

**REGULATING PRIVATE HUMAN SPACE FLIGHT**

**Remarks by**

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**Good morning.**

**Thank you for inviting me to be with you today.**

**Vincent said he wanted me to talk about the regulation of the space tourism industry this morning.**

**When he said that, I thought ... “Hmm. Let’s see. The NCAA basketball finals are this weekend. The Major League baseball season starts this weekend. And he wants me to talk about federal regulations.”**

**Poor Vincent.**

**But then I thought ... well, no, actually wise and perceptive Vincent, because space flight, which has been almost exclusively a spectator sport since it began, is about to open the gates to public participation.**

**What a remarkable development that is. People who are not pilots, not scientists, not military officers, not specialists and, so far, not astronauts, will be able to take a ride to space.**

**It will all be made possible by private entrepreneurs, investing their own resources in their own dreams and inviting the public to buy a ticket and join them.**

**The government’s principal role in this is developing a regulatory regime focused on the safety of the uninvolved public that at the same time regulates in a way that does not stifle the emerging private human space flight industry.**

**So on this subject of federal regulation of space tourism, or what’s becoming known as “new space,” I think the best place to start ... is at the start. And, right from the start, are these words:**

***“Space transportation is inherently risky ...”***

**That notion of risk is so intrinsic to human space flight, and so important, that the congressional authors of the Commercial Space**

**Launch Amendments Act of 2004 put those words right up front so you read that before you read most anything else.**

**When Congress adopted this landmark legislation, it didn't pull any punches in pointing out to potential space travelers that if they wanted to do this, fine. But they needed to do it with their eyes ... and their ears ... wide open.**

**In the same paragraph about risk, Congress spoke to both potential passengers and vehicle developers alike when it pointed out ...**

***“The future of the commercial space flight industry will depend on its ability to continually improve its safety performance.”***

**You can't frame the issues any better than that. Private human space flight is risky, but it has a future. That future hinges on everyone in, or connected with, the industry working all the time to make it as safe as possible, mindful that it will never be risk-free.**

**Let me quote one more time from the legislation, a quote that will help explain why I'm here.**

***“A critical area of responsibility for the Department of Transportation,” the legislation said, “is to regulate the operations and safety of the emerging commercial human space flight industry.”***

**The FAA operates under the Department of Transportation and the Office of Commercial Space Transportation that I lead, is part of the FAA.**

**So there you have the basic package. Congress passed and the President signed the Commercial Space Launch Amendments Act of 2004, essentially directing the FAA to regulate commercial human space flight to help ensure it is operated safely.**

**To that end under the terms of the law, Congress mandated regulations to establish experimental permits, a project currently moving. The whole point is that the more you test, the more you learn and the greater the likelihood that your vehicle becomes better and safer. I'll come back to that in a minute.**

**Congress also mandated rules governing private human space flight requirements for crew and space flight participants. The final rule was published on December 15, 2006 and became effective in mid-February of this year.**

**At the core of these regulations for space flight participants – let’s just call them passengers – is the idea of informed consent. In a nutshell, that boils down to making sure any passenger intending to make a suborbital flight is fully informed of the risk involved so that the passenger can make his or her own choice based on the best and most extensive information available. Most of us are familiar with “informed consent” in a medical context. There the patient is required to demonstrate their cognizance, both verbally and in writing. Our regulations say the same thing.**

**The regulation requires an operator to inform space flight passengers of the risks of space travel generally and the risks of space travel in the operator’s vehicle in particular.**

**The operator is obliged to tell the passenger that the United States government has not certified the vehicle as safe for carrying flight crew or space flight passengers.**

**Realistically, it is not possible to give assurances to anyone preparing to board a rocket for a suborbital flight that there’s nothing to worry about.**

**Of course there is.**

**We’re talking about rockets here, very powerful vehicles powered by volatile fuels. Risk attends any space flight, and it’s the operator’s obligation to make sure the potential passenger is aware of it.**

**Even so, this is not to suggest in anyway that there is or ever will be any compromise on safety. These rules have been developed within an overall environment that puts the safety of the uninvolved public as the primary factor in everything the Office of Commercial Space Transportation does.**

