

UNITED STATES FEDERAL AVIATION ADMINISTRATION

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COMMERCIAL SPACE TRANSPORTATION ADVISORY COMMITTEE

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MEETING MINUTES

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**WEDNESDAY
OCTOBER 21, 2015**

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The Advisory Committee met in the National Transportation Safety Board Conference Center, 429 L'Enfant Plaza Southwest, Washington, DC, at 8:32 am, Michael N. Gold, Chairman, presiding.

PRESENT:

MICHAEL N. GOLD, Chairman
MICHAEL LOPEZ-ALEGRIA, Vice Chairman
CHUCK BEAMES, Vulcan Aerospace
RICHARD DALBELLO, Virgin Galactic
DEBRA FACKTOR LEPORE, Ball Aerospace
PETER FAHRENTHOLD, Northrop Grumman
OSCAR GARCIA, InterFlight Global Corporation
JEFFREY K. GREASON, XCOR Aerospace
MICHAEL D. GRIFFIN, Schafer Corporation
WAYNE HALE, Special Aerospace Sciences
LIVINGSTON L. HOLDER, JR., Holder Aerospace
TIMOTHY HUGHES, Space Exploration Technologies Corporation
JANET C. KARIKA, NASA Launch Services Program
BILL N. KHOURIE, Oklahoma Space Industry Development Authority
CHRISTOPHER KUNSTADTER, XL Insurance
CHARLES PRECOURT, Orbital ATK

CARL D. RISING, Stellar Solutions
FRANK SLAZER, Aerospace Industries Association
MARK SUNDAHL, Cleveland State University

ALSO PRESENT:

EDWIN "BUZZ" ALDRIN, Buzz Aldrin Space Institute
HON. BRIAN BABIN, U.S. House of Representatives, Chairman of Committee on
Science, Space, and Technology
HON. DEREK KILMER, U.S House of Representatives, Member, Committee on
Appropriations
GEORGE NIELD, Associate Administrator, Office of Commercial Space Transportation,
Federal Aviation Administration
KELVIN COLEMAN, AST Chief of Staff
MICHAEL FRENCH, NASA Chief of staff
JIM MUNCY, PoliSpace
LARRY SCOTT, Designated Federal Official

Welcome/Opening Remarks by the Chairman:

COMSTAC Chairman Mike Gold opened the meeting at 8:32 am, and introduced new COMSTAC members Richard DalBello, Chuck Beams, Frank Slazer, and Wayne Hale.

Congressional Speaker/Presentation:

Congressman Babin highlighted COMSTAC's ability to facilitate discussion between stakeholders and the importance of their recommendations to Congress. The House of Representatives sent a unanimous FY 2015 NASA Authorization bill to the Senate. Congress also passed a short-term extension of existing Federal Aviation Administration (FAA) authorities. Many oversight hearings have been held on a variety of topics, from NASA's overall budget request to cargo accidents.

Legislation has expanded the possibilities for commercial spaceflight and resulted in many benefits while minimizing government interference. To continue this growth, government regulators need to provide an understandable, stable, and competitive regulatory environment. Congress passed HR 2262, the Spurring Private Aerospace Competitiveness and Entrepreneurship (SPACE) Act with bipartisan support. The Act preserves FAA's ability to regulate commercial human spaceflight in order to protect the public, extends the learning period and indemnification to 2025, calls for a status report, allows for the industry to develop consensus standards in the interim, updates the definition of government astronauts, closes legal loopholes, asks for important reports, and addresses a variety of other issues.

HR 1508, the Space Resource Exploration and Utilization Act, codifies the right of non-governmental entities to use and remove in situ space resources. HR 2261 ensures that the Department of Commerce can protect national security while maintaining American leadership in the field of remote sensing technologies. HR 2263, the Office of Space Commerce Act, updates the existing office's name, streamlines its functions, and expands its responsibilities.

Mr. Babin said Congress would study the recent accidents involving Orbital ATK, SpaceX and Spaceship One, and decide how best to address each of them. The last NASA Authorization Act expired in 2013, and though the House has passed several NASA Authorization bills since then, they have not made it through the Senate. NASA's funding levels will probably be decided by an omnibus spending bill, and Congressman Babin hoped COMSTAC will urge the Senate to ratify a NASA Authorization bill soon.

