



**Commercial Space Transportation Advisory Committee  
COMSTAC  
October 29, 2009  
Meeting Minutes**

COMSTAC Chairman Will Trafton convened the 50<sup>th</sup> meeting of the Commercial Space Transportation Advisory Committee (COMSTAC), at 8:36 a.m. The meeting was held at the Marriott Metro Center Hotel in Washington, DC. He welcomed members and guests and acknowledged Dr. George C. Nield, FAA Associate Administrator for Commercial Space Transportation and James Van Laak, FAA Deputy Associate Administrator for Commercial Space Transportation, from the Office of Commercial Space Transportation (AST). He also acknowledged COMSTAC Deputy Chair Chris Kunstadter, vice president, XL Insurance.

Chairman Trafton reported that the meeting represented the 50<sup>th</sup> meeting of the Committee and 25 years of the Committee's establishment. He reported on the Committee's work since the May 2009 meeting, including 1) a report entitled "DOD Impact on Commercial Launch Services Competitiveness," noting that the work on that report was led by the Launch Operations and Support Working Group, chaired by Bob Davis; 2) a letter sent to the FAA recommending the extension of indemnification for commercial launch operations in the Commercial Space Launch Act, noting that this work was led by the Risk Management Working Group, chaired by Chris Kunstadter and Janet Sadler; and 3) submission of comments to the FAA on the National Policy Review. He reported that the Committee is in the process of reviewing recommendations developed by the Export Controls Working Group, chaired by Mike Gold.

Chairman Trafton acknowledged COMSTAC member Eleanor Aldrich and her long-term service as a member of COMSTAC, as well as her contributions to U.S. space activities overall. He noted that Ms. Aldrich was honored by Women in Aerospace (WIA) and received the 2009 WIA award for Aerospace Awareness, on Tuesday, October 27.

**Report from the FAA**

Mr. Van Laak provided an update on AST and industry activities since the last COMSTAC meeting in May 2009. He listed several industry accomplishments including the successful launches of Delta IV in June (Boeing), Falcon I in July (SpaceX), and Delta II in October (Boeing) which was the 199<sup>th</sup> FAA licensed launch. He reported on Unreasonable Rocket's first free flight on July 11, Armadillo Aerospace's qualification for the Level Two award at the Lunar Lander Challenge on September 12, and Masten's completion of a Level One flight also for the Lunar Lander Challenge. He also reported on the seventh space flight participant to the International Space Station, the groundbreaking for Spaceport America on June 19, the Sea Launch bankruptcy, the \$5.5

million investment in the Rocket Racing League on July 3rd, and the White Knight 2 appearance at the Oshkosh Air Show on July 28, along with the announcement of a \$280 million investment from Abu Dhabi's Aabar Investments Company.

Mr. Van Laak reported on recent and upcoming AST activities, including approval by FAA Administrator Randy Babbitt for the establishment of a Center of Excellence for Commercial Space Transportation; trips by Dr. Nield to the Royal Aeronautical Society in London in June and the International Astronautical Federation Conference in Republic of Korea this month; reexamination of expected casualty calculations and obtaining industry and COMSTAC feedback on maximum probable loss; the anticipated issuance of the first FAA Safety Approval in the near future; reexamination and reworking of the Amateur Rocket Rule especially in the area of FAA internal coordination; his trip to NASA Johnson Space Center in Houston with several RLV industry representatives; and the establishment of new AST field offices in Houston and Southern California.

Mr. Van Laak pointed out that one of the ways that AST supports industry is through the development of advisory circulars (AC) which often include industry best practices. Due to industry concerns that ACs are often perceived as regulatory, AST has decided to restructure them into guides, adding that AST is working on guides for environmental control and life support and crew training. He listed additional upcoming activities, including the rollout of Spaceship 2, the possibility of two maiden RLV flights, and the first flight of the Falcon 9.

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Chairman Trafton acknowledged and thanked COMSTAC member Debra Facktor Lepore for chairing the Space Transportation Operations Working Group meeting on Wednesday, standing in for STOWG chair Bob Davis.

