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# COMMERCIAL SPACE TRANSPORTATION: BEYOND THE X PRIZE

**(109–2)**

## HEARING

BEFORE THE

SUBCOMMITTEE ON
AVIATION

OF THE

COMMITTEE ON
TRANSPORTATION AND
INFRASTRUCTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED NINTH CONGRESS

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# COMMERCIAL SPACE TRANSPORTATION: BEYOND THE X PRIZE

**Wednesday, February 9, 2005**

HOUSE OF REPRESENTATIVES, COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, SUBCOMMITTEE ON AVIATION, WASHINGTON, D.C.

The subcommittee met, pursuant to call, at 2:08 p.m. in room 2167, Rayburn House Office Building, Hon. John L. Mica [chairman of the subcommittee] presiding.

Mr. MICA. Good afternoon. I would like to call this hearing of the Aviation Subcommittee to order.

We welcome the members attending. Unfortunately, today there are a number of conflicting hearings and meetings. We are getting a little bit of a late start and I apologize.

Today's hearing is going to focus on commercial space transportation beyond the X Prize. The order of business will be, we will hear my opening statement, and then the new Ranking Member's opening statement, and then we will hear from Mr. Boehlert, he has another commitment. Then if any other members do have statements, we would be glad to recognize you, if that is acceptable. So with that, let me welcome everyone again and offer these opening remarks.

Today's hearing launches a new era in commercial transportation oversight. Just four short months ago, Scaled Composites' SpaceShipOne became the first privately operated aircraft to launch more than 62 miles into space and return safely twice in two weeks with a pilot on board. That particular activity launched a whole new era in space and passenger participation in commercial space travel.

This flight also altered our vision of what the aviation system of the future will look like. We now see the possibilities, including the development of space tourism. U.S. spaceports, rapid global transportation, and point-to-point commercial space flight services are all possibilities.

Yet it was not long ago when this was not at all what we had envisioned. In fact, prior to the early 1980s, there was no commercial space launch industry. Rather, we had private payloads that were carried aboard government-owned launch vehicles. Then several events prompted development of a United States commercial space transportation industry. First, the advent of international competition with the creation of a European commercial launch services organization. Second, an unaddressed demand for launch services with the banning of commercial payloads, such as sat-

ellites, from flying aboard the Space Shuttle after the Challenger disaster.

In 1984, Congress passed the Commercial Space Launch Act which sought to encourage the development of the emerging commercial space launch industry and also to facilitate compliance with Federal requirements. Around this same time licensing activities were consolidated in the Office of Commercial Space Transportation within the Department of Transportation. This office was transferred to the FAA in 1995.

By the year 2002, the U.S. commercial space launch industry and the services and industries that it enabled accounted for more than $95 billion in economic activity. But up until October 2004, all commercial launches were conducted without a crew or passengers on board.

Then the X Prize competition was announced to encourage the development of human commercial space flight. The $10 million X Prize was claimed by Scaled Composites SpaceShipOne with a successful completion of a manned commercial space launch mission in October of 2004. With this flight, the commercial space launch industry entered into the next phase of its development: manned commercial space transportation, which raises new issues with regard to operations, impact analysis, and also infrastructure development.

In order to encourage further development of commercial space transportation, many pushed for an expansion of FAA's licensing authority to include licensing space flights with crews and also with passengers on board. Therefore, the Commercial Space Launch Amendments Act passed Congress under suspension of the rules at the end of the last session. This Act gives the FAA the authority to license launches carrying crew and space flight participants, otherwise known as passengers. This recent development also brought the commercial space transportation sector under the jurisdiction of the Transportation and Infrastructure Committee.

Obviously, the Transportation and Infrastructure Committee views oversight of the commercial space launch industry from a very unique perspective. Certainly, supporting this emerging industry is in the best interests of the United States, especially in light of growing international competition.

At the same time, ensuring that the FAA fulfills its oversight responsibilities with regard to safety is also a number one priority, and I know Administrator Blakey, who is with us today, takes this all very seriously as well. As the industry grows and develops, other issues will also require this Committee's attention, including international competition, and we see that now, Europe, China, Russia, Ukraine, India, and Japan, they all offer commercial launch services in competition with United States companies.

We also have issues of environmental impact analysis and mitigation, we have questions relating to application of labor laws, we also have questions of security of the launch facilities, and finally, the current and future impact of commercial space flights and commercial spaceports on our air traffic control system and the safe and efficient use of navigable air space.

I am pleased to welcome today the Honorable Sherwood Boehlert, who is Chairman of the Committee on Science and an active mem-

ber of this Committee, to share his views with us today. We are also pleased to have the Administrator of the Federal Aviation Administration, the Honorable Marion Blakey with us and we look forward to her testimony. For the first time since the passage of the Commercial Space Launch Amendments Act at the end of the 108th Congress, Administrator Blakey will provide a public review of the FAA's role in providing safety oversight of the commercial space transportation industry. We also welcome our other expert witnesses and appreciate the time they have taken to be with us.

I would like to yield first, as I said, to our new Ranking Member and again extend a warm welcome to Jerry Costello, who is one of the most senior members of the Transportation and Infrastructure Committee. Welcome, and you are recognized.

Mr. COSTELLO. Mr. Chairman, thank you. I want you to know that I look forward to working with you and the other members of this Subcommittee and the full Committee.

We have a full plate and a lot of challenging issues in front of us. A few of those issues, the financial condition of the airline industry, the financial condition of the Aviation Trust Fund, the modernization of the ATC system, just a few issues, and then, of course, we will have to deal in the coming days and weeks with the President's budget proposal which significantly cuts the Airport Improvement program and also funding for the ATC modernization program. But those issues will be dealt with in another day.

Today we are here to address the issue of commercial space transportation beyond the X Prize. I thank you for calling the hearing on this important topic today. I am familiar with this emerging industry as a member of the Science Committee, working with Chairman Boehlert and our other members on that Committee. I also am familiar with the industry because the X Prize Foundation is based in St. Louis, Missouri, directly across the river from my congressional district. So I am very familiar with the X Prize Foundation and the program.

Many predict, as you stated, that commercial space tourism will lead to regularly scheduled manned commercial space flights that could generate upwards of $700 million a year in revenue in years to come. As with any industry in its infancy, we must be certain that it is receiving the proper Federal safety oversight without discouraging innovation and development.

I look forward to hearing from the FAA Administrator. I had an opportunity to sit down with her earlier today and speak with her concerning not only this issue but a number of other issues. But I will look forward to hearing from the Administrator today concerning the FAA's role in overseeing the commercial space industry to ensure the safety of the uninvolved public as well as the crew and space flight participants.

As you noted in your opening statement, commercial space launch activities will have an impact on our air traffic control system as well as the environment. We must make certain that the FAA has the proper tools that it needs to ensure the safety of the flights for both aircraft and launch vehicles as well as to protect the environment and other activities.

Finally, Mr. Chairman, as you noted, there are several commercial spaceports currently under development that will be used to

support space tourism. This is a good time to examine the issues associated with licensing these facilities.

Mr. Chairman, I again thank you for calling the hearing today. I look forward to hearing from our witnesses, and look forward to working with you.

Mr. MICA. Again I thank our Ranking Member and welcome him. As I said, he is a senior member of the Transportation Committee.

And as I mentioned the outline of our procedure today, I am going to recognize Mr. Boehlert, also a senior member of the Transportation Committee, but also Chair, a very important Chair in the House, of the Committee on Science. We welcome your remarks at this time, and then, as I said, we will go back to members on our panel.

Welcome, and you are recognized, Mr. Boehlert.

**TESTIMONY OF HON. SHERWOOD BOEHLERT, A MEMBER OF CONGRESS FROM THE STATE OF NEW YORK, CHAIRMAN, COMMITTEE ON SCIENCE, U.S. HOUSE OF REPRESENTATIVES**

Mr. BOEHLERT. Thanks very much, Mr. Chairman, members of the Subcommittee. I will be brief because you have got an impressive list of witnesses and I know you are anxious to hear what they have to say, I am anxious to learn what they have to say also. We are following this very, very carefully. I just want to use my time to make four simple points regarding commercial human space flight.

First, the issue is important. As I mentioned during the floor debate on the Commercial Space Launch Act Amendments last year, I am a convert to the cause. When our colleague Dana Rohrabacher first started pressing the issue with me, I thought the notion of commercial human space flight was, quite frankly, a distraction.

But further research by the Committee, not to mention further developments like Burt Rutan's flight to win the X Prize, have convinced me otherwise. We do not know yet what commercial space flight might lead to, but we need to give this new industry a chance to develop.

That brings me to my second point, which is this, if this new industry is to develop, if innovative technologies are to be pursued, we need to strike the right balance in regulating the industry. The law the President signed last year reflects a year of negotiation that strikes the right balance—protecting the public without stifling the industry.

This is an infant industry. It is not the equivalent of today's airline industry. The law fully protects uninvolved third parties and requires extraordinary disclosures to immediate participants, and it sets the industry on a path toward greater regulation as it develops. That is the right balance and it passed muster with Members who are not exactly in the anti-regulatory camp in both chambers of Congress. The final wording was worked out between my staff and Senator Hollings' staff.

Now we need to ensure that the FAA is implementing the law properly, which is my third point. Our Committee is watching the process like a hawk, as I know your Committee is. The law needs to be implemented by the commercial space side of FAA in the bal-

anced manner intended. Obviously, the commercial aircraft side of FAA can inform the process, but implementation is not a commercial aircraft venture.

I look forward to working with the Transportation and Infrastructure Committee, on which I also serve, to make sure we get this right, and that is my fourth point. Our Committees share jurisdiction over the human portion of the commercial space flight industry. We must not allow disputes between our Committees to magnify any rivalries within FAA or elsewhere. We need to move together to implement a balanced and predictable regulatory regime quickly and effectively. The T&I Committee was helpful in clearing the law for passage last year and I hope we can move forward in that same spirit.

Mr. Chairman, in conclusion, let me just say that this is a much more complicated issue than it appears at first blush. We learned that the hard way in a year of discussions with a small but fractious industry. But thanks to the new law, we now have a clear blueprint to move forward in a way that will protect the public while helping a new industry get on its feet. And that is something that we all applaud. I look forward to working with you and this entire panel as the new law is implemented. And I thank you for the courtesy of this time.

Mr. MICA. Thank you, Mr. Boehlert. What we will do, you can certainly join us on the panel as your schedule permits.

Mr. BOEHLERT. Mr. Chairman, as you indicated at the outset, I now run over to chair a hearing of the Science Committee. We are dealing with a subject of some import to all of us involving CAFE standards.

Mr. MICA. Okay. Well we thank you again for your input, and we look forward to working with you and the Science Committee.

At this time, are there additional members that seek recognition? Mr. Oberstar?

Mr. OBERSTAR. Thank you, Mr. Chairman. I have no questions. We had a discussion last fall on the House floor and we will resume the discussion.

Mr. MICA. If anyone has any opening remarks, we will revert now to them.

Mr. BOEHLERT. Mr. Chairman, if I may, Chairman Oberstar and I have had discussions for 40 years on Capitol Hill, starting as staff members and now as colleagues. I have the highest regard and respect for him and I always value his input.

Mr. MICA. Thank you. I am glad you two are getting acquainted.

[Laughter.]

Mr. MICA. Mr. Oberstar, you are recognized. Thanks, Mr. Boehlert.

Mr. OBERSTAR. The issue before us is not the value of commercial space travel, which has been well-documented, Chairman Boehlert referenced it, Mr. Chairman, you referenced it in your opening remarks, as did Mr. Costello. The issue simply is safety of commercial passenger space travel.

In the debate that we had on the House floor—the very abbreviated debate in the context of the suspension authority which limits debate to 20 minutes a side, no amendments to be offered—we explored this subject and heard the litany of remarks that are re-

peated in the testimony by witnesses today. Chairman Boehlert began by saying we need to give this industry a chance to develop.

We do not want to stifle this industry, said another Member during floor debate, we do not want to stifle this industry with overburdensome regulation in its infancy. There was reference to killing the baby in its cradle. The FAA did not stifle jet travel in its infancy. The whole jet industry emerged very successfully under the watchful eye of the FAA. Nor did all composite general aviation aircraft die in the cradle. Rather, it was nurtured to successful launch under the watchful eye and the intense attention to safety of the FAA.

All we are asking for, all that I was asking for, that a substantial number of Members concurred with, is the FAA to take a safety role for the passengers. The FAA's statement today is a reference to safety on the ground. If a launch vehicle blows up or falls from space, we want to be sure that people and structures on the ground are protected. We ought to worry about the people on the plane. That is what safety is all about. That is what the whole history is of the FAA safety, the premier safety agency in the world.

This legislation now in law, the statutory language sets up commercial space travel for what we in this Subcommittee over twenty years have occasionally pointed to the FAA's failures as being a tombstone mentality: wait until someone dies, then regulate. I think FAA has moved beyond that. This law now says you do not do anything about safety for eight years or until somebody dies, then do something. That is not safety. That is not being anticipatory. That is being reactive, and that is what offends me.

I proposed language, which, frankly, I thought was way too lenient, that would require the FAA in issuing licenses to establish minimum standards to protect the health and safety of crews and passengers, do not worry about the people on the ground, and require the FAA, in setting standards, to take into consideration, in the language of the amendment I would have offered had we been included in any of those preliminary discussions, "the inherently risky nature of human space." That is all. A caveat that, God forbid, we would never put in language today.

In defense of the pending bill, which is now a law, those who were advocating it said, oh, well, everybody who travels in space is going to have to sign a waiver saying that they give up any claim and understand the risks they are engaging in. How many people do you think would sign on to fly a Metroliner if they had to sign such a waiver, a 19 passenger aircraft people are afraid to travel on now? How many people do you think would sign up to fly on a 747 if they had to sign that waiver today, knowingly sign this waiver, you alone are responsible for yourself and you have no claim? Nobody. That is nonsense.

This is not an attempt on my part to stifle human travel in space for commercial purposes, but to give the FAA, the world's premier safety agency, a role in setting standards for safety of passengers and crew. All FAA has now is to worry about people on the ground and let those who want to fly sign their life away. That is not being responsible and that is not carrying out your responsibilities to the traveling public.

We will go through this hearing, we will hear what people have to say, but I come back to the point we need at least a framework of safety around commercial space travel. By no means would that language stifle. In fact, had we the majority I would be writing something much more safety oriented, but for the moment we will deal with this. At least put this little framework around safety in commercial space travel. Thank you, Mr. Chairman.

Mr. MICA. I thank the gentleman. Do other members seek recognition on the majority side? The minority side? Ms. Berkley?

Ms. BERKLEY. Thank you, Mr. Chairman, for holding this hearing. I want to welcome Mr. Costello as the new Ranking Member of our Subcommittee.

Las Vegas is not only the entertainment capital of the world, but north Las Vegas is the home of Bigelow Aerospace. The company's goal is to bring human space travel into commercial business. Bigelow Aerospace, working in conjunction with NASA, is on the cutting edge of space technology. In November of 2005, not many months from now, the company will launch its Genesis spacecraft, a third scaled version of its inflatable space habitat technology, and will launch again in 2006. These inflatable test spacecraft will be designed to last for several years in orbit.

Robert Bigelow, the company's founder, is passionate about commercial space technology and is committed to producing technology that is safe, reliable, user friendly, and economical. Mr. Bigelow is providing me with a statement regarding the commercial space travel and the FAA's oversight duties, which I will submit for insertion in the record and I will provide our first witness a copy of that also.

Mr. Chairman, this is exciting technology and we must strike a balance between FAA's oversight and private innovation. The oversight and regulation of commercial space travel must be sufficient to ensure safety but must not stifle ingenuity.

I look forward to testimony of our witness, who I look forward to hearing every time she comes, and learning more about this issue. Thank you, Mr. Chairman.

Mr. MICA. Thank you. Are there other members who seek recognition? Mr. Carnahan, welcome to the Subcommittee. You are recognized, sir.

Mr. CARNAHAN. Thank you, Mr. Chairman. Since this is my first Subcommittee hearing, let me say, first, how happy I am to be here to work with you, Ranking Member Costello, whose district is right next to mine back in the St. Louis area, and everyone on this Aviation Subcommittee.