**That means we will, as we already do, work closely with vehicle developers and launch operators to license the safe operation of vehicles and launch site facilities, with our inspectors on hand to make certain that the terms of any license are scrupulously followed.**

**That approach is clearly evident in the features of the regulation dealing with the crew of a space flight vehicle.**

**In fact, let me take just a minute or two to give you a few details.**

**To begin with, the rule applies to any applicant for a license or permit proposing to conduct a launch or reentry with a human on board the vehicle, just as it also applies to a licensed or permitted operator conducting a launch or reentry with a human on board a vehicle**

**Next, the rule applies to flight crew or space flight participants on board a launch or reentry vehicle.**

**And, it applies to a remote operator of a launch or reentry vehicle with a human on board.**

**Each crewmember must possess and carry an FAA second-class airman medical certificate. They must complete training on how to carry out his or her role on board or on the ground so that the vehicle will not harm the public. And they must train for his or her role in nominal and non-nominal conditions.**

**Each member of a flight crew must demonstrate an ability to withstand the stresses of flight, which may include high acceleration or deceleration, microgravity, and vibration to the vehicle that will not harm the public.**

**A pilot or remote operators must have an FAA pilot certificate with an instrument rating. They have to have aeronautical experience and skills necessary to pilot and control the vehicle that will operate in the National Airspace System. And they must receive vehicle and mission-specific training for each phase of flight.**

**The rule also establishes requirements governing environmental control and life support systems, smoke detection and fire suppression.**

**The rule requires an operator to account for human factors whenever the crew must perform safety-critical roles. The rule also requires an operator to implement a verification program sufficient to verify the integrated performance of a vehicle's hardware and any software in an operational flight environment before carrying a space flight passenger. In other words, we're not only making sure the systems work, but that they work together.**

*And all these requirements rest on the foundation fact that the FAA regards the flight crew as part of the flight safety system.*

**The rule requires an operator to train each member of the crew and define standards for successful completion of the training. The operator must update crew training by incorporating lessons learned from training and operational missions; document completed training for each crew member; and, establish a recurrent training schedule.**

**Consistent with the provisions of Commercial Space Launch Amendments Act of 2004, the rule now in effect requires crew and space flight passengers to enter into a reciprocal waiver of claims with the U.S. Government. The legislation also expressly excludes space flight passengers from eligibility for indemnification against third party claims.**

**What I've discussed this morning doesn't cover everything in the rule, but I've pretty much given you all the key pieces.**

**I'm happy to tell you that although not everyone subject to this rule sees everything exactly the same way, the reception has been solidly positive. And I'm not surprised, given the industry-wide emphasis on safe operations. They know what it means not to plan properly, not to emphasize safety, and what the broader implications are for the industry. They want to get it right!**

**Earlier, I mentioned "testing" to help assure safe operations and that I'd get back to the subject in a minute.**

**This is the minute.**

**At the FAA, we are at the end of the rule-making process for Experimental Permits for Reusable Suborbital Rockets. This rule has been reviewed and cleared and will be published shortly.**

**The aim of the proposed rule is to expedite research and development on the vehicles intended to carry passengers on suborbital flights. To help facilitate testing of those vehicles, the allowable processing time for making a determination on a permit is reduced by law to 120 days compared to 180 days for a license.**

**An applicant for a permit must provide four things: (1) a program description; (2) a flight test plan; (3) operational safety documentation, including a hazard analysis; and (4) a plan for responding to a mishap.**

**Once issued, an experimental permit will cover multiple launch vehicles of a particular design and allow unlimited launches. The FAA will identify the type of design changes that may be made to a launch vehicle without invalidating the permit.**

**No person may operate a reusable suborbital rocket under a permit for carrying any property or human being for compensation or hire. The one-year permit is renewable following an FAA review.**

**The rules also prescribe the criteria for the physical area in which a launch vehicle with an experimental permit can operate. Among other things, the area has to be large enough to contain any planned trajectory and cannot contain or be adjacent to a densely populated area.**