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### **Remarks by Dr. Nield**

Dr. Nield introduced Jim Duffy as the newly-selected Chief Engineer at AST and provided a brief summary of Mr. Duffy's background and experience. He then acknowledged the 50<sup>th</sup> COMSTAC meeting, noting that the first meeting took place on October 22-23, 1984. He listed several historical facts:

- The first COMSTAC members were appointed by Elizabeth Dole, the U.S. Secretary of Transportation in 1984;
- The first COMSTAC chair was Gerald Mossinghoff, executive director of the Pharmaceutical Manufacturers Association;
- Former members include Norm Augustine, Deke Slayton, Elon Musk and Astronaut Mae Jemison.

He acknowledged current members, including Livingston Holder (Holder Aerospace), who was appointed in 1996, served as chair from 1998 until 2003, and is currently the longest serving member; Lou Gomez (Spaceport America), Eleanor Aldrich (AIAA), and Alex Liang (The Aerospace Corporation) who were also appointed in 1996. He also acknowledged Mike Kelly, (ATK) who was appointed in 1998 and established the RLV Working Group; John Vinter, appointed in 2000, and served as chairman of the

Committee from July 2003 until January 2007; and Billie Reed (Virginia Commercial Space Flight Authority), appointed in 2003.

Dr. Nield highlighted key points in the Augustine Panel's report, noting that the report called for stimulating commercial space flight capability as one of four primary objectives and for consideration of using the commercial sector to transport astronauts to the ISS. He added that the report indicated that the private sector can provide lower cost access to low Earth orbit than the Government and that in general, the panel signaled broad support to the commercial launch industry.

### **Review of U.S. Human Space Flight Plans Committee**

Jeff Greason, president, XCOR Aerospace, reported on the work of the Review of U.S. Human Space Flight Plans Committee, better known as the Augustine Panel, noting that the purpose of that review was to develop options for consideration by the Administration regarding human space flight architecture that would:

- Expedite a new U.S. capability to support utilization of the ISS;
- Support missions to the Moon and other destinations beyond low Earth orbit;
- Stimulate commercial space flight capability; and
- Fit within the current budget profile for NASA exploration activities.

He noted that one of the key questions was “why do we have a human space flight program” and that science and international relations prestige are two reasons but not the most important reasons. He reported that the most important reason was the extension of human civilization beyond Earth with Mars as the starting point.

Mr. Greason reported that the panel agreed that the ISS should be maintained in order to preserve the international partnerships that have been developed and to use it for exploration and launch technology demonstrations. He noted that currently it is too expensive to go to Mars, and in order to lessen the costs, there needs to be additional flight demonstrations. He discussed the various paths that the Panel reviewed for getting to Mars, including starting with the ISS, the Moon, and flexible path.

He discussed the need for the development of in-space propellant storage and transfer, which he described as a single tanker launched to orbit, which autonomously docks with an Earth Departure Stage (EDS) and transfers fuel; or a more advanced version which includes many tankers docking with a depot in orbit and filling it, the EDS then docks and fuels from the depot. He noted that either mode can be used to top off or completely fill an EDS and that one of the advantages is that a smaller booster doing multiple launches can be used. He added that the use of cryogenic propellants is also needed for long missions. He discussed commercial crew service and the need to lower the costs by encouraging competition among small and large companies, the role of infant mortality and flight rate, and the need to look at all systems of a vehicle (booster, capsule) to ensure safety throughout. He specifically noted that the Committee was unconvinced that enough is known about any of the potential high reliability launcher plus capsule systems to distinguish their levels of safety in a meaningful way.

COMSTAC Alternate Frank Slazer (Northrop Grumman) asked whether the Committee addressed the fixed costs that NASA has when launching from the Cape or a range. Mr. Greason responded that this issue was examined in detail including ways to lower these costs for commercial providers. COMSTAC member Mike Gold (Bigelow Aerospace) asked about the \$5 billion recommendation for implementing a commercial crew program. Mr. Greason responded that the Committee wanted to be on the safe side and not under estimate. Dr. Nield asked how the diverse Committee was able to reach consensus. Mr. Greason responded that, although most members came in with preconceptions, after deliberation and analyses of data, members were willing to change their minds on the basis of data and the Committee was able to reach consensus for the final report.