The economy of my home region in St. Louis has a long history to the aviation industry. It was Charles Lindbergh and the Spirit of St. Louis that won the $25,000 prize in 1927 for his historic flight from New York to Paris. Lambert-St. Louis Airport has over $5 billion economic impact to our St. Louis region. In addition, both American Airlines and Boeing are major regional employers. Needless to say, issues under the jurisdiction of this Subcommittee are especially important to my area of the country and the people who live there. I am honored to be here.

The U.S. commercial space transportation industry is at an exciting stage of innovation and development. Given the recent activity,

this hearing on the future of the industry and the FAA's role regarding safety, oversight is very timely. I look forward to hearing the testimony, and have a great day.

Mr. MICA. Any other members seek recognition at this time? If not, I welcome members to submit statements for the record. We will leave the record open for a period of, Mr. Costello moves ten days?

Mr. COSTELLO. Ten days.

Mr. MICA. Without objection, so ordered.

We will now turn to our second panel. We have the Honorable Marion Blakey, who is the Administrator of the Federal Aviation Administration, here to testify. Welcome back. We are pleased to see you and are anxious to hear your opinion and ideas on this important subject. You are recognized.

**TESTIMONY OF THE HONORABLE MARION C. BLAKEY, ADMINISTRATOR, FEDERAL AVIATION ADMINISTRATION**

Ms. BLAKEY. Thank you, Mr. Chairman. I have to say how delighted I am to be here today. It is my pleasure to appear before you for what I understand is the first hearing of the 109th Congress for this Subcommittee. I also want to congratulate the new members of the Subcommittee, and of course the new Ranking Member, Congressman Costello.

Secretary Mineta and I truly value our partnership to make our nation's aviation and space transportation systems the safest and most efficient in the world, and that partnership is no more critical than with this Committee. Lastly, I particularly appreciate Congressman Boehlert's leadership and enthusiasm for commercial space.

Commercial space transportation, a phrase that is relatively new to our lexicon, brings us here today. The space you and I grew up knowing dealt largely with final countdowns, and Jules Bergman. Space was a place where you saw flickering black and white photographs, images with leaps of mankind. Not any more. America's love affair with space is vicarious no more. There is a bold new group of people, astropreneurs, and their aim is to bring space flight into everyone's grasp.

But in the larger context, commercial space transportation is much greater than the thrill private citizens will experience. It is an important step for transportation and for humanity. It is a recipe that is going to lead to greater exploration, innovation, and safety. Our job at the Department of Transportation is to enable the development of human space flight industry while protecting public safety. Given the pace at which this fledgling industry is developing, that is going to be a real challenge.

In many ways, the environment we are in is similar to the barnstorming days of early aviation. Those early fliers took great risk as part of the deal. People who flew with the pioneers also flew because they loved the thrill, and it opened up a whole new world. Just as we learned in aviation, increased experimentation and testing can and will lead to significant advances in safety.

But that kind of progress takes both time and experience. It was more than 20 years after the Wright brothers' first flight before Government regulations concerning aviation were put into place,

and I will tell you, they were relatively primitive and simple at that point. Safer designs and operations were the eventual result, and continents, once separated by months long voyages, would suddenly be only a few hours apart.

Space flight, I think, is following a similar path. Since the passage of the Commercial Space Launch Act in 1984, there have been 168 licensed launches, and the uninvolved public has experienced no fatalities, serious injuries, or significant property damage. That is an impressive safety record.

I would like to compliment the FAA's Associate Administrator for Commercial Space Transportation, Patti Grace Smith, who is sitting here behind me, and her team, and the entrepreneurs who have worked so hard to get this endeavor off the ground. Believe me, I think it has been a lonely enterprise part of that time, but their work has definitely paid off. I also want to emphasize the FAA's commitment to this endeavor. We will continue to draw on our long experience and our very formidable resources to advance commercial space transportation.

The Commercial Space Launch Amendments Act of 2004 establishes a framework, a phased approach, if you will, for the emergence of this mode of transportation. It is a streamlined permitting process, similar to aviation's experimental airworthiness certificate which, as you know, allows aircraft designers and manufacturers to test new ideas as they come along. As this critical phase evolves to a point where license determination is warranted, our safety review of the vehicle's operations will be more in-depth and certainly more comprehensive.

The Commercial Space law of 2004 also allows the FAA to oversee space tourism entrepreneurs without hampering our ability to enforce public safety. For piloted vehicles, the FAA treats the crew as part of the flight safety system. This means that the FAA protects the crew, not for its own sake, but for the protection of people on the ground.

In short, those on board will receive more protection because of the FAA's concerns for the safety of the uninvolved public. The law calls for this approach and calls this approach acceptable for what they consider, we consider, ultra hazardous activity. Passengers on early flights will be engaging at their own risk in an activity that is comparable to extreme sports, such as mountain climbing.

As with any ultra hazardous pioneering activities, there is an unfortunate likelihood that lives may be lost. During this period, though, the FAA and the industry will gain significant operating experience and will be in a better position to determine what standards should be required.

To date, America has made tremendous strides. The $10 million Ansari X Prize was awarded to the crew of Scaled Composites' SpaceShipOne. Pilots Brian Binnie and Mike Melville joined forces with Burt Rutan and Paul Allen to make aerospace history with the first private manned vehicle to reach space. The infrastructure to make it happen is also well underway. We have licensed and regulated launch sites in California, Florida, Virginia, and Alaska. A fifth site in California's Mojave Desert is the Nation's first inland location to receive a license. And you will be pleased to know that

we are in discussions with Oklahoma, New Mexico, and Texas about their license applications as well.

So, as you can see, the short view is exciting and a risky picture. However, it is the longer view that will not only drive this industry forward, it will create transportation advances for all. What might now be viewed as adventure or sport for the barnstormer and the risk-taker is what leads to yet one more giant step for mankind.

The advent of greater access to space, more efficient travel, greater opportunities for exploration, and the chance at expanding the limits of human experience are there for the taking. What is more, we are realizing that they are well within our grasp. And that, history tells us, means it is going to happen much sooner than we think.

With that, Mr. Chairman, I complete my remarks. I look forward to any questions.

Mr. MICA. Thank you. I have a couple of quick questions and then will defer to other members.

First, Ms. Blakey, does the FAA have all of the tools and authority that you feel are needed to ensure the safety of the so-called uninvolved public?

Ms. BLAKEY. I think we have a good range of tools. Again, when you look at the safety record to date, 168 launches with no blemish on safety, I think it tells us that the license system has been working well, and it is a robust system. In addition to that of course, the new Act also gives us additional tools. So at this point and this stage, I would stress, in the industry's development, I think we are all right.

Mr. MICA. Good. The second question is really two parts. First, I spoke a little bit about the impact of commercial space flights and commercial spaceports on the air traffic control system. And within our sort of range, that is something I would like to know what problems you anticipate and how we handle that.

The second thing, once you get outside of our airspace, what steps are we now taking as far as international agreements and such, or where do we hang our future as far as participation in outer space, which we do not control, with other countries? So, a two-part question.

Ms. BLAKEY. I am not sure I can see far enough into the future for the second part to be very definitive. But what I do see right now is that the current system in terms of air traffic control is working very well. Within the corporate culture of FAA, it is obviously very easy for us to pull together and ensure that there is close coordination at the very earliest stage of any projected launch. It is working well.

We essentially control that airspace, issue notams to pilots, put in place TFRs, and to date, I will say it has occurred without any hiccups. We have also a pretty good blueprint for this as we see more and more of these kinds of launches. Reusable launch vehicles are coming into use, not only going up but coming back down and entering the airspace as gliders often with characteristics of airplanes. I think we will be able to use that blueprint that we have worked very hard on to make sure that it really does not cause disruption in the system.

In terms of international activities, what we see there, of course, is that right now we have got some countries that have put all of their resources--I don't mean to say all--they have put significant resources from the national standpoint behind launches. So the concept of private and commercial is very different there than it is here. It is essentially a national enterprise there. And they have had some real success.

But I will say that we have a lot of pride given that we have also seen in recent years the growth here again in some of the launches. We have had success there. So, it is a mixed picture and certainly issues of authority, jurisdiction, et cetera, are ones that we will be working with a time goes on. The United States has never had any difficulty so far in staking out outer space, and I would anticipate we could continue that.

Mr. MICA. Before I get to my other question, it is interesting, and Mr. Oberstar might be interested in this, I thank everybody for their cooperation on this Capetown Treaty, where, we do not pass treaties, but where we modified Federal law to create a registry so we could participate in that registry. I never realized when we did it that not only did it apply to airplanes and airplane engines, but also to spacecraft.

So, for once we are sort of ahead of the game, at least in the commercial pecking order and financing and lien and title of this equipment. Usually, if you can finance it in the private sector, you can sell it. So we may be a little bit ahead of the game from that standpoint. Just an aside.

The last question that I have is, would you anticipate that we would have a minimum age for space flight, because you have to give I guess informed consent under the legislation? How would you handle the age question?

Ms. BLAKEY. I think the requirements of any kind of sensible informed consent regime would prevent people under the age probably of 18, which seems to be the consensus on that, from being able to enter into this kind of risky venture. So I think we will be covering that fairly clearly in those guidelines.

Mr. MICA. That is interesting. In 25 years they are going to come back and dig up the testimony of Administrator Blakey on February 9, 2005, that said no one under 18 should fly in space. I wonder how that will be received?

Ms. BLAKEY. Hopefully, in 25 years the risk factors will be dramatically different and it will be commonplace, if that is the case.

On your point about the international arena, too, I was remiss in not saying that in a way we are also ahead of the game in the area of reusable launch vehicles. Because of the X Prize and now the X Prize Cup coming to New Mexico, we are seeing a lot of international innovators and entrepreneurs and companies wanting to come to this country to set up for that industry. So I think we are actually serving as a catalyst in a way that is going to be very exciting.

Mr. MICA. Thank you. Mr. Costello?

Mr. COSTELLO. Thank you, Mr. Chairman. Administrator Blakey, let me ask you for the record to detail what the FAA licensing procedures are especially when it comes to regarding safety and the

environment. What does an applicant have to go through to apply for and be granted a space launch operation?

Ms. BLAKEY. There are five essential elements that we analyze, and there is a great deal of depth in each one of these, but I would simply tick off the fact that, first, we have to be satisfied that there are no policy issues involved with a particular launch. This has to do with national security and broad issues. The second is the payload. That has to be something that is appropriate and again without significant hazard, and so the payload issues have to be satisfied.

The most intensive and robust of course is the third factor, and that is, if you satisfy the first two, we examine whether it is going to be a safe launch. There we have a good bit of depth because we really look at it from the standpoint of system safety and do a tremendous amount of analysis therefore of all of the parameters of that flight. It goes to whether or not, in terms of looking at risk, looking at the hazards, and mitigation of those, has that been satisfactorily done. One has to look at the operating parameters. Often we have to require changes from an operational standpoint so that, for example, there is not a trajectory that might put the uninvolved public at risk.

And then, of course, we also look at the broad issue of whether this is an acceptable level of risk in terms of commonly understood standards. We have a very high requirement there as well. So with all of that in mind, there are two other factors in a launch license, and those go to the issues of environmental concerns, and then financial responsibility. We ask is this launch viable?

Mr. COSTELLO. You mentioned on page two of your testimony, and I will not go through the whole paragraph, but you say, "As you may know, commercial space launches are inherently dangerous and risky operations," and I think we all acknowledge that. You also indicate further in your testimony that since 1989 the FAA has classified 10 percent of its 168 licensed launches as failures. I wonder, if 10 percent of the 168 launches that were licensed were classified as failures, what is the definition of a failure?

Ms. BLAKEY. The definition of a failure is a launch that had to be aborted, that it had anomalies in it, or there were problems that did not justify it proceeding. That would be a failure. It is very different of course from an accident where, again, you do have injury, loss of property, or, in the worst case, loss of life.

Mr. COSTELLO. In response to the Chairman's question about the FAA's authority, flexibility to either regulate or to address the issue of safety, to Mr. Oberstar's point, obviously the legislation addresses the people who are on the ground, not the crew or the passengers. I wonder, the same question, do you believe that the FAA has the authority under the existing legislation and the flexibility, when you say that safety is the number three and the primary concern in the five criteria, do you have the flexibility and the authority that you need now to make certain to the best that the Agency can that the crew and the passenger is safe as well as the people on the ground?

Ms. BLAKEY. I believe that the license process, which, as I say, is highly detailed and involves not only the kind of scrutiny I just detailed, but involves oversight and monitoring throughout the

launch itself, is a very robust one and allows us a great deal of latitude in ensuring a sound performance.

What I would be reluctant to see us do is to try to stipulate at this stage in the industry, design standards or operating requirements. That really would have to be then one size fits all for operations that we do not even know what they are yet and the vehicles are not yet invented and made. I think that is where we would find it difficult to engage. But the concept of ensuring a sound performance from a safety standpoint under the launch regime through licensing and now permitting, I think will work.

Mr. COSTELLO. Mr. Chairman, thank you.

Mr. MICA. Thank you. Do other members seek recognition for questions? Mrs. Kelly?

Mrs. KELLY. Thank you, Mr. Chairman. I just have two questions. I question the licensing process. Everybody here probably knows this, but I would like to know how long that licensing process takes and I would like to know what the cost is.

Ms. BLAKEY. All right. Under the new legislation, we need to have a license completed in 180 days. The permit process, which again is new and is now envisioned, is 120 days. Now there is a great deal of work that goes on before you formally enter into the process and our staff engages very heavily in consultations and the kind of discussion that gives a common view when the application is formally made.

That said, the cost? I would be very hard pressed to conjecture that. The next panel that is coming up I suspect could give you some solid examples from their own direct experiences in the private sector. I cannot tell you. However, the law is also relatively new and the cost differs I think significantly whether you are talking about the vast majority of launches so far which involve expendable launch vehicles versus the new reusable launch vehicles.

Mrs. KELLY. Thank you.

Mr. MICA. Thank you. Additional questions? Ms. Johnson?

Ms. JOHNSON. Thank you, Mr. Chairman, and thank you for having this hearing. I apologize for being late. I had three meetings at the same time. Maybe this has been explored, and if it has been, I apologize, but I am very concerned about safety in this commercial flight trips. I wonder in the licensing if you have standards for the safety of the vehicle?

Ms. BLAKEY. We look very closely at the safety of the proposed vehicle in terms of its operating parameters, in terms of some of the critical safety systems, engines, for example. Propulsion is one of the things that we certainly focus on in great detail. We try to understand why the design is set up the way it is, what its performance envelope is, and then we try to make sure that it will, in fact, deliver without a high degree of risk to the public on whatever the proposed flight path is.

So there is a lot of work that goes into that without our trying to anticipate what a vehicle should be or should look like. That is what we want to allow the industry itself to come forward with.

Ms. JOHNSON. Sure. In terms of the pilots, do they need the same criteria or knowledge base as a regular pilot, or will there be extra training?

Ms. BLAKEY. At this point, I think again we are going to be looking at this case-by-case. Now I will tell you, it would be hard to find folks more experienced than Mike Melville and Brian Binnie, and they are our first two space pilots, if you will. But I think what you are likely to see, and it's certainly our expectation, would be that the people who are at the controls will be highly experienced, many with test pilot experience and other things that are analogous in terms of their aviation experience as they step up. We have not set particular certificates that are required yet.

Ms. JOHNSON. One last question. Are these flights without liability?

Ms. BLAKEY. No, there is definite liability involved. What I think is a sensible approach that we have taken so far, and it is continued under this legislation, divides that liability. There is essentially risk-sharing here, if you will. We require an operator that comes forward for a launch license to take out the first $500 million of insurance. So they have to step up to the table. The government now indemnifies that launch for an additional $1.5 billion. And should there be a catastrophic event that would go past that cumulative total of $2 billion, then the responsibility reverts back to the operator.

Ms. JOHNSON. I said that was the last, but one more. What do you have to do to beef up your staff to accommodate the additional expertise for this?

Ms. BLAKEY. The expertise on our staff?

Ms. JOHNSON. Yes.

Ms. BLAKEY. You know, we have a broad range of scientists and engineers, people who come to this from the standpoint of missile experience with early launches and the development of the missile industry, as well as people whose experience is long and strong in aviation. I think that kind of cross-section of experience is what we will look to enhance and increase with people coming to it from an air traffic control standpoint as this whole industry moves forward. I hope we will be able to attract some people from the industry to join us so that, again, the partnership is as strong as it can be.