Key Issues Facing AST and Industry:

Dr. George Nield described attending the 66th International Astronautical Conference (IAC) in Jerusalem. Johann-Dietrich Woerner, Director General of the European Space Agency (ESA), envisioned establishing a lunar village on the far side of the Moon. The village would enable countries to participate at appropriate levels, develop commercial space activities, and provide NASA the opportunity to test its Mars plans.

Keeping pace with industry is vital for AST, even as its budget has been flat and launches have increased. While the President has asked for a funding increase for AST, the government is operating under a Continuing Resolution, so this has not occurred. Congressmen Posey and McCarthy introduced HR 3038, which would allow hybrid system and space support vehicles to perform non-launch activities under an AST license at an FAA licensed spaceport. HR 2262 calls for the GAO to produce a report on such space support vehicles. At present, no government agency is tasked with authorizing or supervising non-traditional in-space operations. Senate Bill S1297 calls for the White House Office of Science and Technology Policy (OSTP) to issue a report assessing commercial activities and identifying appropriate oversight authority. AST has published its Recommended Practices and encouraged industry to develop consensus standards, but has no current plans to develop new human spaceflight regulations.

International Space Policy Working Group Report:

Dr. Mark Sundahl, Chair of the Working Group, provided the report. The Working Group has held two teleconferences, one dealing with export controls and the other with non-interference on celestial bodies. It has adopted two observations and a recommendation regarding export controls. There have been great successes with International Traffic in Arms Regulations (ITAR) reform in the field of space technology, but as it stands, suborbital vehicles that have integrated propulsion greater than is required to put the spacecraft into orbit are subject to the ITAR. The Working Group tried to determine which suborbital craft needed to be subject to this regime due to real national security concerns. No Observation, Finding, or Recommendation (OFR) was generated on this topic.

Observations and a recommendation were produced on lessening the burdens imposed on suborbital operators in foreign countries by ITAR. The Working Group met with many other agencies by teleconference to discuss facilitating the export of spacecraft under the Export Administration Regulations (EAR) instead of the ITAR; the call included representatives from the Departments of State and Commerce, NASA, and the Defense Technology Security Administration. Of particular concern to the governmental representatives was that, during a failure investigation, foreign governments might demand technical data subject to ITAR control. After a fruitful discussion, the Group recommends that the FAA AST advocate that peaceful, commercial human spaceflight operations could be conducted outside the United States entirely under the auspices of the EAR under the following circumstances: the spacecraft is entirely operated and maintained exclusively by U.S. persons (as defined by the ITAR), no technical data is disclosed to any foreign persons, and that the foreign government provides binding legal assurances that no ITAR protected technical data relating to the spacecraft or its operations will need to be shared with foreign persons, even in the context of a failure investigation.

Mr. Garcia recommended changing the word “peaceful” to “civil,” to exclude any military commercial suborbital flights. Mr. Slazer asked if the spaceship should also be

specified as being entirely owned by U.S. persons. Mr. Greason said that because corporate ownership of spacecraft is extremely complex, it would be prudent to not craft that language from the floor. COMSTAC approved the recommendation.

The Working Group observed that the FAA AST currently uses expected casualty analysis to determine the magnitude of potential hazards to the public arising from the launch and reentry of spacecraft and the operation of spaceports. It found that computer programs applying probabilistic risk analysis (PRA) are available to determine the scope of potential harmful interference arising during space activities, and could assist in determining the appropriate parameters of a non-interference zone for activities on celestial bodies.

Mr. Greason wanted to share part of the Working Group's deliberation to the full COMSTAC, and stated that a desire for flexibility, rather than support of PRA alone, led to the end result. Chair Gold echoed that this was the beginning of a conversation around this issue, and that PRA was one tool out of many. Ms. Facktor Lepore suggested that COMSTAC use PRA as an example of an approach, instead of the solution, in the finding. Dr. Sundahl suggested adding the following sentence to the finding: "industry would benefit from considering a dynamic approach to determining the parameters of the zone of non-interference by leveraging a variety of tools, such as PRA." With the COMSTAC's approval, he deleted the other portions of the finding. COMSTAC then approved the OFR.