### **COMSTAC Working Group Reports**

#### **Risk Management Working Group (RMWG)**

Chris Kunstadter, vice president, XL Insurance, provided a report on risk management issues, explaining that the RMWG meeting was combined with the Space Transportation Operations Working Group (STOWG) meeting in order to present a special briefing on orbital debris mitigation for upper stages. On risk management issues, he discussed the RMWG's work on the extension of indemnification in the Commercial Space Launch Act, set to expire on December 31, 2009, including the letter drafted by the RMWG and sent to the FAA. He reported that the House passed a three-year extension a few days earlier and the bill is now in the Senate. Mr. Kunstadter reported on the orbital debris mitigation discussion, noting the briefing the previous day by Nicholas Johnson, NASA'S Chief Scientist for Orbital Debris, entitled *The Disposal of Launch Vehicle Orbital Stages*.<sup>1</sup> He highlighted some points from that briefing:

- Orbital debris is not imminently catastrophic to in-orbit satellites, but the risk will continue to increase without mitigation;
- Several organizations (NASA, ESA, the Interagency Debris Coordination Committee, United Nations and others) are working to develop guidelines and best practices for mitigation;
- There are three methods of upper-stage debris mitigation: passivation of upper stages by venting fuel, limiting lifetime on orbit in low Earth Orbit (LEO) and geostationary orbit (GEO), and limiting the risk of human casualty from reentries.
- U.S. launch providers are generally following the guidelines.

Mr. Kunstadter discussed the impact of orbital debris:

- Many LEO satellites are not insured and LEO tends to be self-cleaning due to gravitational and aerodynamic forces;
- In comparison, GEO is not self-cleaning and objects remain in orbit for long periods. About 50% of the GEO satellites are insured, GEO satellites tend to be

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<sup>1</sup> This presentation is available at:

[http://www.faa.gov/about/office\\_org/headquarters\\_offices/ast/advisory\\_committee/meeting\\_news/media/2009/october/Johnson.ppt#261,1,The Disposal of Launch Vehicle Orbital Stages](http://www.faa.gov/about/office_org/headquarters_offices/ast/advisory_committee/meeting_news/media/2009/october/Johnson.ppt#261,1,The Disposal of Launch Vehicle Orbital Stages)

attracted to libration points, located at 75° east over the Indian Ocean and 105° west over the United States;

- The United Nation's Committee for the Peaceful Uses of Outer Space manages five treaties governing space activity, including orbital debris; and
- The Joint Space Operations Center at Vandenberg AFB tracks thousands of objects.

He added that if there was a collision in space, it would be difficult to determine fault legally.

COMSTAC member Berin Szoka (Space Frontier Foundation) asked if the increase in tracked objects was a result of the Chinese ASAT collision; Mr. Kunstadter replied that the increase is due almost entirely to that collision and the collision of the Iridium 33 and Russian Cosmos 2251 satellites. Mr. Van Laak provided additional comments about orbital debris, noting that there are approximately 1500 to 1600 upper stages in orbit. He emphasized FAA's goals to protect the common LEO environment and to protect the public in the event of a random reentry. He added that the FAA is not planning to develop regulations but is looking for ideas and innovative techniques for debris mitigation. When asked if FAA has the authority to fine offenders and reward good practices, Dr. Nield responded that as a regulatory agency, the FAA can suspend licenses and levy fines, but currently there are no regulations, guidelines are voluntary, and it would be difficult to find a source of funding, adding that the FAA is looking at these types of issues.

Mr. Szoka asked if anyone has attempted to quantify the effect on insurance rates and on industry if indemnification lapsed, will taxpayers be free of that liability and how will we know when that will happen? Mr. Kunstadter responded that the impact of no indemnification on insurance rates and industry has been covered comprehensively in the 2006 report by the Aerospace Corporation. Dr. Nield pointed out that no taxpayer funds have ever been used, even though the indemnification regime has been in place for several decades. Mr. Kunstadter added that the maximum probable loss determinations cover potential exposure. COMSTAC alternate Elaine David (Lockheed Martin Corporation) emphasized that the Aerospace Corporation report covers almost all conceivable situations and that indemnification is critical to the continuation of international competitiveness for the U.S. commercial launch industry.