Ms. JOHNSON. So the workload at this point is not heavy enough to require additional bodies and minds?

Ms. BLAKEY. We are adding some staff now and we are hoping to have the kind of workload that would call for adding to the staff on an incremental basis. But I would return to one point, and that is, we have a very strong corporate partnership in our support for commercial space. We have everything from the medical research capabilities of CAMI out in Oklahoma City, we have the tech center that can do interesting and important research that can support this, as well as all of the expertise that comes to it from the aviation safety and air traffic control side, and our airport regulators.

So, with all of that, it is not just the Office of Commercial Space. They are the lead, they are the ones who have the authority, but they draw on this expertise in a corporate partnership. We have got an integrated product team now that brings all those people together to support the office.

Ms. JOHNSON. Thank you very much. Thank you, Mr. Chairman.

Mr. MICA. Thank you. Other members with questions who seek recognition? Mr. Oberstar?

Mr. OBERSTAR. Thank you, Mr. Chairman.

Administrator Blakey, thank you for your distinguished presence among us. You always shed light and bring grasp and understanding of aviation issues to our Committee and to the public, the aviation community. I realize this is a little difficult position for you to be in, addressing safety and passenger space travel. I read with some great interest your statement at Page 6, "government requirements for building or designing an aircraft date from 1926." Do you remember who it was that initiated those regulations?

Ms. BLAKEY. I can tell you what they were but I cannot tell you who. Perhaps you could. I will bet you can.

[Laughter.]

Mr. OBERSTAR. Yes. It was an Assistant Secretary of Commerce who was slapped down by the industry and by the Secretary of Commerce and his White House for having the audacity to suggest that the government should regulate air travel, the safety of air travel. You will stifle this industry, they said.

And in the 1920s aircraft had the bad habit of losing a wing in flight, losing an engine in flight. So this Assistant Secretary of Commerce pulled his horns in and bided his time and he became Secretary of Commerce, and then he launched the regulations. Herbert Hoover—Hoover insisted on the regulation of safety in aviation less for protecting those who would travel than for advancing the cause of commercial aviation. "If we do not make it safe," he said, "people will not use it."

So now we are at the dawn of another era 80 years later. As President, Hoover insisted pressing the agenda on safety. He is not given much credit for it, as something else happened along the way to obscure his presidency. But I will always give him credit for that vision of what was needed in the service of industry and, incidentally, service of safety for the traveling public. Now safety is imbedded in our mind and heart and the fabric of the FAA.

As I said, it is the premier agency and other aviation agencies take their lead from the FAA and other countries of the world look to the FAA. Brazil would not approve an Embraer aircraft until the FAA first had certified it. Airbus, for all of its competition with Boeing, knows it cannot put an aircraft in the air—I remember a meeting with Airbus in Toulouse when the president, Jean Pierson, said, "It is extremely important for us that the FAA accepts our design, because when it does we can sell this airplane anywhere in the world." All right. Now, with that background, give me an example of a safety regulation that would stifle this industry.

Ms. BLAKEY. I think the concern about a regulation that would be prescriptive is that we are not anticipating some of the kinds of innovation, some of the kinds of operations that could be, should be explored and could be, in fact, the real making of this industry. We have only had—

Mr. OBERSTAR. What would you do, what would FAA do that you would sign off on that would stifle this industry from the standpoint of safety?

Ms. BLAKEY. We would certainly try not to. But I think the concern is we do not know enough to set out a regulatory regime yet

for operations and for the design of vehicles that we do not know what they are yet.

Mr. OBERSTAR. Do you think it is a good idea to wait until there is a crash and a fatality to issue such regulations?

Ms. BLAKEY. We will not wait until there is a crash. One of the things that I really do believe—

Mr. OBERSTAR. But you are prohibited from doing anything until that by the law.

Ms. BLAKEY. The licensing regime and the permitting regime gives us great latitude.

Mr. OBERSTAR. You know, I disagree with you. FAA has the skill, the expertise, the understanding of aerodynamics and design to be able to look at a vehicle and say, you know, consider the context of the language that I offered, "inherently risky nature of space travel" and say this is inherently risky, but this is really crazy, you ought not to do this.

Ms. BLAKEY. I think the license regime, I think the permitting process gives us great latitude to do that. One thing I will stress, and I very much appreciate the confidence that your remarks signify in the FAA, the FAA has a long and important reputation for ensuring safety that we will not compromise in any way. That will continue. And the vehicles under which we can do it currently I think allow for us to do that job and do it very well. It will be on a tailored basis, it will be on the basis of each one of these as they come to us because we cannot anticipate what they will look like. But you can believe me, we will oversee safety.

Mr. OBERSTAR. You said in your testimony that you will regulate safety to protect people on the ground. That would in my mind indicate that the FAA would look at a design and a structure and, if it found a design feature that was flawed, likely to cause a crash, and your engineers know what they are looking at when they look at conventional aircraft and say, you cannot do that, that if it were likely to cause a crash over a populated area, you would intervene.

Ms. BLAKEY. Absolutely. We would not grant a permit or license.

Mr. OBERSTAR. So why would you not intervene in a design flaw that is likely to endanger lives of passengers aboard an aircraft that is going to the edge of space?

Ms. BLAKEY. The two things are inexorably linked.

Mr. OBERSTAR. Well, you are prohibited from doing that under the law.

Ms. BLAKEY. I think what we are concerned about—

Mr. OBERSTAR. But given the authority, you could do that, could you not, in a way that would not stifle the advancement of science?

Ms. BLAKEY. I think the protection of the uninvolved public goes a long way toward protecting those who are in the craft itself. What I will say though—

Mr. OBERSTAR. Do you think a simple waiver of responsibility is sufficient to protect people?

Ms. BLAKEY. I think it informs them. And I think as adults who want to engage in risky exploration, and that is what this is. This is not transportation and I think it is a mistake to make analogies to transportation, people are not using it to get from here to there. This is not routine, this is much more comparable to climbing Mount Everest than it is to anything else.

Mr. OBERSTAR. I think you and the others miss the point. Experimentation with human lives, we do not allow that in the laboratories of the Food and Drug Administration or of the National Cancer Institute. Why should we allow it on space travel?

Ms. BLAKEY. We do not prohibit all sorts of risky sport activity, all sorts of risky exploration. In fact, this country thrives on it.

Mr. OBERSTAR. Oh, I think you miss the point. Your agency is the premier agency for safety. You ought to accept the responsibility and not be abdicating that responsibility.

Ms. BLAKEY. The FAA, believe me, will always step up on safety. And I think as we look at this over time, we are going to see that the authority we have is flexible enough to address most of the concerns we can anticipate. There will be some none of us will be able to anticipate.

Mr. OBERSTAR. What you are saying to me, though, in roundabout fashion, is that we are not able to conjure up regulations you would issue at this time that would stifle the advancement of this technology to launch people in commercial passenger travel in space.

Ms. BLAKEY. I think that what we think is that we have the authority we need currently as far as we can see. And let me also just say this. This legislation is brand new, passed December, as you point out. We are working with it ourselves. Over time, if we find that it is hamstringing us, if it is causing problems that we can see from a safety standpoint, believe me, we will be the first to stick up our hand, no question about it. But at this point, from what we can see, I think we believe we can make this work.

Mr. OBERSTAR. Well, I have great lung power, but I will not hold my breath that long.

[Laughter.]

Mr. MICA. I thank the gentleman. Are there any further questions for this witness?

[No response.]

Mr. MICA. I thank you, Ms. Blakey, for being with us and for your testimony today. Sort of an exciting launch of our Subcommittee hearings and actually a new era. And given my gene pool, I do not think I will be here in 2030, but I have asked Holly to check out your testimony in 2030 in light of some 25 years.

Ms. BLAKEY. I hope we will both be around to check that out.

Mr. MICA. We thank you and we will excuse you at this time.

We now call our third panel, our last panel, and thank them for being patient. We have four witnesses here.

First, we have Mr. John Douglass, president and CEO of Aerospace Industries Association; we also have Michael Kelly, who is chairman of the Reusable Launch Vehicle Working Group, COMSTAC; we have Mr. Lou Gomez, program manager of the Southwest Regional Spaceport in New Mexico; and then finally, Mr. Will Whitehorn, president of Virgin Galactic. I would like to welcome all of our witnesses. If you have any lengthy statements or information you would like to be made part of the record of this hearing, just request so through the Chair.

We will recognize first and welcome back Mr. John Douglass with the Aerospace Industries Association. Welcome, sir, and you are recognized.

**TESTIMONY OF JOHN DOUGLASS, PRESIDENT AND CEO, AEROSPACE INDUSTRIES ASSOCIATION; MICHAEL KELLY, CHAIRMAN, REUSABLE LAUNCH VEHICLE WORKING GROUP, COMSTAC; LOU GOMEZ, PROGRAM MANAGER, SOUTHWEST REGIONAL SPACEPORT, NEW MEXICO; WILL WHITEHORN, PRESIDENT, VIRGIN GALACTIC**

Mr. DOUGLASS. Thank you, Mr. Chairman. I want to begin by thanking you for having this hearing. This is an important subject and I appreciate the fact that you and Mr. Costello are taking the time to do this. With your permission, sir, I would like to enter my written statement into the record.

Mr. MICA. Without objection, your entire statement will be made part of the record.

Mr. DOUGLASS. What I am going to try to do is very quickly summarize some points that were in my statement. I have also made a couple of notes from listening to the discussion that has gone on before and I will just try and add a few comments that might be helpful to the Committee relative to the discussions that went before me.

The first thing I think to point out that needs to be pointed out is that while this commercial space part of the aerospace industry is a very important and vital part, it is still a very small part of our overall aerospace industry in the United States. In 2004, we had total sales of about $160 billion, $38 billion of it were in space related products, $20 of those $38 billion were done by the Department of Defense, $16 billion were done by NASA, and $2 billion were done in the commercial sector. So, $2 billion out of $160 billion.

But it is a part of our future that we hold to be very important, and it is also very tightly laced into what we do as a society on a day to day basis. More and more of our communications, of our banking information and so on is going through commercial space products.

To the discussion that went on before, it is important to note that of all of the launches that were mentioned in the previous testimony, only one of those launches involved humans. All the rest were non-rated systems. And it is likely that for a considerable period into the future the preponderance of commercial space launches are going to be unpopulated launches, and that is an important thing to remember as you look at the regulation of this whole part of the industry.

It is also important to note the dependence of our economy and our national security on commercial space. That is a growing dependence and it is a dependence that is vital both to our national security and to our economic security. It is also important, Mr. Chairman, to note that this part of our industry, just like the aircraft production base, tends to be a cyclic part of our production.

As you are I am sure aware, when commercial satellites were first begun to be launched, they had fairly short lifespans, they had to be launched again in fairly small increments of time. Today, we can put commercial space systems into orbit that can last ten, fifteen years, fairly long periods of time. And what happens is the market tends to get saturated, then there will be a few lean years, then opportunities again open up.

It is also important to note in that context, in the beginning of this part of the space industry, the United States was pretty much the sole provider of commercial launch services to anybody in the world that wanted to go into a commercial space endeavor. Because of the entry of other nations into this arena, we are now at about 50 percent of the global market.

It is important for us to recognize that we do not want to see the U.S. market share of this part of our industry decline further. Today, in the commercial space arena we have, in addition to the United States, we have the Russians, we have the Chinese, we have the Indians, we have the Brazilians, and probably our biggest competitor is, of course, the EU nations.

I want to also knit a couple of things together about the discussion that went on before. One of the things that our industry is most concerned about for the future is the development of a new air traffic control system for our atmospheric traffic of the future. It is very likely that a significant portion of that system is going to be a space-based system.

We certainly do not want to tie the Administrator's hands in how that is constructed. It could be a space-based system that was shared with the Department of Defense, it could be one that is an FAA operated network of its own, Chairman Blakey or whoever comes after her may want to have their own constellation, but it could be a commercial constellation which provided space-based imagery to our system, and we certainly would not want to rule that out.

To the discussion about the safety issues that were mentioned earlier, it is too bad that Mr. Oberstar had to leave because I frankly would be interested in his response to our long-range vision of how this should operate. The key issue that we see today, sir, is that we want the system that eventually evolves for commercial space travel to as closely as possible mimic the system that we have for atmospheric air travel.

In other words, we would like to see a series of certificates established, a type certificate for the system that would be the launch system, and an operator's certificate for operating that system. Now you could imagine, sir, if we had to get a separate license every time an airplane took off in the United States, it would be a gillion licenses, and we cannot do that. That is why we have a type certificate and an operator's certificate.

And eventually, we are going to get into a regime where the number of commercial space launches will be so numerous that we will not be able to do that mission on a mission-by-mission basis, we will have to have these type certificates. The sooner we can move to that regime, the better that industry would like it.

I think my time is up, sir. I would be glad to answer any questions along any of these subjects.

Mr. MICA. Thank you. We will defer questions until we have heard from the other panelists.

I will now recognize Michael Kelly, Chairman of Reusable Launch Vehicles Working Group. Welcome, and you are recognized, sir.

Mr. KELLY. Thank you very much. I will greatly abbreviate my comments, which are twofold in their focus. The first is to tell you

the direction that we believe that the emerging private commercial space transportation industry is taking, and this is hereafter referred to as the industry, and then on how the industry has planned to address the issues left open by the Commercial Space Launch Amendments Act of 2004.

Now for the first time since it began many, many years ago, this industry actually is emerging. But we have a long way to go before there is such a thing as an ongoing, revenue-producing industry and even the smallest of stumbles could add years of delay.

The main thing that has happened over the past couple of years in the way of establishing a market for this industry has been the recognition that personal space flight, the conveyance of paying passengers into space, is now the only reasonable market that will sustain initial development of private space transportation systems. Burt Rutan demonstrating his reusable space ship, Richard Branson stepping forward and establishing a credible operating company, and the market being demonstrated by two paying passengers having flown into space on Russian launchers have all brought this into focus as being a real market and the one that is going to sustain the industry.

Now, the government has kept pace with this. The Commercial Space Launch Amendments Act was the first piece of legislation ever to address human passenger space flight. It continued to provide for the safety of the uninvolved public, but it does not preempt the right of space flyers to take their own informed risks, and I highly commend the Congress for recognizing individual rights.

That does not mean that safety of space flyers is not a serious issue. This is the other half of the equation. And if it is not addressed in legislation, how is it to be ensured? This is the foremost concern of the industry.

And in order to answer the question of how we ensure the safety of flight, both out of a concern for human life and also for the health of the industry which would be severely damaged by unsafe operations, a group of industry leaders met earlier this year in January to discuss an industry solution for ensuring the safety of space flyers. They developed a plan to establish a federally-recognized Industry Consensus Standards Organization. The primary purpose of this would be to formulate industry Consensus Standards that would ensure the safety of space flyers. Any time industry Consensus Standards exist, they take the place of Federal regulations.

Such standards are prevalent in the United States. The best example, and I use this for a specific reason, is Underwriters Laboratories. Not only electrical devices, but almost every hazardous device sold in this country carries a UL stamp of approval. This is an independent organization whose stamp of approval carries the weight of over a century of experience and gives a device both market acceptance and a limit to liability for the manufacturer, that people, while they do not have to get that stamp of approval, should do nothing else. We believe the same stamp of approval will provide the same level of safety and protection for both passengers and manufacturers and operators of space ships.

Of course there is only one way to ensure perfect safety, and that is not to engage in an activity. If the Government regulates the

safety aspects of space flyers themselves, we think this would be tantamount to prohibiting personal space flight as an activity. There is no experience base on which to formulate regulations that are similar to the ones that FAA has used for years. The only people who are gaining the experience that can be applied quickly and in the time required to support this industry are the people who are in it themselves. That is why we advocate an Industry Standards group, and independent one, rather than a Federal regulatory agency.

Congress has shown its commitment to guaranteeing the freedom of this industry to grow as a commercial enterprise and maintaining that course is I think something we as an industry would like to see happen. We are certainly stepping up to our part of the job by taking responsibility for the freedom that we do have to trade value for value with people, selling them a service to convey them into space with the informed consent that they have that this is a risky operation.

That concludes my oral arguments. I have a much longer written statement that I am sure you have questions about.

Mr. MICA. We will be glad to put the entire statement in the record if you would like to submit it. We thank you for your testimony.