The Working Group also discussed international legal issues that arise out of HR 2262: whether the language of the bill violates the Article II prohibition of national appropriation under the OST (Outer Space Treaty), and whether there is a sufficient legal structure to authorize and supervise collection of natural resources under Article VI of the OST. No OFRs were produced regarding the first issue, but a finding was proposed for the second. The Working Group debated whether the language of Title II of HR 2262, when combined with the proposed mission authorization process, would satisfy Article VI requirements. The finding was that the FAA AST, and U.S. policy makers in general, should support a legal and regulatory environment that encourages the commercial use of space to the maximum extent possible while maintaining compliance with international law. COMSTAC supports the goals of Title II of HR 2262. Mr. Greason suggested turning the finding into two distinct ones. Mr. Hughes suggested spelling out the goals of HR 2262 so there would be no confusion. Dr. Sundahl asked to add the language of the bill to the second finding during a break and return to COMSTAC with it, and Chair Gold agreed.

The Working Group produced a finding and recommendation on interfacing with the International Standards Organization (ISO). It found that Subcommittee 14 of Technical Committee 20, the ISO's Space Systems and Operations section, is evaluating the formation of a working group to deal with human spaceflight standards. Its recommendation is that FAA support the US technical advisory group chair in his efforts to establish this cross-disciplinary working group, and to use it to share the U.S. government's position with the ISO. COMSTAC approved the finding and recommendation.

Samuel duPont from the Office of the U.S. Trade Representative gave a presentation to the Group discussing plans with Antrix to open up its services market to American satellite operators. There is concern around whether Antrix will have an unfair advantage over domestic private sector competition, since it is an Indian governmental entity.

Dr. Sundahl presented the redrafted findings regarding the utilization of space resources. The first finding was that the FAA AST, and U.S. policy makers in general, should support a legal regulatory environment that encourages the commercial use of space to the maximum extent possible, while maintaining compliance with international law. The second finding was that COMSTAC supports the goals of Title II of HR 2262 and enumerated those goals. The findings were approved by the COMSTAC.

Operations Working Group Report:

Chair Janet Karika gave the report. In addition to developing OFRs, the Working Group was briefed on spaceports by Jim Ball of Spaceport Strategy, received an FAA status update on investigations from Mike Romanowski, and heard from Tom Lollis and Lieutenant Colonel Jertberg of U.S. Space Command on how Space Command is continuing to fold in commercial requirements. The Working Group produced findings regarding the spaceport directory: that FAA AST supports the development of a spaceport directory, that AST supports the Working Group distributing the proposed templates to spaceports for completion, that OWG leads Christine Anderson and Bill Khourie will contact spaceports, and that with that information the Group will populate the spaceport directory. Upon completion, the results will be briefed at COMSTAC and AST, and they will jointly identify an appropriate mechanism for publication, distribution and maintenance of the directory. The directory is currently in the data collections phase. COMSTAC adopted the findings.

Since the last COMSTAC meeting, there has been serious engagement on the need for Air Force commercial ranges to accommodate users from all sectors, as is required in the Space Transportation Policy. The commercial launch community's needs and requirements at federal launch ranges are becoming more complex. The Group observed that Space Command is examining how to meet these needs efficiently while maintaining safety at their federal launch ranges. The Working Group recommends that FAA AST continue to advocate for commercial users' range requirements and that AST work with Space Command to explore ways to better communicate and advocate for commercial launch provider needs. COMSTAC voted to approve the OFRs.

The Working Group met with Doug Loverro, Deputy Assistant Secretary of Defense for Space Policy, on the topic of space traffic management. The Group developed an observation and a finding, and hopes to gather data on roles and responsibilities. It observed that the Department of Defense (DoD) is expending significant resources to monitor and inform private sector entities on conjunctions in orbit. The Group found that interagency discussions on space traffic management roles and responsibilities are needed to find a best fit for this critical task, and continued assessments on transferring

this responsibility from the DoD to the Department of Transportation (DOT) are needed. COMSTAC voted in favor of the OFRs.

Business Legal Working Group Report:

Mr. Chris Kunstadter gave the report. The Group had a panel discussion on the future of commercial space with representatives from NASA and OSTP, a discussion on informed consent with FAA AST, and produced three OFRs. After AST presents its proposal on informed consent, the Group plans to hold a telecon on it. The Group produced an OFR on commercial crew funding, and observed that the U.S. is currently dependent on Russia to transport astronauts to the International Space Station (ISS). It found that regaining the ability to transport astronauts to and from Low Earth Orbit (LEO) is critical, and recommends that in any interagency discussion or dialogue with Congressional policymakers, AST should support full funding of the FY2016 Presidential Budget Request for the commercial crew program. COMSTAC adopted the OFR.

