Commercial Space Transportation Advisory Committee (COMSTAC)
Systems Working Group Teleconference Minutes
September 18, 2012, 1:00 am EDT

COMSTAC DFO, Sue Lender, welcomed teleconference participants as they joined the meeting. She also activated the recording feature and took attendance. **(Participants list on page 6).**

Sue reviewed the ground rules for the teleconference. She also noted the minutes will be posted to AST website as soon as possible. She then turned the meeting over to Pam Melroy, who welcomed the participants. Pam noted that the FAA is not soliciting proposals for agency support at this time. These teleconferences are for the purpose of background research. If, in the future, the FAA considers rulemaking, it may use the inputs from this research for background information. She reminded participants that the next teleconference will be on October 23, 2012, at 1:00 p.m. EDT.

Pam then reviewed the August teleconference, where the issues were the level of safety participants thought the FAA should target, whether the FAA should regulate multiple levels of spaceflight safety, what level of safety should be achieved through rulemaking, and whether that should be quantified. Also considered was what level of care short of a fatality the FAA ought to concern itself with. Pam thanked all who participated in that discussion. She then noted that the topic for this teleconference was what FAA oversight would look like. Aircraft-like certification is not feasible at this time, due to current technology and the FAA's statutory mandate to only pursue minimal regulations that take into consideration the evolving standards of safety in the commercial space flight industry.

The subjects included what a licensing process should look like in terms of FAA oversight. Could or should that oversight be called "certification"? Finally, for how long should informed consent remain in effect in the future after occupant safety regulations have been issued?

Pam highlighted a couple items of background for those who are less familiar with FAA/AST. The FAA does not have statutory authority to issue certificates for commercial launch and reentry vehicles, but it does have statutory authority to license operations. The FAA also has a statutory requirement to make a license determination in 180 days. The difference between a license and an aviation-like certification process generally reflects the level of insight, oversight, and how much detail is involved. Pam then asked how the FAA/AST can best ascertain in 180 days whether avoidable risks to occupants have been adequately addressed and mitigated.

A participant responded, one way is to review a submitted document with various subheadings saying how it had addressed each risk and how it mitigated each risk.

Another participant requested AST to elaborate a little bit on the statement regarding aircraft-like certification as not feasible at this time due to current technology.

Pam stated that the FAA does not have statutory authority to issue a certificate. The expectation of an aviation-like certification is not what Congress intended the FAA to do. The maturity of the industry is really what was meant by the phrase "current technology". The challenge is not to over codify best practices that don't allow for technological innovation. There's not enough maturity now to know exactly how to perform a standard oversight that would fit every applicable vehicle.

The questioner asked if the statement was addressing the issue of expendable versus fully reusable systems.

Mike Kelly of AST noted that the technology is not at a level of maturity where a reusable orbital launch vehicle could be certifiable for common carrier purposes. As for an expendable launch vehicle, he did not know how that could be done. One could follow human-rating procedures, but doing so may not rise to the level of common carrier certification. Mike Kelly observed that we don't know what the standards for launch vehicles are. The industry is not capable of the common carriage level of safety yet.

Livingston Holder summarized how commercial aircraft and general aviation aircraft are certificated. Each piece of equipment has a specific function and requirements are specific on how that equipment is built. With launch vehicles, the industry is not mature enough to state that this technology will serve this function in this manner. The experience base does not yet exist. It is just too hard to put aviation regulations in the same category that exists for launch vehicles. Over time the body of regulation will grow, but the industry is not mature enough yet for this to happen.

The questioner noted that the certification process is the final step in assessing the airworthiness of the flight system. He asked if this was the correct interpretation of the intention of certification.

Mike Kelly noted that with aircraft, the implication is that the FAA certifies it and the level of safety is such that no one thinks twice about stepping onto an aircraft.

Another participant stated that this discussion illustrates perfectly why, whatever the regulatory regime should be called, it should not be called certification. There are so many regimes in existence and each has something called certification. None of these have the same meaning.

Another commenter suggested a different angle. He referenced the FAA category of experimental aircraft, a subsection of which is research and development. Perhaps the FAA is going to start some of the safety findings from Part 21 in those 180 days. Pam asked for more detail about the connection to the part referenced. The commenter noted that part 21 refers to aircraft. This discussion is about spacecraft – flying vehicles not

certified under any other chapter. There is a very clear risk assessment and responsibility assessment for the crew and for whoever is onboard those spacecraft. He noted that Spaceship One and Spaceship Two are flying under the experimental category. This chapter would work well without all the certification implementation that other chapters have.

A speaker noted that he represents aircraft certification engineers in the FAA. He observed that while each industry's product is slightly different from any other, we still want them to develop their best engineering practices and data packages. We would want AST to take a systemic view of the spacecraft. Further, he noted that a certificate is just a piece of paper. It does, however, carry a certain weight with the public and implies that something has been deemed safe.

Livingston Holder reiterated that the technology is still immature. There is a lot of work to do to get to a point where we have a recognized, regular, and well-accepted practice for accepting vehicles for regular flight.

Pam transitioned the discussion to the next set of questions. Does certification matter? Does it change the way we do our oversight or not? Does it mean anything? If it's not certification or issuing a certificate, what might you call it and what does it mean?

There was a discussion around the term certification. Some participants indicated that the FAA/AST already uses the terms launch license and launch operator's license. There is the experimental airworthiness program. Developers specify the operating limits of a vehicle under this program and show they can operate at or above those limits. There was a suggestion that categories might be necessary: commuter, cargo, transport, etc.

Certification conveys the meaning familiar to commercial aviation. Commercial human spaceflight needs another term. Experimental certificate or license might be appropriate until the industry can establish some standards. Pam clarified the difference between an experimental certificate and other types of airworthiness certificates. That is, the prohibition under the experimental certificates against using any operations for compensation or hire.