We will hear now from Mr. Lou Gomez, program manager of Southwest Regional Spaceport, New Mexico. Welcome, sir, and you are recognized.

Mr. GOMEZ. Thank you, Mr. Chairman, and members of the Committee. I want to thank you for this opportunity to brief the Committee on the status of the New Mexico Spaceport development efforts. I will be briefing you on what we have done so far and what our plans are, what our progress is. Before I get started, I want to thank the FAA, particularly Administrator Marion Blakey and Associate Administrator Patti Smith for their continuing support for our program.

Some of our program highlights in the developing our spaceport. From 1994 to 1996, we completed feasibility studies for an inland spaceport. From 1966 to 1967, we conducted environmental studies and submitted initial license application to the FAA. In 1998, we submitted a Statement of Qualifications to Lockheed Martin to host the VentureStar program. The Lockheed Martin folks told us that our proposal was top rated. In 2003, we submitted a proposal to the X Prize Foundation to host the X Prize Cup. And in 2004, New Mexico was selected to host the X Prize Cup.

New Mexico has several advantages, including low population density, uncongested airspace, altitude advantages, excellent weather, and State support, both political and popular.

This chart here shows the population density of the United States. As you take a look at that red circle there, you will see where the spaceport is located. Of course, you can see that we have very, very low population density and this feeds back into the safety problems that you were discussing earlier, because one of the things you have to satisfy is the FAA requirement for flight safety and being able to meet their expected casualty rates. So you can see that helps us tremendously in that area.

The next chart shows the air traffic throughout the United States. Again, if you take a look at that red circle, you will see that the spaceport is located in an area where there is hardly any air traffic. The reason for that is we are adjacent to the Army's White Sands Missile Range and they have controlled airspace and that limits the air traffic through that area.

The next chart is a chart that we put together using VentureStar vehicle performance data. We actually put this in our proposal to Lockheed Martin. What we did is we took their vehicle performance data, put together this chart, and it basically shows that by launching from New Mexico, we are at an altitude of 4300 feet and our latitude is 38.2, you can pick up almost 3,000 pounds of payload to orbit by launching from New Mexico versus some of the other sites in the United States.

We have excellent weather. Southern New Mexico's benign climate is amenable to year-round outdoor work. Major weather disturbances such as hurricanes and tornadoes are rare, and we have no salt air corrosion.

The Southwest Regional Spaceport is located in southern New Mexico in Sierra County, between Las Cruces and Truth or Consequences. It is shown there on the map as the Southwest Regional Spaceport. Also shown there to the right in green is the White Sands Missile Range and that is what helps us in our controlled air space.

Since winning the X Prize Cup, New Mexico has been working to develop the program and required infrastructure. The drawing I am about to show you is a conceptual layout that includes runways, launch/landing pads, propellant storage areas, vehicle assembly buildings, office and control buildings. If you look at that chart, this is an actual view of the Southwest Regional Spaceport itself. The buildings are conceptual, but the land itself is where the spaceport will be located. As you can see, there is very, very low population density, it is flat, so that helps our flight safety situation.

As far as issues and concerns, we believe that commercial space is an emerging industry that has the potential for significant positive impact on the U.S. economy. We ask Congress and the regulatory agencies to take a careful approach to legislation and regulation of this industry to ensure that unintended negative effects do not occur.

Thank you, Mr. Chairman, members of the Committee, this concludes my presentation. I will be happy to answer any questions you might have.

Mr. MICA. Again, I thank you.

We will now hear from Mr. Will Whitehorn, who is president of Virgin Galactic. We appreciate your patience. Welcome, and you are recognized, sir.

Mr. WHITEHORN. Thank you very much, Chairman. I will not repeat the statement which I have brought forward today. I will just make a few comments to endorse those that my colleagues have made already.

This is a fledgling industry. It is an industry which, in terms of passenger carrying, is in its infancy, an infancy which began last year with the first flights of SpaceShipOne. We, as a group of com-

panies involved in the airline industry worldwide, we have three airlines operating around the world, one of which flies into many cities in the U.S.A., we take safety extremely seriously at Virgin Group and we would not be entering this industry unless we had a safety culture to bring to it.

One of the reasons that Burt Rutan and Paul Allen have been very keen to work with Virgin on the second phase of the SpaceShipOne project, we call it SpaceShipTwo, one of the reasons they have been keen to work with us is because of the culture we bring of being involved in the civil aviation industry.

Virgin has been operating in that industry now for nearly 30 years and we actually have a unique record worldwide in that we have never lost a single passenger in an accident, despite operating around the world over 120 aircraft. We have also been for nearly ten years now in the rail industry in the U.K., where we have introduced the most modern fleet of trains in the United Kingdom. We carry 50 million passengers a year in that industry. We have never lost a single person in an accident.

Now we intend to bring this culture to this industry right from the word go. But we would not enable ourselves to raise the funds to develop this business and order the spaceships necessary to create a space industry which would eventually lead to a wider commercialization of space and cheap economical and safe satellite launching, and eventually space exploration, this could not be achieved if it was stifled at birth as an industry by a regulatory structure which was designed for a mature industry. So we endorse the way that Congress has passed an Act which does allow an investment to take place in this industry.

That does not mean to say that as an operator working with a manufacturer, Burt Rutan Scaled Composites, we will not make safety the highest priority. We intend to build the spacecraft, which I have just been in the Mojave Desert contracting to have built, the first five spacecraft, we will build them beyond what we would regard as a certification of aircraft in the United States, that we will take the choices as to how we do that and we will work with the FAA to ensure that they consider the decisions that we have taken in the circumstances of the knowledge that we have at this time to be the best ones. Not every decision that is taken in these early years will be the right one. But it will be taken in the best and informed way by the parties. Mistakes may be made, but they will be learned from.

But given that we have had 1,800 people who have now approached us wishing to fly in the early years, and given that they read like a textbook of Hollywood, Congress itself, international stardom, we are hardly likely to launch space flights which will kill these people. It will not be our intention to operate in anything but the safest way possible.

We have put our brand on the line by going into this industry. But our $120 million initial investment in buying the technology from Paul Allen, and $100 million on building the first five spaceships with Burt Rutan is an investment we are making in the United States. We intend to operate in the United States and we intend to build our second and third operations after Mojave in maybe places like New Mexico, Florida, or other parts of the USA

where spaceports are developed. We are intending to do that and invest in building a U.S. company because we believe the regulatory environment for doing it is the right one and the right decisions have been taken to encourage this fledgling industry.

I personally see it much more in terms of Wilbur and Orville Wright. If we see Burt Rutan as being like the Wright Brothers in this industry and what we have had before is what existed before aircraft were developed in the early 1900s, before we had an industry which was based upon transporting people across the Atlantic in large ships, large ships which were heavily regulated in their construction by the late 19th century, in fact, so regulated that they built the world's safest ever ship called the Titanic and look what happened there. That was the most regulated industry of its time in the world.

Along came the changes that took place in 1903 when two brothers built an aircraft that managed to fly and the rapid development of that industry which created an industry through both the First World War and beyond it, which then got to maturity level by 1926 which deserved regulation. It was regulated in the United Kingdom first. In fact, the FAA in the United States was modelled on the CAA in the U.K., which is the world's oldest regulatory structure for aircraft design. That development was not right at the beginning. The FAA was not created by Herbert Hoover to kill an industry. It was there to create a standard for it.

Now we have learned from those lessons in the aviation industry today and we believe that, working with the FAA, the new industry that is forming can create those standards of the future. As they develop, they can be introduced. And if this industry gets it wrong and the FAA gets it wrong, Congress will be the first people down the throats of this industry, and I will not have a brand worth its name. So we do not intend for that to happen. Thank you very much.

Mr. MICA. Thank you. I thank all of our panelists for their testimony. A couple of questions now.

Mr. Douglass, what do you believe that the FAA's role should be in providing safety oversight of commercial space transportation industry?

Mr. DOUGLASS. I think eventually it needs to be pretty much the same that it is for airplanes, sir. When you think about what is happening today in I guess the term would be human-rated commercial space systems, we are probably inventing some new terminology here because this is such a new thing, many of the scientific things that are taking place have already been pioneered by the government in various ways.

For example, this remarkable achievement of SpaceShipOne, as remarkable as it is, was achieved almost 40 years ago by NASA and Alan Shepard's first suborbital flight. So our government and our industry knows a lot more about this kind of stuff than let us say the government and the industry did during the first 10 or 20 years after the Wright Brothers flew their airplanes. Everybody was learning it together in those days.

In this instance, you have a situation where the government has invested in this and has made a number of wonderful achievements in space, and now the commercial industry is following down that

path. So we do know a lot more. And I think there is a role there for the FAA but it should be as close as possible to the way they regulate air traffic.

Mr. MICA. The U.S. has lost quite a bit of business in the commercial space launch industry. As far as U.S. commercial space transportation industry, how do you see that competition evolving? Now Mr. Whitehorn is pretty optimistic. He felt that within our regulatory environment, et cetera, that they could launch their project within the United States. Do you think we will lose to the international arena if we get too bogged down in regulating and sort of protecting the industry against itself?

Mr. DOUGLASS. We certainly have to be mindful of what is going on in other parts of the world and we need to have a regulatory regime here in the United States that recognizes that this is going to end up being a global phenomena. The Russians already, as you know, are using their government systems to take people up to space for a very large amount of money. So one could argue in a sense the Russians are already ahead of us in this.

I think, to be honest with you, Mr. Chairman, people do not really know how big this market is going to be. I find what some of my colleagues have said today interesting and courageous and it is wonderful that people are willing to put a lot of money into investing this. But I just cannot sit here today and tell you that this is absolutely going to happen. And I have a lot of confidence, frankly, in this Committee and confidence in Administrator Blakey and Secretary Mineta to walk the balance that you need, to regulate when you need to, but to give latitude when you need to. I think we have struck a pretty good balance so far.

Mr. MICA. Mr. Gomez, have you given Ms. Blakey a request for AIP funding for your project?

Mr. GOMEZ. Yes, we have.

Mr. MICA. Thank you. I thought you would appreciate that one.

Mr. Kelly, you seem to think that there will be some inevitable problems and possibly accidents or something to set this program back. Somewhere I thought I heard you say that we might anticipate some of these possible eventualities, such as we have developed with our aviation experience and the development of our commercial passenger aviation system. And by the same token, I thought I heard you also say that, basically, we should stay out of the Government regulation of commercial space transportation industry. How do you reconcile those?

Mr. KELLY. Good question.

Mr. MICA. Maybe I took something out of context.

Mr. KELLY. No, no, no. Actually, it is a very good question because I want to distinguish among three different things. One is, first of all, the regulation that is now in place for ensuring the safety of the uninvolved public. That is not only an appropriate function of Government, Government is the only entity that can do this. It has consequences that go far beyond simply the reckless actions of someone flying too close to a population area. There are international aspects, treaty, national security issues, et cetera. Only the Government can or should regulate these things. And it is doing a very good job. AST does this through its launch licensing process.

The second area—I think Administration Blakey made an excellent remark—in the early days of personal space flight, this is not transportation, this is an adventure activity. That is what the first flights are going to be like. People are going to be taking risks not in the way they would getting on a bus or on an airplane or a train.

I am impressed with the safety record you have because rail travel historically has been the most dangerous of anything. Quite an achievement. They are going to be getting on something that they know is dangerous, that is all there is to it. It is a risky business. And the farther and faster you go, the more risky it gets. There will be fatalities. Nobody wants them. It is something that the industry and the passengers are just going to have to deal with. But they will.

The industry is going to pose itself to get experience as quickly as it can and disseminate it among the developers and operators as quickly as they can. It happens now in all other industries and this one is no exception. And so for the phase of the exploratory and adventure part of this industry, I do not think that you can have anything else but a self-regulated industry.

Now when it goes into the mode of having what would be a common carrier regular transportation system, I think that is a gray area. I think that FAA has done a very good job at ensuring passenger safety, there is no question about that. I am not sure that it has done the best possible job only because Government, by its very nature, takes longer to introduce safety innovations than industry does.

That is not a criticism at all. They do provide a high level of safety, there is no question about it, whether it is as high as it could be is another question. However, the industry to some extent supersedes this anyway. Boeing, for example, has a certification regime that incorporates the FARs as a subset. Theirs is actually much more stringent than the Federal Aviation Agency. That is not true of everybody, but it certainly true of some companies.

Mr. MICA. I thank you for your testimonies. I thank all of our witnesses.

Mr. Costello?

Mr. COSTELLO. Mr. Chairman, thank you. Mr. Kelly, I was going to ask you my first question and it was the last question that the Chairman just asked, because I was kind of confused as to what the Government's role in your view should be as far as regulation and safety.

And I was going to ask you, if you were saying in your testimony, as I read it here, that the industry has higher standards, in many cases far superior to the Government, and it says in terms of actual safety, "industry standards are likely to be superior to Government regulations," and I understand the point that you are making, but I was going to ask you to kind of clarify what you think the Government's role should be and what you think the private sector's role should be. So I am glad that you clarified that.

Mr. Douglass, you made the point, in answer to Chairman Mica's question of what the FAA's role should be, you said that "eventually" it should pretty much be the same as it is in aviation. I won-

der if you would clarify what you mean by that, when you say "eventually" it should be the same as aviation.

Mr. DOUGLASS. Well, sir, as you know, we are developing a new air traffic control system for our country and the time frame that we are looking at is all of the traffic that we expect between now and 2025. I think it is reasonable to expect, now we are in 2005, that is 20 years from now, that this part of our industry will have developed to the point where there could potentially be many, many of these launches.

And just as that air traffic control system is going to have to accommodate all kinds of new air-breathing vehicles, like we are talking about air taxis, and remotely piloted air vehicles and so on, it has got to also be able to accommodate both the launch and reentry from space if it is going to occur on a routine basis. We cannot have situations where we stop all the air traffic on the East Coast every time we do a launch. We cannot have air traffic between Los Angeles and the East Coast stopped every time we launch something out somewhere in New Mexico or Arizona or wherever it is. We have got to have a seamless system that works in a coordinated way.

And so, just looking towards that period of time into the future, we think that eventually we ought to be able to have a system where you could get a type certificate for the launch vehicle that you were using and the reentry vehicle that you would come back in and an operator's certificate, just the way the FAA does today where all of the things that Mr. Kelly and others have talked about today are a part of the certification process as you get your type certificate and your operator's certificate, and then this would the operate on a relatively seamless basis. We do not see it over the long term as being feasible to get an individual license for every single launch that would occur as these launches begin to become numerous.

Mr. COSTELLO. Mr. Chairman, I have no further questions.

Mr. KUHL. [Presiding.] Are there any other members asking questions? Mr. Oberstar?

Mr. OBERSTAR. I welcome this panel. I read your testimony last night in preparation for today's hearings and was very interested in the various comments made.

Mr. Douglass, I have enormous respect for you and the leadership you have provided for the aerospace sector. You have been a champion voice, a solid, thoughtful, constructive voice. You have all pointed to the great advantages, commercial benefits of space travel and certainly of the tantalizing challenge to the human spirit of space travel.

What I do not understand is the statement that you had in your statement, Mr. Kelly, saying that "Federal regulation of space flyer safety would almost be"—you used the word almost—"the equivalent of outlawing personal space flight." What do you mean by that? What do you mean by outlawing?

Mr. KELLY. The restrictions that one would have to place on safety provisions for passengers at this stage of our knowledge—

Mr. OBERSTAR. Give me an example.

Mr. KELLY. Sure, I will give you an example. Someone had asked, and I believe it was you, asked earlier if the FAA would per-

mit a plane that did not meet structural safety factors to fly if it was likely to fall apart over a city, and the answer was, no, and it should not. If the Federal Government decided that it was going to say, okay, passengers will not be safe unless spacecraft have aircraft structural factors of safety, knowing nothing else, that would physically make impossible space travel. You cannot have—

Mr. OBERSTAR. But if you look at the language that I proposed in the course of the debate last fall, with the caveat "taking into consideration the inherently risky nature of space travel," how can that be the equivalent of outlawing personal space flight.

Mr. KELLY. Once again, if you are formulating regulations with no experience whatsoever, how do you do it? The FAA—

Mr. OBERSTAR. Well, there was no experience in the 1920s.

Mr. KELLY. Oh, yes, there was 26 years of experience.