#### **Export Controls Working Group (ECWG)**

Michael Gold, Director of D.C. Operations & Business Growth for Bigelow Aerospace, discussed recent developments in export controls, the ECWG meeting on Wednesday, and recommendations made by the working group. He reported on H.R. 2410, the State Department Authorization bill passed by the House, which includes export controls reform provisions to review a minimum of 20 percent of the United States Munitions List (USML) on an annual and ongoing basis to give the President authority to remove satellites and related components from the USML; and to publicly release commodity jurisdiction (CJ) requests. He explained that currently CJs, which are determinations of the technology that go on the USML and the Commerce Control List (CCL), are privately

held. He believes that the Senate will take action on this issue if Senator John Kerry prioritizes it and noted that President Obama was the only candidate to include export control reform in his platform, and that currently there is an internal White House review in progress to gather information on what should be done with export control reform.

Mr. Gold reported that the ECWG developed three recommendations related to H.R. 2410:

- 1.** The COMSTAC supports export control reform in general and the goals and objectives of H.R. 2410 in regard to, among others, reviewing and revising the USML. We urge the Senate to move as quickly as possible in taking up and passing comparable legislation.
- 2.** Obtaining a broad array of industry input is vital for the U.S. Department of State and other federal entities to effectively implement positive changes to the nation's export control regime. Therefore, future export control reform legislation in the Senate and House should encourage the Department of State to share significant planned rules and policy shifts with the Defense Trade Advisory Group ("DTAG"), the COMSTAC, and any other relevant Federal Advisory Committees that express a desire to become involved.
- 3.** We support H.R. 2410's call for the public disclosure of properly redacted Commodity Jurisdiction Request determinations via the Internet, and would encourage the Department of State to take such action immediately.

Mr. Gold emphasized that no substantive changes were made to U.S. export controls policy relative to China, with one exception, that the Secretary of Commerce will sign off on approvals instead of the President. He also expressed his opinion that the ITAR is unconstitutional as a prior restraint on free speech, it is too broad, not sufficiently narrowly tailored for its purpose, does not protect a significant governmental interest, and does not provide hard deadlines or expeditious judicial review. Next, Mr. Gold reviewed the five recommendations developed by the ECWG at the beginning of the year:

- 1.** The COMSTAC supports the interagency effort to review and revise the United States Munitions List (USML) and the Commerce Control List (CCL). Products, technologies, and related material that are obsolete, militarily benign, or widely available in the international commercial marketplace should not be subject to the USML. Moreover, inconsistencies, overlaps, and contradictions between USML and CCL should be identified and addressed. Due to the constantly evolving nature of technology in the global marketplace, the USML and CCL should be reviewed, updated, and reconciled on, at least, an annual bases, in whole or in part, with input from all of the relevant stakeholders in the private sector. Congress should enact legislation to ensure that technologies under Chapter XV are not excluded from this process.
- 2.** The White House should also consider establishing a standing entity, potentially within the Office of Science and Technology Policy (OSTP) in coordination with other relevant

agencies, to support this review process on an ongoing basis. Congress, for its part, should draft and pass the legislation necessary to allow this process to take place.

3. The transparency of the export control process must also be enhanced. Specifically, explanatory notes should be included at the end of each USML and CCL category. Additionally, the results of Commodity Jurisdictional requests, and advisory opinions, including the text of the requests themselves, (redacted as necessary), should be publicly released in a timely fashion and in an easily accessible manner.
4. The Directorate of Defense Trade Controls (DDTC) should bolster the efficacy of its Response Team. The Response Team's capabilities should be enhanced to allow it to act as an ombudsman, providing interested parties with greater information, as well as recommendations for potential strategies and paths forward. To meet the requisite Response Team staffing needs, the DDTC should consider hiring personnel with relevant, practical experience.
5. The DDTC, in conjunction with industry and relevant stakeholders, should review and consider expanding the availability of exemptions, such as those granted with respect to Canada, to NATO, and major non-NATO U.S. allies.

