Mr. O'Keefe, I believe that we must also address NASA's organizational culture with regard to information flow, and assure the proper level of internal oversight.

Answer 1:
A tremendous effort has been implemented over the years to motivate staff to communicate safety concerns and reinforce the expectation that any individual with a safety concern is expected to communicate it.

Numerous mechanisms are in place to facilitate this communication and employees are rewarded for expressing their concerns. United Space Alliance, the Space Shuttle program's prime contractor, has a formal Time-Out Policy (E–02–18) signed by the Vice President, Safety Quality & Mission Assurance, that encourages and actively supports the safety practice of calling a "time out" when anyone is unsure or uncomfortable with any situation. Policies are in place for all employees whether civil service or contractors to stop any activity that they feel is unsafe. This safety awareness behavior is highly encouraged and rewarded at all levels. NASA management has an excellent record of responding to safety concerns expressed by individuals.

Since Challenger, the management structure for space flight programs has been reviewed and undergone significant changes in organization, personnel, and management philosophy. Program reporting channels have been redefined and stream-

lined. In the past year, additional changes have been made, further improving the oversight and accountability of program management. Since last year, the Program Managers for both the Shuttle and International Space Station Program have reported directly to the Deputy Associate Administrator for International Space Station and Space Shuttle Programs at NASA Headquarters.

Because of the lessons NASA learned following the Challenger tragedy, we put in place a process for ensuring that elements of the Shuttle system are safe before we commit to flight. Each Shuttle flight is subjected to a rigorous review prior to certification of flight readiness (COFR). Two weeks prior to launch, NASA holds a Flight Readiness Review (FRR), chaired by the Associate Administrator for Space Flight. The FRR is attended by all senior program management and contractor officials. At the FRR, project managers assess readiness for launch, report hardware status, problems encountered during launch processing and their resolution, and launch constraints. Each manager and official is required to sign the COFR.

In the recent past, this process has identified several potentially serious issues with Shuttle flowliners and the ball strut tie-rod assembly (BSTRA). These problems were analyzed and resolved prior to flight.

Even at the risk of delays to our launch schedule, NASA is committed to identifying and resolving potential safety issues. Each and every employee is empowered and obligated to identify issues that they believe may pose a risk to the Shuttle and her crew.

This process is codified in NSTS 08117, "Requirements and Procedures for the Certification of Flight Readiness," which lays out the steps in the COFR process: including Project Milestone Reviews; the Program Milestone Reviews; and the Flight Readiness Review (FRR).

In addition to formal COFR and other processes, employees and contractors are encouraged to identify and report safety issues both through regular reporting channels and anonymously through the NASA Safety Reporting System (NSRS). The Office of Safety and Mission Assurance is responsible for this anonymous process.

The NSRS is an anonymous, voluntary, and responsive reporting channel to notify NASA's senior management of employee concerns about hazards. It is managed independently by NASA's Office of Safety and Mission Assurance and is designed to supplement local hazard reporting channels. Anyone can initiate an NSRS report. Personnel are directed to report hazards first through their local channels and then to NSRS if no remedial action is taken; if they are unsatisfied with the action taken; or if they fear reprisal if they report the hazard through normal channels. NSRS reports receive prompt attention from senior personnel. A summary of NSRS status is presented at each FRR. The NASA Administrator established the NSRS in 1987 following the Challenger accident. This system has supported all Shuttle flights since that time and has been expanded to cover all NASA operations.

Question 2:

And on the question of the ratio of employees to contractors, tell me, what *expansion* of your workforce will be needed to *assure* excellence in safety and in order to position NASA to meet its goals for the 21st Century?

Answer 2:

The ratio of civil servant to contractor is not constant but varies depending on the nature of the work. For example, for a project that entails work that is commercial in nature, the work could be accomplished with a bare minimum of government involvement; whereas, if the project involves work that is not performed in the private sector, civil servants may perform it mostly or wholly. Most complex aerospace projects are somewhere on the continuum and can involve a mix of contractor and civil servant employees. Assuring excellence might not necessarily require the expansion of either the civil servant or contractor workforce. Rather, program excellence relies on well-informed and experienced-based management decisions regarding the effective deployment (mix) of civil servant and contractor human capital resources based on the nature of the project and the risk of program failure.

Question 3:

Do you foresee more government workers or private contractors?