**That's a partial sketch of the proposed experimental permit rule. Clearly the aim is testing to promote safety. Just as clearly, that kind of thinking is a feature of the emerging RLV industry. Let me explain.**

**In February, we held the Tenth Annual FAA Commercial Space Transportation Conference. Perhaps some of you were there. It was a terrific event for many reasons, all of them involving exceptional people devoted to private human space flight.**

**Safety influenced every discussion. Just to give you an example, let me tell you a little bit about the last panel of the conference. The panel was called, “*When Is a Launch Vehicle Ready to Carry Passengers?*”**

**The panelists were certainly familiar names in the industry: George Whitesides who, with his wife, is set to be among the first to take a suborbital trip; Jeff Greason of XCOR; John Herrington of Rocketplane Kistler, and; Alex Tai of Virgin Galactic.**

**The collective message of the vehicle operators was safety. There won’t be any manufactured deadlines or pre-set number of flights that, when completed, will determine whether a vehicle is safe. It will fly when it is as safe as the builders can make it. Alex Tai said there was no point in pressuring engineers. You need to test until you learn what you need to know and have proved it.**

**Jeff Greason spoke about stretching the envelope which is another way of saying you discover ... incrementally through testing ... the strong points and the points in your design that need improvement. One step at a time until you have a vehicle safe enough to ensure, safe enough to make money, which is another way of saying a vehicle that convinces the passenger the risk is worth taking.**

**It’s important to note that these and many of the panelists are operating under a regulatory regime that always ranks safety at the top of the list. They are comfortable in that kind of regime because, really, they are the people who put safety at the top.**

**That’s an important point. And so is this: Private human space flight did not sneak up on policy makers. By the time SpaceShipOne captured the X-Prize, the work had already begun on the Commercial Space Launch Amendments Act.**

**The United States is leading the way in private human space flight for a combination of excellent reasons, beginning with private entrepreneurial developers with the skill and imagination to make this an industry. Added to that, the government has been and remains an ally and supporter, a fact made clear in the U.S. Space Transportation**

**Policy announced in 2004, the President's Vision for Space Exploration, and huge support and encouragement from NASA's Mike Griffin.**

**The U.S. Space Transportation Policy said, and I quote: "The United States Government must capitalize on the entrepreneurial spirit of the U.S. private sector, which offers ... opportunities to open new commercial markets, including public space travel." That's' what the policy says. I submit that as citizens we have an obligation and responsibility to ensure that this happens.**

**That same policy included a directive to the Department of Transportation under which the FAA operates, and I quote again, "to encourage, facilitate and promote U.S. commercial space transportation activities, including commercial human space flight."**

**So what you have here is a combination of the private sector and the government working toward the same goal, and joined by communities around the country who see private space activity as a job creator and revenue producer.**

**Still, I know, whenever the topic of regulation comes up it's almost inevitable that a palpable skepticism comes with it. So let's look at regulation from a slightly different perspective, the perspective of Europe.**

**Last summer, the Vega Group in England released a study on space tourism. The very first issue listed among those affecting space tourism in Europe was ... lack of a regulatory framework.**

**The study devoted a good deal of attention to the American legislation I've discussed, concluding that the "United States, through the FAA has created a favorable regulatory environment for space tourism. Whilst emphasizing safety, regulations do not stifle the growing industry. No such regulatory environment has been seriously considered in Europe."**

**That's nice to hear. Makes you think we're doing something right. And we are.**

**What we have in human space flight is 50 years of federal precedent but very little hands-on experience by private entrepreneurial developers. The regulatory framework brings to this new effort a reference point, a measure of stability as very capable people apply modern science and physics to a very old dream.**

**I can tell you it's very gratifying to be part of this, to be a companion to private enterprise as it makes the most of fresh thinking about space and new business plans and new vehicles.**

**One of the great things about working in this field is the realization that the future ... the future that imagination has taken us to so often before ... is closer now in a real way than it has ever been. Private citizens will fly in space on private vehicles. It's about time don't you think? Maybe you will be one of them. And it won't be long now.**

**Thank you very much.**