The Group produced an OFR on private sector space stations. NASA has stated that it will not place a government space station in LEO after the retirement of the ISS. The Group found that the U.S. should maintain a presence in LEO after retirement of the ISS, and that the private sector is developing capabilities to operate commercial space stations. It recommended that in any interagency discussion or dialogue with Congressional policy makers, FAA AST should support the development of private sector space stations in order to maintain U.S. space leadership. COMSTAC adopted the OFR.

The Group observed that NASA plans to support the robust development of cislunar space as precursor to human missions to Mars. The Group found that the private sector has many capabilities that NASA could leverage to support human exploration beyond LEO. It recommended that in any interagency discussion with Congressional policymakers, FAA AST should support the use of private sector capabilities for government human spaceflight exploration programs beyond LEO. Mr. Beames and Mr. Holder clarified the definition of commercial spaceflight capabilities, and that the goal of the OFR was to encourage private sector companies. COMSTAC adopted the OFR.

Remarks by Edwin “Buzz” Aldrin

Dr. Aldrin discussed a recent study by the Buzz Aldrin Space Institute that was presented at the IAC in Jerusalem. He recommended examining tourism trips to the far side of the Moon and Mars using circular, co-planar orbits, and laid out the viability of various orbital configurations. He proposed moving beyond sending six person crews to Mars for a year and a half, and reminded COMSTAC that all the groundbreaking work done by the Spirit and Opportunity rovers in the past five years could have been done in one week by a human crew. He questioned whether current spaceflight goals are far-reaching enough, and reiterated a commitment to sending permanent colonists to Mars.

Dr. Aldrin recommended placing a B330 space station in LEO, and recognized that this would spur competition and cooperation with the Chinese. Other plans Dr. Aldrin discussed included towing an asteroid to an L1 or L2 orbit, and the construction of the SLS. He hoped that the public would remember that the Apollo program suffered tragedies like the Apollo 1 fire, and that such accidents shouldn't scupper space exploration.

Congressional Speaker/Presentation:

Congressman Kilmer expounded on the economic and technological benefits of space exploration and commercialization. He hoped Congress could expand opportunities for commercial space development, which it could do by providing adequate funding, and by funding NASA's full budget request. He stressed that, to give agencies and companies certainty, Congress needs to pass a full budget instead of a Continuing Resolution.

Mr. Slazer asked Congressman Kilmer if he thought the upcoming House vote on the Export Import Bank would be successful. Mr. Kilmer speculated that there would be some procedural issues before voting actually occurred, but hoped that it would pass out of the House. In the Senate, he expected it to end up as part of some larger bill on transportation or defense. Mr. Greason brought up the importance of building a talented, skilled workforce and the deadening effect that export controls have on hiring promising students from overseas. Congressman Kilmer thought that comprehensive immigration reform could go a long ways towards fixing this issue. He also hoped that investing in STEM education would strengthen America's own workforce. Chair Gold hoped that Appropriations would fund FAA AST at the level it needs to do its complex job efficiently, and asked whether there was any possibility of passing an omnibus budget bill this year. Mr. Kilmer hoped that passing such a bill was possible.

Standards Working Group Report:

Oscar Garcia, Chair of the Working Group, provided the report. The Group held two conference calls, multiple ad-hoc meetings with industry, the public and other stakeholders, two calls with AST leadership, and calls with other stakeholders. It distinguished between standards and recommended practices. Standards are agreed-on guidelines determining how things are to be done, and a strong reason must exist for not following them. They can be created by government or industry. Voluntary consensus standards are defined by OMB and will probably be FAA's chosen method of regulation in the future. Recommended practices are broader, less technical, and less binding. The Working Group proposes that both are dealt with in the same platform and within the same conversations.

FAA AST asked the Group to come up with a roadmap for moving beyond the learning period to standardization and regulation. Currently, the commercial spaceflight industry is most concerned with public safety. Eventually, commercial spaceflight will become routine and enter a regulation environment where public safety, occupant

safety, national security, and mission assurance are all important. The Group has developed a rough sketch of the anticipated stages industry will move through, called the Safety Roadmap to Regulation (SARP). The timeline begins in 2015, and moves through three future phases -- pre-regulation, regulation and certification -- when certain milestones are met.

The Group is attempting to work concurrently with FAA AST and industry to develop the SARPs. Advisory Regulatory Committees can assist as this process continues. The roadmap will address areas of possible future regulation, concepts to define in routine operations, and the construction of a safety framework by managing new knowledge and operational experience. Paul Damphousse and James Duffy will lead the roadmap drafting working group. The Group is also examining ways of classifying standards. The Finding passed with no opposition.