Mr. OBERSTAR. Sure, there were a lot of fatalities.

Mr. KELLY. That is exactly right, and—

Mr. OBERSTAR. And there was no experience with composites when Cirrus began its plan to build an all composite general aviation aircraft but as an all composite aircraft. There were parts of aircrafts built with composites, but not an all composite. They did not know for sure whether the wings should go entirely through the aircraft, or whether it should be joined somewhere in the midsection of the aircraft. Those matters were all worked out.

Mr. KELLY. It takes a long time to do that and this particular industry is so capital intensive that we cannot afford to wait.

Mr. OBERSTAR. You cannot afford to thread safety into it?

Mr. KELLY. No, no, no. You can afford to thread safety into it, you cannot afford to thread paranoia into it.

Mr. OBERSTAR. No one is talking about paranoia. Do you think the FAA is paranoid? Hardly.

Mr. KELLY. No. I think that a responsible agency—

Mr. OBERSTAR. I do not think that is a defensible argument.

Mr. KELLY. A responsible agency that was charged with doing something that no one can do would tend to err on the side of caution.

Mr. OBERSTAR. I do not think that we are talking about something that no one can do.

Mr. KELLY. No one can do it. There is no experience. There is no precedent.

Mr. OBERSTAR. Mr. Whitehorn has had experience.

Mr. KELLY. No, no, no. There is no precedent for the safety of flight of spaceships. No matter what—

Mr. OBERSTAR. I disagree with your premise. We have a body of safety professionals in the Federal Aviation Administration who understand how to move toward safety. We do not have zero fatality as a goal in commercial aviation, subspace commercial aviation. It is a goal of reducing fatalities and reducing risk.

Mr. KELLY. That is another aspect of this, and that is I do not think—I take that back. The Administrator recognized that this is a risky operation, especially at the beginning, and it is. This is inherently a higher risk proposition than regular air transportation.

I disagree, however, that there is any experience base on which to formulate regulations. The experience that you have from expendable launch vehicles, and the example of Alan Shepard's flight

into space was cited, is completely inapplicable to reusable launch vehicles, and, frankly, the experience that we have with airplanes is as well. There is no overlap between the two.

Mr. OBERSTAR. I do not think that is a defense against incorporating safety in the design features of this vehicle.

Mr. Whitehorn, what safety concerns did you have in moving ahead with your launch?

Mr. WHITEHORN. That is a very good question to ask because I plan to be on one of the test flights, so I am taking this issue particularly seriously in a personal sense.

Mr. OBERSTAR. I should think so.

Mr. WHITEHORN. Our view of this issue at Virgin, which is a company very experienced in dealing with regulatory authorities both in the United Kingdom and in the United States on safety issues, and where I think we have a very good track record in this area, our view is that we should be building SpaceShipTwo, the successor to SpaceShipOne, which will carry the first commercial passengers affordably into space, our view is that we should be building it above the current standards in aviation that exist at the moment. But it is better that we spend our investment dollars on doing that than going through bureaucratic processes at this stage in the game which may not be the right ones.

You were asking earlier, you were asking Marion Blakey I think the question what is it that you do not want to regulate, give me an example, I think you asked her. I thought I would give you an example of the kind of issues that one has to grapple with at this stage where a light touch of regulation in the personal sense is probably important.

Pressure suits is a good example. Pressure suits are worn by supersonic fighter pilots, they are worn in space, NASA astronauts would wear them on a Shuttle mission, for example, they would wear a pressure suit. However, if you were going to take space tourists into space where you are not going to have years of experience of the individuals, it may be actually negative in the safety sense and it may be counter-intuitive to design a pressure suit for a commercial space tourist. It may be better to design the vehicle that you are taking them in with a whole safety regime around the vehicle.

The vehicle itself that goes into space becomes your lifeboat in the event of an incident. You do not rely on the extraneous technologies that NASA has relied on which it has cobbled together in its 40 years of experience, from oxygen to pressure suits, rather than treating the vehicle itself as a safety lifeboat in its own right.

Mr. OBERSTAR. So you pressurize the vehicle, not the individual.

Mr. WHITEHORN. Not only pressurize the vehicle, but you think of how you design their experience so that when they experience the G-forces they do not need a pressure suit to be safe in that reentry. That is new and blue sky thinking where a very heavy regulatory regime at this stage would actually potentially force us away from the safest thing to do once we have considered it.

Mr. OBERSTAR. You fear an FAA or a safety regulatory regime—

Mr. WHITEHORN. I have no fear of the FAA, sir.

Mr. OBERSTAR.—that would come in and impose upon you some regulation of this kind. That is not the way the FAA operates. They

work with the manufacturer in the development of new design aircraft, for example. If in your case—

Mr. WHITEHORN. Let me put it this way. There has been a lot of experience built up in this industry—

Mr. OBERSTAR. Just a minute. If, in your case, you are convinced that pressurizing the aircraft rather than the individual within the aircraft is safe, do you think the FAA is going to say oh, no, I do not think so. They are going to work with you to develop that idea.

Mr. WHITEHORN. Well, actually, we would be pressurizing the craft anyway. We are talking about a pressure suit to protect you against G-forces, not for breathability. But just let me give you an example. The received wisdom as it would be laid down by NASA would necessarily dictate that you cannot send somebody into space experiencing these G-forces unless you put them in a pressure suit.

In fact, experience has told us that you can now design the entire craft and the person's position in the craft with the freedoms that we would have to do that because of the nature of the beast that we are creating, which is something to carry people into space for the experience of the adventure. We may be able to design a craft in a safer way by ignoring that received wisdom and experience at this stage, that received wisdom and experience developed in a governmental program designed around an entire range of goals which are not necessarily goals about safety. The Apollo space program was not a program designed with safety as the first priority, it was designed with getting to the Moon as the first priority.

Actually, as I said in the testimony, our project here, given the nature of the worldwide business we operate and the brand we have, safety is our first priority. It may not even be the FAA's first priority at this stage in the project. It may not even be the first priority of other aspects of the industry, those who are creating new star relaunchable vehicles for satellites. But for our company coming into this business, working with Scaled Composites, safety is our first priority.

Mr. OBERSTAR. Sure. So I do not understand your fear of a regulatory regime within which the FAA is a partner in the development of the safety and using its body of expertise over many decades to participate in the safety—

Mr. WHITEHORN. I think you will find, Congressman Oberstar, that in nothing I have said today nor in my testimony have I experienced any fear of that sort. If the regulatory regime that had been passed as a result of the Act going through Congress in 2004 had introduced different criteria, then we may well have worked with those criteria.

But we are where we are and I am telling you what we are planning to do is to operate, in terms of the way we do things, to create the safest possible experience for the greatest number of people. We are working on the Benthamite principle of the greatest happiness of the greatest number as this project goes forward and commercial space tourism leads to a new industry.

Mr. OBERSTAR. Let me just read to you the language of the bill, which is the language that I discussed in the course debate on the House floor last fall. "In carrying out responsibilities under this provision, the Secretary shall ensure that each license approved includes minimum standards to protect the health and safety of

crews and space flight participants, taking into account the inherently risky nature of human flight." What objection do you find to that?

Mr. WHITEHORN. I do not find any objection to that.

Mr. OBERSTAR. Fine. Mr. Douglass, do you find any objection to that?

Mr. DOUGLASS. Sir, I am uninformed by the debate that you all had. But my sense of this is that I do not.

Mr. OBERSTAR. The only objection was the gentleman from California, my dear friend Mr. Rohrabacher, who said, you know, I want to get this bill passed now and if we accepted that language we might have to go back to conference with the Senate and work it out, and we just do not have time to do it, it is the end of the session. They did not involve our Committee in this process. We could have had this language all done and included.

Mr. Kelly, do you find that language objectionable?

Mr. KELLY. I am sorry, could you repeat it?

Mr. OBERSTAR. I will be happy to do that. "The Secretary shall ensure that each license approved includes minimum standards to protect the health and safety of crews and space flight participants, taking into account the inherently risky nature of human flight."

Mr. KELLY. Actually, I have no objection to that. In fact, it is part of, or it should be part anyway, of an AST license to ensure the crew safety with respect to their being part of the safety loop involving third party liability. No, I have no objection to that sort of thing at all.

Mr. OBERSTAR. You are a wonderful panel. Thank you very much. I appreciate your contribution.

[Laughter.]

Mr. WHITEHORN. And thank you for your enthusiasm, sir.

Mr. OBERSTAR. I appreciate it. Thank you.

Mr. KUHL. Thank you, Congressman. Is there any other member that wishes to question? I do not believe so.

On behalf of Chairman Mica, let me thank the members of Panel III for coming and testifying. We found it very interesting and very, very helpful in this process. So thank you again for coming. Your participation is certainly appreciated.

Mr. Costello, any last comments?

Mr. COSTELLO. Just to thank the witnesses for being here.

Mr. KUHL. Okay. And thank you, Administrator Blakey, we appreciate your attendance here.

And with that, the Subcommittee is adjourned.

[Whereupon, at 4:03 p.m., the subcommittee was adjourned.]

# Bigelow Aerospace Comments for Rep. Berkley on the Role of the Federal Aviation Administration in Providing Safety and Oversight for the Commercial Space Industry

"The policy of being too cautious is the greatest risk of all."
-- Jawaharlal Nehru

"*There are risks and costs to a program of action. But they are far less than the long-range risks and costs of comfortable inaction.*"
-- John F. Kennedy

In much the same way that the advent of the Internet transformed the business world, the industrial implications of commercial space development will be nothing less than revolutionary. As the successful flights of SpaceShipOne illustrates, tourism will be the first business sector to feel the tremendous impact of privately-owned space-faring capabilities. However, it is important to acknowledge that, while the benefits of space tourism are not to be taken lightly, such endeavors represent only a beginning, not an ending, for commercial space development.

Subsequent to the production of low-cost private sector space habitats, microgravity research and development will create changes throughout the global economy. Specifically, next-generation drug treatments and pharmaceuticals that micrograv R&D will lead to may change the face of the biotechnology field, and new materials that can only be developed in micrograv could transform everything from the microchip industry to housing construction. A thriving space-based economy will represent a quantum leap in this nation's technological evolution, however, as is always the case with progress, the benefits cannot be realized without encountering a fair amount of risk.

Risk is a part of everyday life, and, at least for the foreseeable future, risk will remain an unavoidable aspect of space travel. No amount of oversight, regulation, planning, or intervention will change this simple fact. Space travel is an inherently risky proposition.

Returning to the issue of tourism, this market is certainly no stranger to risk. Many mountain climbing expeditions often involve much greater risk than even spaceflight has to offer. As a matter of fact, the number of individuals killed during various mountain climbing attempts, or even activities as mundane as downhill skiing, far eclipse the number of deaths in the entire history of human spaceflight. Yet, there has been very little Congressional attention paid to the risks of 'adventure tourism' such as mountain climbing, much less any serious consideration by federal

agencies. The reason for this warranted low-level of oversight is because (1) activities like mountain climbing are inherently risky endeavors and those who participate are well aware of the potential danger; and (2) the government acknowledges the individual's right to choose to put themselves at risk.

Similarly, in the context of spaceflight, even without the voluminous legal warnings and notices that Bigelow Aerospace and other commercial space operators will inevitably utilize, the average lay-person already knows that spaceflight is a dangerous and uncommon activity that involves elevated levels of risk. Additionally, if American individuals and corporations are not allowed to take such risks, there quite simply will be no domestic space travel industry.

Given this situation, ***the FAA must remain absolutely resolute in supporting the private sector's ability to choose to take the risks that are inherently a part of space travel.*** The field of private sector space development is now in an extremely precarious and vulnerable position. ***Unwarranted, burdensome government regulations could kill the entire industry before it even has a chance to develop*** (or, at a minimum, force all operations to move overseas). The federal government must have faith in American entrepreneurs' ability to take calculated risks, and restrain itself from attempting to over-regulate a field that has yet to conduct a single launch with paying customers. Of course, the government has a proper role to play in guarding against outright fraud and mitigating any danger to innocent bystanders on the ground, however, such concerns must be balanced against the critical need of the entrepreneurial community not to be buried in red-tape and to have the freedom to effectively make and implement their own decisions.

The recently enacted Commercial Space Launch Amendments Act (H.R. 5382), did an excellent job of striking the proper balance between government restraint and responsibility. By allowing passengers to fly at their own risk, and granting entrepreneurs a relatively free regulatory environment in which to operate in over the course of the next eight years (unless a fatal accident were to occur), Congress has given this young industry a vital opportunity to grow and mature.

In implementing the Act, and in all other aspects of its work, the FAA must uphold the primary thrust of the new law, which was to keep the ability to make decisions in regard to risk squarely in the hands of the passengers and the businesses that fly them. So long as the FAA and other federal agencies uphold this single, simple principal, there is no limit to the benefits that commercial space development can bring to all of us here on Earth.

In pursuing commercial space development there will be risks, and, unquestionably, there will be failures, but, to paraphrase Nehru and John Kennedy, unwarranted caution can be the greatest risk of all.

STATEMENT OF MARION C. BLAKEY, ADMINISTRATOR OF THE FEDERAL AVIATION ADMINISTRATION, BEFORE THE AVIATION SUBCOMMITTEE OF THE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, U.S. HOUSE OF REPRESENTATIVES, ON COMMERCIAL SPACE TRANSPORTATION

FEBRUARY 9, 2005

Chairman Mica, Mr. Costello, and Members of the Subcommittee:

Good afternoon. It is a pleasure to be here today at the Subcommittee's first hearing of the 109th Congress. Today I would like to provide a brief overview of the Federal Aviation Administration's activities in overseeing the commercial space transportation industry. Specifically, I will address how we plan to implement the most recent changes that Congress enacted in December, and how we see the future of this growing industry. But first, I wish to offer my congratulations to the new Members of the Subcommittee. I would also like to extend my best wishes to the new Ranking Democrat on the Subcommittee, Mr. Costello. Congressman Costello has been a valuable Member of this Committee since his election to Congress. I look forward to working with all of you, as well as the returning Members of the Subcommittee, on the important agenda ahead of us. Secretary Mineta and I truly value our partnership with Congress and the work we do together to make our nation's aviation and space transportation systems the safest and most efficient in the world.

Commercial space transportation is an increasingly important part of our nation's transportation system. Last year, the FAA completed a study examining the contributions of commercial space transportation, and other industries that are linked to space transportation. We found that in 2002, commercial space transportation and enabled industries created more than $95 billion in economic activity, $23.5 billion in earnings, and 576,400 jobs. Commercial space launches deliver communications, weather and science satellites to orbit. Satellite communications are integrated now into our daily lives, providing us with television, access to the Internet, credit card purchasing, and digital radio.

The timing of this hearing is particularly appropriate given that tomorrow is the opening of the FAA's annual Commercial Space Transportation Conference here in D.C. This event will feature remarks by some of the key individuals in both industry and government and will include panels on the X Prize and Beyond, Emergent ELV Technologies, Regulating Outside the Box, Space and Air Traffic Management, and Educating Tomorrow's Engineers.

The FAA's Commercial Space Transportation Office is responsible for protecting public health and safety through the licensing and regulation of commercial space launches and reentries and the operation of launch and reentry sites. Our Commercial Space Office encourages, facilitates and promotes commercial launches and reentries and to facilitate the strengthening and expansion of the U.S. space transportation infrastructure. As always, our first priority is the safety of the public at large.

The Commercial Space Office was originally established in 1984, by President Reagan, following the passage of the first law governing the commercial space industry. It was located at that time in the Office of then Secretary of Transportation Elizabeth Dole. The Office was later transferred to the FAA in 1995. The Office licensed its first launch of an expendable, vertically launched rocket in 1989. Since then there have been 168 licensed launches by U.S. companies such as Lockheed Martin, Boeing, Orbital Sciences, and most recently Scaled Composites. Headed by Mr. Burt Rutan, Scaled Composites SpaceShipOne was the first private, *manned* vehicle to reach space. While the FAA does not license launches performed by and for the U.S. government—we do work very closely with our colleagues at NASA and the Air Force to establish seamless safety rules for both government and private launch facilities.