Participants agreed that this is one reason the FAA should not designate certification of launch vehicles as part of its regulatory process. We do need to put some energy into selecting and defining what we want to call it. The terms "FAA approval document" and "participant license" were suggested. Certification does not inevitably follow passenger carriage. The authorizing legislation for aircraft and for spacecraft is very different. The FAA should be capable of developing different regulations for spaceflight and aircraft.

The issue of a manufacturer developing a vehicle and another party operating it arose. In this case, is there equipment that requires standardization? There may come a point where the FAA will license the hardware from one company and the launch operations for another company. However, the industry is too young for this type of regulation yet.

Perhaps in 20 years. Pam noted that the FAA/AST needs to take the action of including a discussion of definitions in this background research process.

The discussion turned to the subject of informed consent. Pam read the portion of the statute that speaks to this:

> In accordance with regulations promulgated by the Secretary, the holder of the license or permit has informed the space flight participant in writing about the risks of the launch and reentry, including the safety record of the launch or reentry vehicle type . . .

She then asked how long after occupant safety regulations have been issued should the informed consent requirement stay in place.

Participants put forward several viewpoints.

In order to transition away from an informed consent regime, two things needed to take place. First, the federal government has to be willing to accept responsibility for the safety of the participants.

Secondly, safety has to cease to be a buying decision. People have to feel there is no difference whether they fly with carrier A or B. They are both safe. Price and service then become the deciding factors.

Another participant offered a medical perspective where surgery or a medical procedure takes place and informed consent is used to provide the risk, benefit, and alternative options information to the patient. Another example was that of human volunteers for research efforts where informed consent is provided to the volunteer. Typically, the informed consent lasts six months to a year in this realm.

Another participant offered the perspective where informed consent includes legal liability issues and states are offering protections to operators in case an accident occurs.

One participant raised the question: what is the purpose of informed consent? One response was that someone has to make the decision as to whether the risks are worth it for a particular person for a particular flight. There are really only three parties who can make that decision: the vehicle operator, the government, and the participant taking the flight. A vehicle operator can decide how safe is safe enough, but that's fraught with all kinds of ethical risks. The government can decide how safe is safe enough, but can regulate to such a degree where there would be no industry. The participant can decide how safe is safe enough. For the participant to say how safe is safe enough, the person has to know how safe it is. This means the risks must be carefully explained and informed consent is that method of providing the information to the participant.

A participant noted that one of the major issues is to decide what are the risks someone is consenting to. Some of the medical risks to which someone may consent are still in the research stage.

Another participant made the point that in order for the commercial space industry to progress, safety has to improve. The participant suggested safety be a competitive factor among operators. Passengers or spaceflight participants can then make their choices based on an operator's safety record.

Pam noted that the teleconference was running out of its allotted time. Sue Lender requested all participants send her an email indicating their participation on the teleconference. Pam called attention to the docket (FAA-2012-0818) if people wanted to post comments. They can also phone or email comments directly to her. The next teleconference is scheduled for October 23, 2013 at 1:00 p.m. Eastern Daylight Time. That discussion will be on the types of requirements and associated guidance materials the FAA should develop. She thanked everyone for their participation, as did Livingston.

Livingston adjourned the meeting at approximately 2:02 p.m. EDT. Sue noted that the recording was being turned off.

Teleconference Participants

Participants included: Livingston Holder (Holder Aerospace), Chair, Brett Alexander (Blue Origin), Sirisha Bandla (Commercial Spaceflight Federation), Karrie Bem (Lockheed Martin), Chris Burns (Cutting Edge Communications), Michael Chandler (Johnson Space Center), A.C. Charania (Virgin Galactic), Steve Davis (SpaceX), Adam Dershowitz (Exponent), Tomaso DiPaolo (NATCA), Ted Duchesne (Johnson Space Center), Matthew Dunn (SpaceX), Christine Fanchiang (University of Colorado), Charles Griffith, Kevin Heath (WayPoint 2 Space), Ruth Hunter (Volpe Institute, DOT), Pat Hynes (New Mexico Space Grant Consortium), Mary Ellen Kirchack, David Klaus, Ray Johnson (Aerospace Corporation), Chuck Larsen, Michael Lembeck (Boeing), Raymond Leung (GWU), Michael Lopez-Alegria (Commercial Spaceflight Federation), Gaspare Maggio (SpaceX), Kate Maliga (Tauri Group), Stokes McMillan (Sierra Nevada), Robert Millman (Blue Origin), Jim Muncy (PoliSpace), Michael Murray (ULA), Aaron Oesterle (PoliSpace), Michelle Peters (Zero-G), Bob Potlach (Johnson Space Center), Mark Purcell (Lockheed Martin), Mark Purcell (Lockheed Martin), Mike Snead (Spacefaring Institute), Terrance Taddeo (Johnson Space Center), Jon Turnipseed (Virgin Galactic), Laurence Ulissey (Johnson Space Center), James Vanderploeg (UTMB Aerospace Medicine), Erika Wagner (Blue Origin), Carl Walz (Orbital Sciences), Derek Webber (Spaceport Associates), Thomas Wiener, Lynna Wood (Boeing), Rachel Yates (Holland & Hart)

Participants from the FAA Office of Commercial Space Transportation (AST) included: Susie Allen-Sierpinski, Paul Eckert, Stewart Jackson, Mike Kelly, Susan Lender, Rob Lowe (ATO), Thomas Martin, Brian Meade, Pam Melroy, Michelle Murray, Mike Machula, Randy Repcheck, Jeff Sugar, Jim Van Laak, and Ken Wong.