The Group produced a recommendation establishing a SARPs Practices Subcommittee under the Standards Working Group. The Subcommittee's initial focus area will be to prioritize areas needing work within occupant safety. Ms. Facktor Lepore pointed out that this finding was a recommendation to COMSTAC, not FAA AST, and so COMSTAC can just act on it without the formal recommendation process. Mr. Garcia reflected that having a chartered subcommittee would help ensure that the right organizations participate. Mr. Greason pointed out that they would not be able to do this without cooperation from AST, and so an official action would be best. Mr. Kelvin Coleman, AST Chief of Staff, confirmed AST's desire to engage on this topic whether it comes forward as a recommendation or in another form. Mr. Holder suggested amending the language to include the phrase "with AST". Dr. Sundahl pointed out that what COMSTAC was really recommending was that the AST participate in the Committee, and Chair Gold reminded the group that recommendations require the AST to respond. The recommendation was changed to reflect those suggestions and COMSTAC approved it. The recommendation on human occupancy safety also passed. The Working Group plans to establish the Roadmap Subcommittee by the next COMSTAC meeting.

NASA Political Perspectives

Mr. Mike French, NASA Chief of Staff, said NASA and AST have a close relationship that continues to grow with the commercial space sector. NASA has emerged into a new period of stability after the 2010 Authorization Act and has consistently invested into a set of programs. As NASA transitions beyond LEO, private exploration and development will ensue in LEO, and NASA remains committed to continuing to partner with these entities. Unless the budget allotted to space technology and commercial crew grows, programs will suffer. NASA wants to launch American astronauts on American soil as soon as possible, which will require full funding.

Ms. Facktor Lepore asked Mr. French to expand on the role of earth science and other NOAA and USGS operations in NASA's portfolio. Mr. French explained that NASA has a strong relationship with USGS and NOAA. Chair Gold asked about Mr. French's thoughts on Article VI of the OST and mission authorization. Mr. French affirmed that NASA supports its commercial partners, and referred COMSTAC to the last statement

by the NASA administrator. Vice-Chair Lopez-Alegria thanked NASA for all its commercial support and the small-dollar risks they take. Dr. Aldrin asked what problems Mr. French saw with NASA supporting a commercial space station in LEO before the ISS is decommissioned. Mr. French said that NASA felt great hesitancy to committing NASA dollars exclusively to a LEO space station while the ISS was functional, but that areas where funding can benefit commercial LEO activity are of great interest. Dr. Aldrin also brought up international lunar activity, and Mr. French confirmed that NASA is committed to supporting international activity on the Moon.

New Business:

Chair Gold thanked the Working Group chairs for their work getting the OFRs out to the full committee. The Chair thanked Mr. Coleman for his work on this meeting. Mr. Greason reflected that more areas of recent COMSTAC discussion are linked to the transportation industry, and that the charter might need to be updated to reflect this. The Chair said he would look at the Charter and Bylaws and report on any updates they might require at the next COMSTAC meeting. Ms. Karika stated that the current meeting format was very helpful. Mr. Holder said that holding working group meetings sequentially instead of concurrently was an excellent change. Dr. Sundahl requested that a new list of working group and COMSTAC members be drawn up, and that new members get the chance to join working groups. Mr. Garcia asked how COMSTAC could help with efforts to revitalize spaceports. Dr. Neild said that information is being gathered for bills on Capitol Hill and that AST would be available to provide answers.

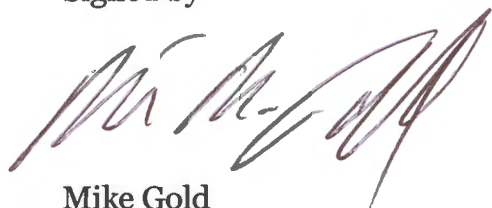
Public Comments

Jim Muncy of PoliSpace proposed a draft OFR on the ESA Director General's idea of a lunar village. Dr. Sundahl read the draft on AST engaging with ESA to refine and attain the lunar village concept. COMSTAC members were hesitant to compose a measure on the fly. Dr. Sundahl suggested changing the OFR to an observation reflecting that there is a great deal of interest about the lunar village and that in the next COMSTAC meeting further work will be done. Ms. Karika and Ms. Facktor Lepore seconded and refined the suggestion.

Wrap-Up and Adjournment

Chair Gold adjourned the meeting at 2:35 p.m.

Signed by



Mike Gold
Chair, COMSTAC