As you may know, commercial space launches are inherently dangerous and risky operations-- a fact that is recognized not just by those who are directly involved but also by the law and regulatory regime that governs the industry. As a result, the approach to safety in the commercial space arena differs from the approach for civil aviation, where

safety is achieved with the high reliability of today's aircraft. The FAA's safety focus in commercial space transportation has been on protecting the general public and their property from the dangers inherent in such operations. For launches, the safety approach is to contain the hazards. As noted above, rocket failures occur with some regularity. Historically, the failure rate has been approximately 10 percent for licensed launches. The mission of the FAA is to ensure that each rocket that fails has a safety system that ensures no damage is done to life or property on the ground.

Our licensing process includes a pre-licensing consultation period during which our technical team begins a dialogue with launch applicants regarding what they propose and requirements they must meet to receive a license. After this initial dialogue, we proceed to a more comprehensive review and analysis during which we analyze and evaluate every possible aspect of a proposed space launch operation. This includes a policy review, payload review, safety evaluation, financial responsibility determination, and an environmental review. We issue a license only after we determine that an applicant's launch or reentry proposal will not jeopardize public health and safety, the safety of property, or conflict with U.S. national security or foreign policy interests and obligations.

In addition to licensing launches, the FAA is also responsible for licensing and regulating the operation of launch sites. We have licensed four launch sites in the U.S. – in California, Florida, Virginia, and Alaska. Last year, we added a fifth—the Mojave Airport in California, which is a dual use facility. In fact, it is the first inland launch site in the country to receive a license. States are increasingly interested in hosting a launch site because they see spaceports as potential sources of future economic growth. We are currently in discussions with Oklahoma, New Mexico, and Texas about their license applications. In the future, we anticipate there will be a network of non-federal launch sites throughout the U.S.

During the 20-year history of the government's oversight of commercial space launches, there have been no launch accidents that have resulted in loss of life, serious injuries, or

major property damage. While there have been rocket launch failures, where, for example, the rocket malfunctioned or had to be destroyed deliberately because it veered from its intended trajectory, or where a satellite payload was not successfully inserted into orbit, the uninvolved public was still protected. We believe that this is an impressive safety record that speaks to the skill, dedication, and commitment to safety of the FAA's team, our industry partners, and of our government partners like NASA and the Air Force.

One of the key ways the U.S. supports the commercial space industry is through a statutory risk-sharing program between private industry and the federal government. It consists of three major components: (1) liability and government property insurance that is obtained by the launch operator; (2) cross-waivers of liability; and (3) provisions for payment by the government of third-party liability claims in excess of required liability insurance, up to $ 1.5 billion, as adjusted for inflation. This liability risk-sharing arrangement was recently extended by Congress through 2009 with a provision for a comprehensive study on whether this program could be eliminated and what alternatives there are to maintain a viable and competitive U.S. industry. Because of the excellent safety record of the industry, the indemnification provision has never been invoked.

Let me now briefly discuss FAA's recent commercial space activities. Last year the FAA licensed 14 commercial launches, the most since 1999 and more than what both NASA and DOD launched in 2004. These included five Atlas launches, three Sea Launch missions, one Taurus Launch, and five launches by SpaceShipOne. The industry is continuing to develop and evolve to an era of reusable launch vehicles, suborbital launch vehicles and, most recently, personal human spaceflight.

You may recall that last June, we all witnessed the first privately funded launch of a manned vehicle into space. Before that day, the commercial space industry dealt only in *unmanned* vehicles. Burt Rutan and his team at Scaled Composites accomplished this historic feat. Mike Melville piloted SpaceShipOne--traveling to an altitude of 337,500 feet and reaching the X-Prize threshold of space. The FAA's Associate Administrator,

Patti Grace Smith, presented Mr. Melville with the first FAA-issued commercial astronaut wings. A few short months later, on October 4th, I had the privilege of awarding the next set of wings to Astronaut Brian Binnie. Astronaut Binnie's flight on SpaceShipOne was the flight that won the $10 million Ansari X-Prize, which was awarded to the first company to launch a vehicle that carried the equivalent of three persons on board and returned twice within a two-week span.

Mr. Rutan and his team earned the respect and admiration of the entire country with the accomplishment. I am also proud of the exceptional licensing and safety work done by our FAA team, which included not only staff from our Commercial Space Office, but also experts from our Aviation Safety Organization and from our Air Traffic Organization. Our people worked tirelessly with Mr. Rutan's company throughout the development of SpaceShipOne to enable these historic flights and to fully protect the American public.

SpaceShipOne marked the beginning of a new chapter in commercial space transportation. A new generation of vehicles shows the potential for the development of a space tourism industry. Congress recognized this new beginning in passing last December the *Commercial Space Launch Amendments Act of 2004,* designed to promote the development of human space flight. It does so by giving the FAA responsibility over the safety of the crew and passengers. Under a new regulatory regime, paying passengers, deemed "space flight participants," will now be able to fly into space on board commercial space vehicles after such passengers are informed of and assume the significant risks of the venture. The new legislation sets an ambitious schedule for issuing rules on commercial human space flight. The FAA's staff are already working on rules for experimental permits called for by the new law and for rules on medical and training requirements for crew and space flight participants.

Advocates of this new law were concerned that "over-regulation" by the Federal Government might stifle development of new launch vehicles. Today's commercial space innovators have been compared to the barnstorming aviators that created the

foundation for what is now the safest form of transportation. Like those early pioneers, the innovators of today need an environment that will allow them to develop the spacecraft of the future. We agree that government regulation should not be the enemy of innovation, particularly where design concepts and standard are unknown. At the dawn of aviation, industry pioneers were left to create aircraft designs without benefit of government oversight. The government requirements for building or designing an aircraft date from 1926, more than 20 years after the Wright Brother's historic flight. Ensuring safety often is an evolutionary process. Part of the improvement to safety involves the simple result of mitigating risks and learning from mistakes.

Government oversight of civil aviation evolved as the aircraft industry developed. Likewise, government oversight of commercial space transportation must also evolve appropriately as the industry matures. This may mean permitting more risk now to those who choose to assume those risks in order to achieve an ultimately safer, more advanced launch vehicle. At the same time, the new law does not disturb the FAA's current authority to fully protect the safety of the uninvolved public. I assure you, we will continue to take that responsibility very seriously in conducting our licensing and permitting reviews under the new law.

Finally, Mr. Chairman, let me say a few words about the current economic condition of and outlook for the industry. In the orbital segment of the industry, there has been a downturn in the launch of expendable launch vehicles (ELV's) from 2000 to the present. Today, the supply of available launch vehicles internationally has increased while demand has not. As a result, launch prices have dropped compared to the mid-1990s. In addition, U.S.-manufactured launch vehicles have to compete against low-cost Russian rockets. At this time, the future outlook for 2004-2013 is for only slight growth in the expected demand for commercial launch services.

We see future potential growth in the suborbital segment of the industry, as new U.S.-built vehicles are developed to meet the demand for human space travel and tourism. As noted above, SpaceShipOne's five launches have led the way. Additional entrepreneurs

are expected to enter the market. For example, Sir Richard Branson, owner of Virgin Airlines, announced plans to fly customers into space aboard a fleet of five passenger rockets on a service he will call Virgin Galactic. We understand he plans to lease or buy these spacecraft from Scaled Composites, no doubt a welcome investment for the innovative American company.

In conclusion, I want to assure the Committee that the FAA will continue to strive to be proactive, vigilant, and responsive to the needs of the commercial space transportation. We will create a sound regulatory framework that protects public safety while enabling the industry to manage risk, evolve its technology, and bring its products to the global marketplace with appropriate regulatory oversight. As Secretary Mineta recently said before the Aero Club here in Washington: "The first rule, to quote an old adage, is 'do no harm.' This means that your government will not stand in the way of airlines as they seek to innovate. It means giving the fledgling commercial space industry the freedom to develop, and I am very pleased that we now have a streamlined legislative foundation in place to support this exciting new area of transportation." I agree with the Secretary.

That concludes my prepared statement, Mr. Chairman. I would be happy to answer any questions you and the Members of the Subcommittee may have.

**OPENING STATEMENT OF**
**THE HONORABLE JERRY F. COSTELLO**
**AVIATION SUBCOMMITTEE**
**HEARING ON COMMERCIAL SPACE TRANSPORTATION:**
**BEYOND THE *X PRIZE***
**FEBRUARY 9, 2005**

I want to thank Chairman Mica for calling today's hearing on Commercial Space Transportation – Beyond the *X Prize*. I am very familiar with this emerging industry, not only from my work on the House Science Committee, but also because X-Prize Foundation, the organization that sponsored the October 2004 ANSARI X-Prize, is located in St. Louis, Mo – near my Congressional district.

Many predict that commercial space tourism will lead to regularly scheduled, manned commercial space flights, which could generate upwards of $700 million a year in revenues in the years to come. As with any industry in its infancy, we must ensure that it is receiving the proper federal safety oversight without discouraging innovation and development. I look forward to hearing from the FAA Administrator, Marion Blakey, about FAA's role in overseeing the commercial space industry to ensure the safety of the uninvolved public, as well as crew and space flight participants.

Commercial space launch activities are also likely to have an impact on our air traffic control system as well as the environment. We must ensure that FAA has the tools it needs to ensure the safety of flight for both aircraft and launch vehicles as well as to protect the

environment from these activities. Further, there are several commercial spaceports currently under development that will be used to support space tourism and this is a good time to examine the issues associated with licensing these facilities.

Mr. Chairman, I thank you again for convening this hearing and I look forward to hearing from the witnesses.

**STATEMENT BY**
**MR. JOHN W. DOUGLASS**
**PRESIDENT AND CHIEF EXECUTIVE OFFICER**
**AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA**

**Hearing on "Commercial Space Transportation: Beyond the X Prize"**
**House Transportation & Infrastructure Aviation Subcommittee**

**February 9, 2005**

## Introduction

Chairman Mica, on behalf of the Aerospace Industries Association of America, or AIA, I wish to thank you, Representative Costello, and members of the Aviation Subcommittee for the opportunity to testify this afternoon on the evolution and the potential of the nation's commercial space industry. AIA, whose member companies employ 607,000 engineering and production workers, has a long history in the management of space transportation and satellite issues. With more than 100 regular and 170 associate members, we operate as the largest aerospace manufacturing trade association in the United States.

I will begin with a summary of the capabilities of the U.S. commercial space satellite, launch, and tourism sectors. After this overview, I will discuss two policy developments that have affected the industry during the last year and how our competitors overseas integrate commercial space programs into their geopolitical strategies. Finally, I will close by addressing the essential relationship between the commercial space transportation industry and the nation's air traffic control system.

## Commercial Space Industry Overview

**Satellite and Launch Services.** Revolutionary advances in information technology have produced significant changes throughout the U.S. commercial space industry. Historically, the satellite manufacturing and launch sector depended on the Defense Department's requirement for secure communications. Military satellites typically remained on-orbit for less than ten years, triggered high operational costs, and deployed from isolated launch facilities.

While the first commercial communications satellite, *Early Bird*, had a modest life cycle of 48 months, today's satellites offer telecommunications and imaging services to billions of users for an average period of 15 years. The longer lifetimes of modern commercial satellites subsequently reduce launch, maintenance, and replacement costs. At the same time, the economic and social applications of these current networks have increased at a dramatic rate. Internet, cell phone, and Direct TV connections merely begin the list. Commercial satellites also enable agricultural land management, urban planning, law enforcement surveillance, and terrestrial mapping. Their applications grow as the images that they produce reveal increasing levels of detail. Older remote sensing satellites, for

example, detected items the size of bridges or roads, while upgraded systems now transmit high-resolution pictures of objects as small as a car.

American companies maintain a leading, but diminishing, role in the commercial satellite and launch markets. According to Futron, an aerospace analytical firm, U.S. bidders captured 10 of the 13 commercial satellite contracts awarded last year while two European consortia won the remainder. Over time, U.S. global market share in the industry has averaged 50 percent or higher, and supports more than 100,000 high-skilled jobs.

The launch segment, however, faces declining demand and severe competition from Western European, Russian, and Japanese launch vehicle producers. Futron reports that the total number of worldwide orbital launches fell from 89 in 1997 to 54 in 2004. For 2005, only three domestic commercial launches are currently scheduled. While global launch industry revenues have increased over the last ten years, U.S. industry revenues have declined.

During the last 15 years, the nation's "space economy" has witnessed the emergence of several privately funded ventures, many of which are now in the process of developing adaptable orbital and sub-orbital transportation platforms for tourism as well as the launching of commercial and government payloads. The key challenges for this evolving industry focus on gaining access to capital, the absence of clear human rating standards for vehicles, the management of technical risk, and regulatory uncertainty.

The newer ventures, in addition to a number of established aerospace companies, offer customers new contracting opportunities that rely on transferable technologies and commercial market demand. In the view of AIA, this approach will enhance competition and creativity to a greater extent than traditional government procurement cycles of detailed specifications for systems and components with life spans that end as contracts expire.

**Space Tourism.** Civilian orbital and sub-orbital travel, Mr. Chairman, holds the promise of expanding the quality-of-life improvements that American society has realized from 45 years of space exploration. Since the 1960s, products based on NASA's exploration-related technologies have included high-performance semiconductors first used by mission control personnel; automobile safety tools derived from spacecraft testing; pollution abatement devices pioneered by Shuttle emissions software; water purification monitors adapted from space life support instruments; and medical advances, such as skin burn and breast cancer treatments, that incorporate the agency's solar cell and ultrasound techniques.

A future program of extra-terrestrial travel by private customers would revitalize the nation's space industrial base and harvest even more results from microgravity research. In recent testimony before the Science Committee, one expert noted two trends concerning the business potential of space tourism: surveys indicating that approximately 60 percent of Americans would take orbital or sub-orbital trips if they

could afford them; and the estimated global consumer market of one billion people for space or science fiction media. Futron's most recent study values the public spaceflight market at more than one billion dollars per year during the next twenty years, and NASA's X-Prize competition has engendered public enthusiasm about the potential for space passenger travel.

On the economic end, industry, scholars, and government officials agree that a sustained human presence in space could lead to the discovery of light-weight manufacturing materials and new sources of clean energy. Apollo 11 astronaut and award-wining rocket designer Dr. Buzz Aldrin has also testified that a two-stage-to-orbit tourist system, with a reusable first stage, could make access to space a more affordable proposition for both public and private sector customers.

**Government-Industry Cooperation**

The Bush Administration's revised U.S. Space Transportation Policy (USSTP), issued last month, recognizes the changing dynamics of space transportation in directing the appropriate federal agencies to:

- "Purchase commercially available U.S. space transportation products and services to the maximum extent possible;"
- "Provide a timely and responsive regulatory environment for licensing commercial space launch and reentry activities;" and
- "Encourage and facilitate the U.S. commercial space transportation industry to enhance the achievement of national security and civil space transportation objectives, benefit the U.S. economy, and increase the industry's international competitiveness."

These directions amplify the nation's Vision for Space Exploration, announced by the President in January 2004, and the findings last spring of the independent Aldridge Commission that the private sector should have a more systematic role in space operations and exploration.

Congress also recognized the changing dynamics of space transportation late last year with the passage of the Commercial Space Launch Amendments Act of 2004 (P.L. 108-492). P.L. 108-492 consolidates all commercial space flight regulatory authority under the FAA and simplifies the licensing process for new types of reusable suborbital rockets. In codifying these reforms, the law declares that government space policies should embrace the goal of "safely opening space to the American people and their private commercial, scientific, and cultural enterprises."

Science Committee Chairman Boehlert captured the significance of P.L. 108-492 by reminding his colleagues that the legislation looked towards "the future of the U.S.

aerospace industry" since it promoted innovation in space transportation programs for both humans and cargo.

My friend and talented colleague, FAA Administrator Blakey, plans to discuss commercial space regulatory and licensing issues in more detail. AIA will actively support cooperation between industry and government to fulfill the licensing mandates of the USSTP and the policy guidance of P.L. 108-492 in the interest of supporting a flexible space industrial base. We further request the Subcommittee's support for an equitable FAA budget that will allow the agency to execute its multiple regulatory missions.

**Foreign Governments in the Commercial Space Industry**

Aware of the prestige and capabilities of American space industries, China, the European Union (EU), India, and Russia support varying space programs with a similar goal: to build economic and/or military capabilities through the aggressive use of commercial launch and satellite research. In the near future, therefore, the United States will confront progressively resourceful and sophisticated foreign space industry competition.