Answer 3:

Rather than dictating increases or decreases in the number of certain types of employees, the Federal Government has set a path in recent years to make greater use of regular competitions as a tool to ensure that managers do effectively deploy civil servant and contractor human capital resources. The Competitive Sourcing reform in the President's Management Agenda is the government-wide vehicle for this improved approach to Federal human capital management.

Question 4:
To inspire our young people to enter scientific fields and to entice the best and brightest to choose a career with NASA, rather than say, Wall Street or Microsoft, what visions will you offer to the next generation and how will you communicate it to our young people?

Answer 4:
NASA's mission to understand and explore depends upon an educated and motivated workforce with the ingenuity to invent tools and solve problems and the courage to always ask the next question. To accomplish this, education has been made a core mission of the Agency: "To Inspire the Next Generation of Explorers . . . as only NASA can." Two Agency goals in our FY 2004 Strategic Plan guide our educational efforts:

Goal 6: Inspire and motivate students to pursue careers in science, technology, engineering and mathematics.

Goal 7: Engage the public in shaping and sharing the experience of exploration and discovery

As stated in the NASA Strategic Plan, education and inspiration are integral parts of NASA's programs, and educational and motivational activities are being incorporated into every NASA program from the earliest stages. To guide this process, a new NASA Enterprise—Education—has been created to serve as the Agency's umbrella organization for defining and articulating an overarching education vision and mission. The Education Enterprise will serve as the focal point for education planning and implementation, program reviews, and the evaluative performance of all NASA sponsored educational programs. The evaluation of NASA's education programs will be based upon benchmarked criteria as is practiced or tracked through established and recognized educational tools as well as commensurate with other NASA research and development activities.

The Education Enterprise has established four new initiatives in FY 2004 to inspire and entice students to enter scientific fields and choose a career with NASA or NASA affiliated organizations:

The Educator Astronaut Program: seeking America's exemplary teachers to become members of the NASA Astronaut Corps to bring the wonder of space exploration into our education system;

Explorer Schools: through a competitive process, identify middle schools that will bring teams of educators together to work in partnership with NASA over a 3-year period to enhance their professional development, and provide them unique teaching tools and learning resources for students, in support of increased student achievement in mathematics and science.

Scholarship for Service (proposed—enabling legislation pending): providing full scholarships for students seeking degrees in science or engineering fields of high priority for NASA in exchange for a year for year matching employment requirement by the student recipient; and

Explorer Institutes: working with the Nation's museums, and science and technology centers to provide compelling learning experiences for students, their parents and the general public.

The United States needs a technically competent workforce that reflects our Nation's diversity. Inspiring and motivating students to pursue careers in science, technology, engineering and mathematics assures NASA a new and continuing generation of explorers and a workforce that will keep America technologically and economically competitive. Our vision is "To Inspire the Next Generation of Explorers" to pursue education and careers in science and technical fields and to be prepared to join NASA in pursuit of exploration and discovery.

NASA also must be effective in communicating this vision and marketing the Agency as an "employer of choice" to the graduates who are ready to enter the workforce. NASA recognized the importance of having an effective recruitment program and during FY 2002 conducted a National Recruitment Initiative study to develop hiring strategies and tools for NASA's current and future science and engineering needs. The study focused on strategies appropriate for hiring new graduates—the "fresh-outs"—and provided valuable insights regarding effective recruitment approaches to use in today's labor market.

Using what we learned from that focused study, as well as other research, we developed new recruitment materials and more effective communications strategies to appeal to the emerging workforce. Our marketing techniques have become more expansive in order to compete in today's environment. We established a unified NASA JOBS website to provide easy access to information on jobs, with direct links to information on NASA's mission and the ability for individuals to apply for positions on-line. We developed new promotional materials, including CD ROM business cards

with links to the NASA JOBS web site and a short movie on the history of NASA. We have developed an employment DVD that provides information on what it's like to work at NASA from those who know best—our own employees. We have put a face on the thousands of individuals throughout the agency engaged in challenging, state-of-the-art work. The themes of challenging work and opportunities for growth are included throughout the DVD as employees explain why they came to NASA and why they stay.

In summary, our core mission "To Inspire the Next Generation of Explorers . . . as Only NASA Can" guides both our education and employment strategies to inspire and entice the best and brightest to choose a career with NASA.