**China.** Five years ago, the China National Space Administration (CNSA) released a series of ten and twenty year objectives. The more significant milestones include "an integrated Chinese military and civilian earth observation system" and "international cooperation" to procure "more advanced [space development] technology from Western countries." By 2010, the CNSA hopes to finish upgrading its Long March family of launch vehicles and create an independent satellite navigation system. The CNSA manages most of its space programs from the 1,900-square mile Jiuquan Satellite Launch Center in northwestern China. The facility's technicians built the first spacecraft that carried the nation's first astronaut into orbit in October 2003.

**The European Union.** The EU officially charges the European Space Agency (ESA) to "mobilize public and private resources" behind space priorities because "whole sectors of human activity today depend on the use of space satellites and technologies." Furthermore, a European Commission White Paper from November 2003 identifies space as "an opportunity" that "Europe cannot afford to miss." The White Paper instructs the ESA to assess the contractual framework of the *Galileo* global navigation satellite network for determining the "best approach to public/private finance for future space projects." *Galileo* has also stimulated Europe's overall space technical competitiveness.

**India.** As a matter of national policy, India deploys commercial space systems to consolidate its position as a regional economic power in competition with China. The father of the Indian space program, Dr. Vikram Sarabhai, set the parameters of India's strategy by declaring that "we do not have the fantasy of competing with the economically advanced nations in the exploration of the Moon or manned spaceflight." In keeping with this vision, the Indian Space Research Organization recently undertook two developmental flights of a three-stage satellite launch vehicle and has activated nine "Indian National Satellites" primarily for telecommunications services.

**Russia**. In the post-Soviet era, Russia, like India, has decided to become a commercial space power. Unlike India, the Russian government has sought the active assistance of China in this endeavor. Last year, the third session of the Russo-Chinese Sub-Commission on Space Cooperation agreed to the long-range joint development of 13 "areas of civilian space" such as "remote space probing, space telecommunication systems, navigation, and land infrastructure."

India and Russia in particular, Mr. Chairman, will continue to challenge U.S. industry in offering low-priced space delivery vehicles.

**Air Traffic Management Modernization**

AIA commends you, Mr. Chairman, and the members of the Subcommittee for your exemplary leadership in establishing the seven-agency Joint Planning and Development Office (JPDO), through Section 709 of P.L. 108-176, to accelerate the modernization of the National Airspace System (NAS).

As you know, the JPDO released its *Next Generation Air Transportation System Integrated Plan* in December. The *Plan* recognizes the critical role that a secure and upgraded NAS will play in promoting our national security and maintaining America's global economic leadership. For civil and military users alike, it outlines the vision of a digital-based network to improve the efficiency of air transport operations.

By convening this hearing, the Subcommittee has drawn a connection between the commercial space industry and NAS modernization. Elements of the *Plan* with a potential relationship to commercial space tools include the following:

- "Providing each traveler and operator in the system the specific situational awareness they need to reach decisions through the creation of a combined information network;"

- "Reducing the impact of weather on air travel through a system-wide capability for enhanced weather observations and forecasts;" and

- "[Defining and evaluating] fundamental communications, navigation, and surveillance architecture options, such as moving to digital data links."

Commercial space technologies, Mr. Chairman, feature a broad array of tools to meet the situational awareness requirements of the National Airspace System by providing secure, instant, and high-resolution data.

**Conclusion**

AIA deeply appreciates this chance to share with the Subcommittee its industrial and public policy perspectives on the commercial space transportation sector. Both the launch and satellite components in the commercial space arena can:

- Advance our ability to leverage the economic and public safety benefits of space exploration;
- Reward risk and creativity in reusable rocket and vehicle development;
- Fortify the standing of the United States as an international space power against aggressive foreign competition; and
- Support the modernization of the National Airspace System.

Thank you once again, Mr. Chairman. I will be pleased to answer any questions by members of the Subcommittee.

**John W. Douglass**
**President and Chief Executive Officer**
**Aerospace Industries Association**

John W. Douglass is president and chief executive officer of the Aerospace Industries Association, which represents the nation's manufacturers of commercial, military, and business aircraft, helicopters, aircraft engines, missiles, spacecraft, materiel, and related components and equipment. Mr. Douglass became the seventh full-time chief executive of the association in 1998. Before that he served for nearly three years as assistant secretary of the Navy for research, development and acquisition of defense systems for the U.S. Navy and U.S. Marine Corps.

A nationally recognized expert in systems acquisition, Mr. Douglass has extensive acquisition experience in Congress, the Defense Department, and the executive branch as a policy authority, contracting officer, engineering officer, test and evaluation officer, program control officer, and research director.

Before being named a civilian Navy executive, Mr. Douglass was with the Senate Armed Services Committee where he was foreign policy and science and technology advisor to Senator Sam Nunn and served as lead minority staff member for defense conversion and technology reinvestment programs.

Earlier Mr. Douglass completed 28 years of U.S. Air Force service and retired as a brigadier general in 1992. His numerous Air Force assignments included service as the deputy U.S. military representative to NATO as well as director of plans and policy and director of science and technology in the Office of the Secretary of the Air Force. He also served as special assistant to the under secretary of defense for acquisition.

Within the executive branch, Mr. Douglass was director of national security programs for the White House, responsible for formulating policy on a broad range of national security issues. He served as President Reagan's personal representative to the Blue Ribbon Commission on Defense Management chaired by David Packard.

A native of Miami, Florida, he earned a bachelor of science degree in industrial engineering from the University of Florida, a master of science degree in industrial engineering from Texas Tech University and a master of science degree in management science from Fairleigh Dickinson University. Mr. Douglass has done postgraduate work at the Cornell University Center for International Studies where he was an Air Force Research Fellow with the Peace Studies Program.

Mr. Douglass is a member of the Board of Governors of the Aerospace Industries Association and chairman of the Board of Trustees of the National Center for Advanced Technologies. He served on the Commission on the Future of the United States Aerospace Industry, which issued its final report in November 2002. Mr. Douglass is chairman of the International Coordinating Council of Aerospace Industries Associations.

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**AIA Positions**

*Member, AIA Board of Governors*
*Chairman, Board of Trustees, National Center for Advanced Technologies*
*Chairman, International Coordinating Council of Aerospace Industries Associations*

**Member:**

*American Astronautical Society Board of Directors*
*Council of Manufacturing Associations Board of Directors, National Association of Manufacturers*
*Chairman, International Coordinating Council of Aerospace Industries Associations*
*Defense Acquisition Excellence Council*
*FAA Research, Engineering and Development Advisory Committee*
*National Contract Management Association*
*University of Tennessee Aerospace Advisory Council*

*(06.04)*

New Mexico Office for
Space Commercialization

Briefing to the
U.S. House of Representatives
Committee on Transportation and
Infrastructure

Rayburn House Office Building
Washington, D.C.
February 9, 2005

By
Louis R. Gomez
NMOSC Program Manager for the
Southwest Regional Spaceport

Mr. Chairman, Members of the Committee, I am Lou Gomez, the Program Manager for the Southwest Regional Spaceport within the New Mexico Office for Space Commercialization.

I want to thank you for this opportunity to brief the Committee on the status of New Mexico's spaceport development efforts.

I will be briefing you on New Mexico's plans and progress.

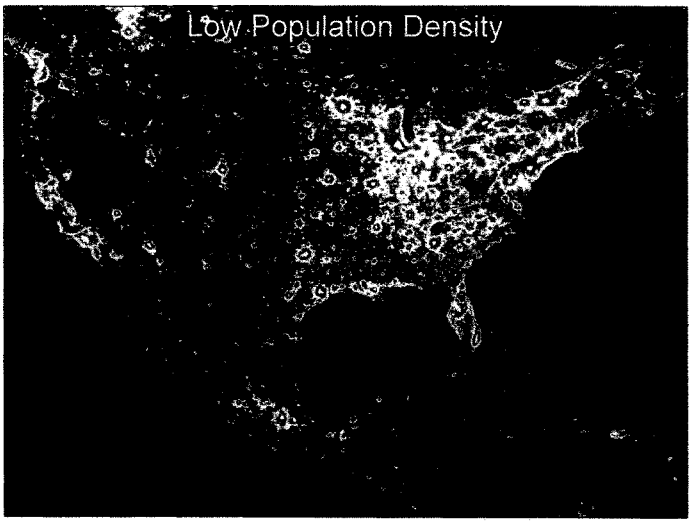
I also want to thank the FAA, particularly Administrator Marion Blakey and Associate Administrator Patti Smith for their continuing support of our program.

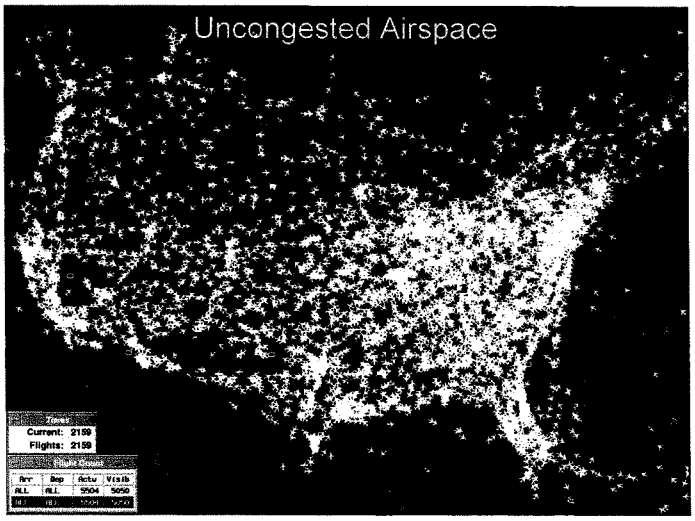
## Program Highlights

- 1994-1996: Completed feasibility studies for an inland spaceport
- 1996-1997: Conducted environmental studies and submitted initial license application to the FAA
- 1998: Submitted Statement of Qualifications to Lockheed Martin to host the VentureStar program. LM told NM that our proposal was the top rated.
- 2003: Submitted Proposal to X Prize Foundation to host the X Prize Cup
- 2004: New Mexico was selected to host the X Prize Cup

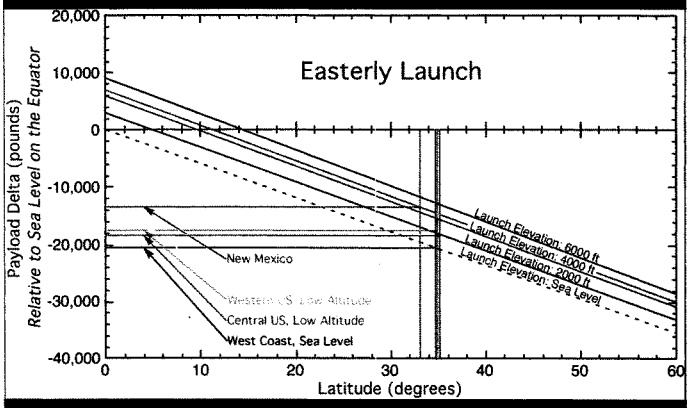
## New Mexico's Advantages

- Low population density
- Uncongested airspace
- Altitude advantages
- Excellent weather
- State support, both political and popular


Low Population Density


Uncongested Airspace
Current: 2159
Flights: 2159

## High Altitude Launch Site Provides More Payload

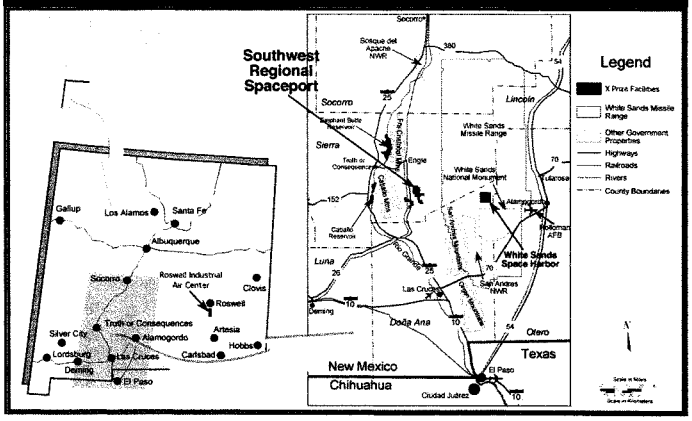



This plot applies to vertical launch to orbit, but a similar advantage applies to vertical launch of suborbital vehicles

## Excellent Weather

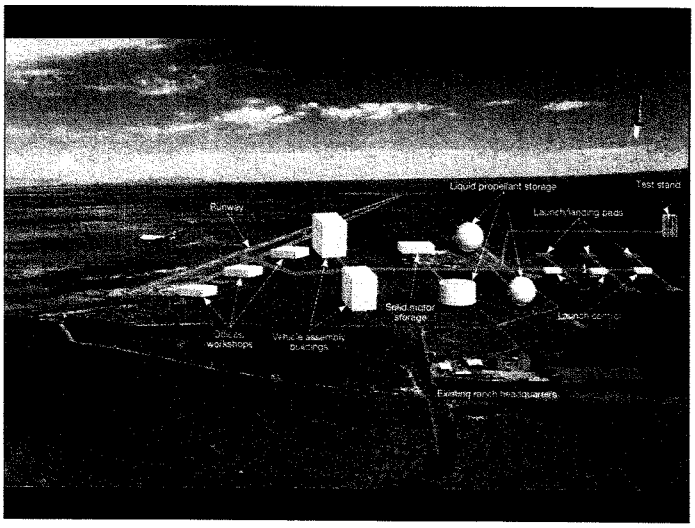
- Southern New Mexico's benign climate is amenable to year-round outdoor work
- Major weather disturbances, such as hurricanes and tornadoes, are rare
- There is no salt air corrosion

The SRS is in southern New Mexico in Sierra County, between Las Cruces and Truth or Consequences




# Status

- Since winning the X Prize Cup, NM has been working to develop the program and required infrastructure
- Drawing shows conceptual layout for X Prize Cup
  - Runway, launch landing pads, propellant storage, vehicle assembly buildings, office and control buildings
- X Prize Cup flight events could begin as early as 2006




# Issues and Concerns

- We believe commercial space is an emerging industry that has the potential for significant positive impact on the US economy
- We ask Congress and the regulatory agencies to take a careful approach to legislation and regulation of this industry to ensure that unintended negative effects do not occur

Thank you Mr. Chairman and Members of the Committee. This concludes my presentation. I will be happy to answer your questions.

**Testimony of Michael S. Kelly,**
**Chairman, Reusable Launch Vehicles Working Group,**
**Commercial Space Transportation Advisory Committee**
**Before the House Aviation Subcommittee**
**9 February 2005**

Mr. Chairman, Members of the Aviation Subcommittee, ladies and gentlemen, I appear before you today to testify on the state of the emerging private commercial space transportation industry (hereafter, "the industry"). My testimony will focus on two areas, the direction of the industry, and its plans for dealing with regulation as a result of the enactment of the Commercial Space Launch Amendments Act of 2004.

For the first time, the term "emerging" can now be used in a positive sense. It *is* emerging thanks to the achievements of a small group of individuals. However, make no mistake: there is as yet no industry in the sense of ongoing, revenue-producing operations. We have a long way to go before such a thing exists and even the smallest of stumbles could add years of delay.

The landmark achievement of last year was establishing a personal space flight, the conveyance of paying passengers into space, as the primary market for the industry. Any commercial enterprise requires a market, if only a perceived one, to attract the startup investment required. Because space transportation is a very capital-intensive activity, potential payoffs needed to be great. The great irony is that every visionary in this field has had, as an ultimate *end* goal, the establishment of a personal space flight industry. Only a tiny subset of these visionaries recognized that what was considered the "furthest out" of the markets prospects was the only sensible one with which to begin.

Demand was never really in question, but it was not until Dennis Tito became the first person to pay for a trip into space that the demand was demonstrated.

After that, what was required was a demonstration that private industry could develop a safe transportation system that could repeatedly take people into space, and return them safely to the earth. Last year, Burt Rutan and Scaled Composites made that demonstration, and did it so completely and decisively that even many of the visionaries in this field are stunned and amazed.

Concurrent with Rutan's demonstration, the next step in establishing an industry occurred. An operator who has the financial capacity and reputation to go the last mile stepped forth. Sir Richard Branson announced his intent to purchase several spaceships from Scaled Composites, and offer suborbital space rides to private citizens at a price of $200,000 a ticket. At last count, Virgin Galactic had 14,000 reservations.

Government has kept pace with these rapid developments. The Commercial Launch Amendments Space Act of 2004, now signed into law, is the first legislation dealing with the reality of private, personal spaceflight. While the Act continued to provide for the safety of the uninvolved public, it resisted limiting the freedom of the participants in personal spaceflight. It did not attempt to legislatively preempt the right of space flyers to assess and take their own risks. It is to the everlasting credit of this Congress that these rights of the individual were explicitly acknowledge and preserved by this Act.

However, safety of space flyers is a serious issue. If it is not addressed in legislation, many asked, how would it be ensured?

Make no mistake, safety is *the* foremost concern of this industry. Primarily, the concern is out of basic human decency and a deep commitment to the value of human

life. Close behind that motivation (though almost inseparable from it) is a more immediate concern: the economic aspect of the safety of space flyers.

It is in everyone's best interest to have a safe and reliable vehicle and a safe operator in this industry.

Aviation safety has long been regulated by the federal government. But aviation safety regulations were based on the operational experience of many years. There is no such experience base for personal space transportation. A major fear of the industry, and its financial backers, has been that the government would attempt to formulate regulations in a vacuum, placing impossible obstacles in the way of people whose job is difficult enough as it is.

But the question remained of how, in lieu of government regulation, the industry would ensure the safety of space flyers. To start to find an answer, the most prominent members of the industry met in El Segundo California on 18 January of this year. Their task was to provide an industry solution to the problem of safety.

Out of this first meeting came a plan of action. The members decided to establish a federally recognized Industry Consensus Standards Organization whose purpose would be primarily to establish Consensus Standards for ensuring the safety of space flyers. If such Consensus Standards exist, they take the place of federal regulation, and provide the equivalent or greater effect.

Such Standards are prevalent in the U.S. An example of how they provide safety in the face of hazards arguably greater than those posed by suborbital space flight may be found in the workings of Underwriters Laboratories. Virtually every electrical device sold in this country carries a UL stamp of approval. That stamp specifically means that

the safety of the device has been assessed with the benefit of over a century of experience, and found to the best of all knowledge to be safe. While it is possible to sell a non-UL approved device, market acceptance is low, and liability exposure to the seller high. Though not in many cases compulsory, obtaining UL approval is the only sensible way to proceed.

The same will be true of spaceships and operating procedures promulgated by this future Industry Standards Organization. When faced with the choice of flying on an approved versus non-approved spaceship, a space flyer is much more likely to accept the former.

In terms of *actual* safety, Industry Standards are likely to be superior to government regulations. Since they come directly out of industry experience, they can be accepted and implemented quickly without the review of people who are less experienced in the field, or who have experience only in the non-applicable field of expendable launch vehicles.

Though it is too long a story to relate here, it is a matter of historical fact that aviation safety regulations have sometimes *reduced* safety of aircraft compared to what industry would have provided. Worse, the imprimatur of government approval carries a weight that can give a false sense of security. This violates the principle of informed consent.

Perfect safety is a worthy goal, and having it always in the forefront will keep the industry healthy and growing. However, any activity in which humans engage will someday result in an accident. There will be injuries, and there will be fatalities. No one wants this, but it will happen. How we respond is what is important. The industry has

committed itself to safety, and to incorporate lessons learned from such accidents as quickly and completely as possible. No one can reasonably expect more, because no more can be done.

I do not share the view of many in industry that the first fatal accident will spell the end of personal spaceflight. Such a thing has never happened in all of history, and never will happen in all of future history. It is contrary to human nature. But the outlook provided by this view is one that ensures a commitment to safety at the maximum level possible.

There is only one way to ensure *perfect* safety in this or any human activity, and that is to not engage in it. Legislatively, the only way to see that no one engages in an activity is to outlaw it. It is my position, and that of many in the industry and government, that federal regulation of space flyer safety would almost be the equivalent of outlawing personal spaceflight. This industry needs all of the innovation human beings can muster, and these innovations – especially those related to safety – need to be developed and implemented as quickly as humanly possible. If these things do not happen, the financial backing will be the first thing to disappear. The industry will stop "emerging," and instead *sub*merge.

The Congress has shown its commitment to guaranteeing the freedom of this industry to grow as a commercial enterprise. That is defined as people trading value for value, according to their own judgment unclouded by coercion. Industry has now stepped up to take the responsibilities that come with freedom. Maintaining this course will guarantee that the door to the future opened last year will remain open.

Before I conclude, I wish to reiterate the significance of last year's events. Without those space flights, and without the Commercial Space Launch Amendments Act of 2004, the commercial space flight industry would remain stagnant. Now it is moving forward, in a direction of which for many years we could only dream.

There are people who deserve recognition. Prior to last year, Dennis Tito proved the market for personal spaceflight by becoming the first person to purchase a ride into space. Peter Diamandis conceived and executed a brilliant plan for incentivizing the development of a private spaceship, the ANSARI X PRIZE. Paul Allen had the vision and commitment to finance such a development effort. Patricia Grace Smith, FAA Associate Administrator for Commercial Space Transportation, had the vision and commitment to help this happen while maintaining the safety of the uninvolved public. But it was Burt Rutan who, in the end, had the genius and ability to create the first private spaceship, and he who showed the world once and for all that it could be done.

These are people not just of vision, but of action. They persevered in the face of obstacles that defeated others, and opened the door to the next great human adventure. I believe that humanity owes them a debt of gratitude that should and will be paid by having their names live on throughout history.

For now, we owe them – and ourselves – the commitment to work together to ensure that their accomplishments do not lay fallow. The government and industry have now defined their proper areas of responsibility. Let us preserve that, so that this great adventure may flourish.

**OPENING STATEMENT OF**
**THE HONORABLE JAMES L. OBERSTAR**
**AVIATION SUBCOMMITTEE**
**HEARING ON COMMERCIAL SPACE TRANSPORTATION:**
**BEYOND THE *X PRIZE***
**FEBRUARY 9, 2005**

I want to thank Chairman Mica and Ranking Member Costello for calling today's hearing on Commercial Space Transportation – Beyond the *X Prize*. Many predict that commercial space tourism will lead to regularly scheduled, manned commercial space flights, which could generate upwards of $700 million a year in revenues in the years to come. As with any emerging industry, we must ensure that it is receiving the proper federal safety oversight without discouraging development.

Mr. Chairman, yesterday I introduced a bill to enhance the safety of the commercial passenger space industry by ensuring that the Federal Aviation Administration (FAA) has the authority it needs to protect the safety of passengers on commercial space flights.

The *Commercial Space Launch Amendments Act of 2004*, P.L. 108-492 (the Act), prohibits the Secretary of Transportation from issuing safety design and operating regulations or even minimal safety requirements for individual licenses for the next eight years unless there is a potentially catastrophic incident. The current statutory language amounts to, in essence, the codification of what has come to be known in aviation safety

parlance as the "Tombstone Mentality." For years, this Subcommittee has criticized the FAA for waiting until after a disaster to take safety actions, and has urged upon the FAA, a more proactive safety oversight role. Supporters of the *Commercial Space Launch Amendments Act* argued that safety regulation would discourage experimentation and innovation. However, the Act went well beyond these objectives and essentially tied FAA's hands by totally banning any safety requirements, except in post-accident circumstances where lives have already been lost. The FAA is prevented from requiring even the simplest, least expensive enhancements to protect the safety of passengers on these space flights.

The legislation that I introduced would give the FAA the authority and flexibility to establish minimum safety regulations. This safety authority would <u>not</u> preclude innovation nor, contrary to the claims of supporters of the Act, would it require FAA to impose the same degree of regulation on the developing space travel industry that is imposed on the mature air transportation industry. Specifically, although this bill would require that FAA include, in each license it issues, minimum standards to protect the health and safety of crews and space flight participants, it would further require, in imposing these standards, FAA to take into account the "inherently risky nature of human space flight."

This bill would give the FAA the flexibility to create a regulatory structure governing the design or operation of a launch vehicle to protect the health and safety of crews and space flight participants as is necessary, without having to wait for a catastrophic failure to occur. My changes to the Act would ensure that the FAA has the tools necessary to carry out its safety mission.

To that end, I look forward to hearing from the FAA Administrator, Marion Blakey, about FAA's role in overseeing the commercial space industry to ensure the safety of the uninvolved public, as well as crew and space flight participants.

Commercial space launch activities are also likely to have an impact on our air traffic control system as well as the environment. We must ensure that FAA has the tools and procedures it needs to ensure the safety of flight through the navigable airspace for both aircraft and launch vehicles as well as to protect the environment from these activities.

Mr. Chairman, as this Subcommittee begins its oversight of this new and emerging commercial space industry, I hope that we can work together to protect the safety of passengers on space flights, without placing unreasonable limitations on the development of commercial space travel.

I look forward to hearing from the witnesses.

ELLEN O. TAUSCHER
10TH DISTRICT, CALIFORNIA

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**Statement by Representative Ellen Tauscher**
**Subcommittee on Aviation Hearing**
**Commercial Space Transportation: Beyond the *X Prize***
**Wednesday, February 9, 2005**

Mr. Chairman and Mr. Ranking Member, it is a pleasure to be here this afternoon for the first meeting of the Aviation Subcommittee in the 109th Congress.

I would like to offer my special congratulations to the Subcommittee's new Ranking Member, Mr. Costello.

I have appreciated my opportunity to serve with Mr. Costello on the Committee and I look forward to working with you in the coming months.

First, may I say that the Aviation Subcommittee has a formidable task ahead of it as we enter this Congress.

Beginning with today's hearing, our Subcommittee must address issues both important to the American people and vital to the long term economic success of the industries which we are tasked with overseeing.

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Mr. Chairman, I especially look forward to continued oversight of the financial health of the nation's airline industry.

I believe we have an opportunity to help ensure the long-term stability of the industry and should act sooner rather than later as we begin the 109th Congress.

Mr. Chairman, late last year, Americans stood stunned as SpaceShipOne left Earth's atmosphere to briefly visit suborbital space.

It marked a milestone in commercial space travel in our nation's history and continued the American tradition of great invention and unsurpassed ingenuity.

We are a nation of explorers.

When in 1961, President Kennedy challenged the American people by declaring that America would send a man to the moon before the end of the decade – Americans responded.

And whether President Kennedy made this declaration due to a desire for exploration or out of a political desire to "catch up to and overtake" the Soviet Union in the "space race," since then, the United States of America has been unsurpassed in our exploration of space.

I believe our past investments are reaping present dividends. Today, we can not live without the advancements offered to all Americans because of space travel.

Our everyday ability to communicate through cell phones and the internet and the capability to protect our nation through superior technology are all just a few of the technologies available because of our space exploration.

More specifically, however, Mr. Chairman, they are all in part a product of the commercial space transportation industry.

There is no doubt that the commercial space transportation industry has created serious economic activity and has provided hundreds of thousands of jobs for Americans.

It is also clear that with increased foreign competition, the industry must evolve to both address this competition and meet new market demands.

The success of SpaceShipOne, the Ansari X Prize, and Sir Richard Branson's new venture, Virgin Galactica are certainly evidence of this fact.

Our challenge, then, lies in striking the right balance between ensuring the safety of both the non-involved general public and any future commercial passengers and a regulatory structure which will continue to encourage new development and investment.

Promisingly, the industry has an impressive safety record. Since the first permitted launch in 1989, there have been no launch accidents which have resulted in the loss of life or serious injury.

However, as the industry moves towards passenger space travel, we must keep in mind that historically, there has been an approximately 10 percent rocket failure rate for licensed launches.

In light of the Federal Aviation Administration's (FAA) core responsibility to ensure passenger safety and the federal government's current liability structure shared with the industry, I am interested to hear from our witnesses today, especially Administrator Blakey, on how the FAA should implement the provisions included in the Commercial Space Launch Amendments Act of 2004 (P.L. 108-492), adopted by Congress at the end of last year.

More specifically, I fear that we have not provided FAA with strong enough authority to curtail unsafe operating practices or limit flawed design options before an accident has occurred.

According to language included in the Commercial Space Launch Amendments Act, the Secretary should be limited to restricting or prohibiting design features or operating practices "contributed to an unplanned event or series of events during a licensed or permitted commercial human space flight that posed a high risk of causing a serious or fatal injury to crew or space flight participants" (Commercial Space Launch Amendments Act of 2004, P.L. 108-492).

While I understand that commercial passenger space flight is inherently risky, I encourage the FAA, in developing its regulations, to use an abundance of caution to help ensure the industry's outstanding safety record remains in tact.

Finally, Mr. Chairman, I look forward to this Subcommittee's continued oversight of the commercial space transportation industry and the opportunity to review any legislation which is introduced in the House pertaining to the FAA's continued authority with the industry.

I look forward to hearing from today's witnesses and the questions to follow.

Thank you.

STATEMENT OF WILL WHITEHORN,
PRESIDENT,
VIRGIN GALACTIC
BEFORE THE HOUSE AVIATION SUBCOMMITTEE
FEBRUARY 9, 2005

Chairman Mica, Ranking Member Costello, and other Members of this distinguished Subcommittee, on behalf of Virgin Galactic, thank you for the opportunity to testify today. Virgin Galactic appreciates the chance to explain how, with an unwavering commitment to safety, we plan to make available and affordable an adventure of a lifetime. As we move forward to make this vision a reality, we look forward to working closely with this important Subcommittee and Administrator Blakely, with whom I am privileged to join on today's panel of distinguished witnesses.

I am Will Whitehorn, the President of Virgin Galactic. I also am Group Corporate Affairs and Brand Development Director for Virgin Management Limited. I have nearly 30 year of aviation experience having previously worked for British Airways and Thomas Cook before joining Virgin in 1987.

The history of Virgin Galactic goes back to the mid-1990s when Sir Richard Branson identified that new technologies in composite materials, rocketry and computing could easily lead to the development of safe, economical reusable spacecraft in the future. At that time, we registered the Virgin trademark in the area of space travel. In 1999, we registered the Virgin Galactic name.

Virgin has a long history of working with Burt Rutan going back to the early 1990s. When Mr. Rutan informed us he was building a spaceship for a private customer to win the X Prize, we made a commitment to him that we would be prepared to develop a commercial version of SpaceShipOne should he be successful. Over the last year we have negotiated with Paul G. Allen, the visionary and financier behind SpaceShipOne, to buy the rights to use his technology. Following the successful conclusion of these negotiations, we signed a $21.5 million deal for the use of that technology and developed a $100 million investment plan to build up to five spaceships at Burt Rutan's factory in Mohave, California. The plan for the ships themselves is being developed by Mr. Rutan to a specification created by Virgin Galactic.

Safety obviously is our first priority. Suffice it to say that we have considerable experience in issues regarding passenger carriage and an unwavering commitment to safety. Virgin currently operates three separate airlines around the world which together carry over 50 million passengers a year. The best know of these is Virgin Atlantic Airways whose main business is operating scheduled services between the United Kingdom and a variety of destinations in the United States, as well as flights to the Far East, Africa and Australasia. We have an unblemished safety record having never lost a single passenger in over 21 years of operation. All of our airlines also are profitable without ever having received any state subsidy. We also operate the UK's largest long-distance rail company which also has an unblemished safety record despite carrying 35 million passengers per year at speeds over 125 miles per hour.

Virgin Galactic plans to start operating base tourism flights in 2008. It is envisaged that the astronauts that we carry will have a two-and-a-half hour trip with up to 20 minutes in space and a maximum altitude of around 100 miles above the Earth's surface. Our current plan is to begin operations in Mohave and then develop a second site in another location that could possibly be either Florida, Texas or New Mexico. The flights will be what is known as sub-orbital. The pioneers who become astronauts with Virgin Galactic will initially pay $200,000 for the trip but the Company hopes to reduce the cost over time as the business develops. Our long-term goal is to develop commercial space tourism into an orbital business which could in the future carry payloads as well as people into orbit. Burt Rutan has expressed his wish to put the first private spacecraft on Mars. It may be several more years before I get the chance to address the Subcommittee on that subject!

Mr. Chairman, let me conclude by again thanking you, Ranking Member Costello, and other Subcommittee Members for the opportunity to testify today. Virgin Galactic looks forward to working with you and your staff. I am pleased to respond to your questions today and to keep you apprised of relevant developments as we prepare to take-off.

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