Chairman Trafton put both sets of recommendations up for a vote. The first set of recommendations was unanimously adopted by the Committee. The second set of recommendations had one nay vote from Lockheed Martin because of objection to the second recommendation to establish an entity to support review of the USML. Chairman Trafton advised the Committee and meeting attendees that the second set of five recommendations were not adopted by the Committee and more deliberation would be needed.

#### **Reusable Launch Vehicle Working Group (RLVWG)**

Jeff Greason provided the report for the RLVWG, standing in for working group chair, Brett Alexander. Mr. Greason reported that members of the RLVWG believe that there is insufficient commonality among the work practices of companies, making standardization unnecessary for now. He also reported that for the next RLVWG meeting, the group will have a broader discussion about industry standards focusing on more than training and ways that the group can play a role in fostering or accelerating with other organizations to facilitate the development of standards. Mr. Van Laak commented that he would like to industry to fill vacuums so that FAA or Congress won't have to step in, for example, the development of functional industry standards that can be generically applied to different systems.

#### **Space Transportation Operations Working Group (STOWG)**

Debra Facktor Lepore, president, DFL Space, provided the report for the STOWG, standing in for Bob Davis. She reported on STOWG action items, including the soliciting of industry input regarding the National Policy Review, noting that the input received indicated that current policy is sufficient. She reported that the group has recommended adding to the Review a statement that gives FAA regulatory authority for

human space flight regulation and on-orbit operation certification; and to further take this issue as an action item for the STOWG, including examining the terms used by NASA, e.g., human rating (which has different meanings). She also reported on the STOWG's work on the *"DoD Impact on U.S. Commercial Launch Services Competitiveness"* paper and the discussion regarding that paper, noting that FAA, DoD, and the COMSTAC will have further discussions on this issue, especially since it was determined that some of the problems listed in the paper have been resolved. Ms. Lepore discussed additional details regarding the orbital debris mitigation issue, and reported that the FAA has asked COMSTAC to provide input on five questions regarding this issue.

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After lunch, Chairman Trafton noted that the Committee still has no chair for the Technology and Innovation Working Group as a result of the death of Dr. Alex Liang in May, adding that the Committee appreciates the work of Kevin Reyes, Boeing Launch Services, who has volunteered to lead the 2010 GSO Forecast Team. Next, he announced the open discussion period which was led by Mr. Van Laak. Mr. Van Laak pointed out that the recent changes in the COMSTAC made by FAA include the open discussion period to allow members of industry and other interested parties to bring important issues and concerns to the FAA and to the COMSTAC and encouraged meeting attendees to do so.

The first comment was regarding the DoD paper mentioned above, noting that one of the problems identified in the paper was the prioritization of launches at the ranges (i.e., government launches are given priority over commercial). The commenter reported that a commercial launch had recently been given priority over the Shuttle. This was confirmed by FAA/AST staff member Al Wassel, who noted that Gen. James, Commander, 14<sup>th</sup> Air Force, put the commercial Intelsat launch on an "equal footing" on the launch schedule. He also reported that Lockheed Martin and Boeing were recently invited to attend the Consolidated Launch Schedule Review Board, led by the Air Force. Mr. Wassel said that he would act as a liaison between the range operations and industry to keep everyone informed of range-scheduling progress. Frank DiBello, (Space Florida) reinforced this position, noting that the Air Force is working with the state of Florida to streamline operations, shorten cycle times for processing documentation, and taking other positive steps to make the range safety process better.

Eric Laursen (Lockheed Martin Commercial Launch Services) noted that he was glad that the climate is changing because of the significant delays that occur for commercial launches when a government launch slips. Ms. Lepore commented that Mr. Wassel's proposal to act as a liaison regarding scheduling information would be very helpful to emerging launch providers. Mr. Van Laak and Mr. Wassel emphasized the importance of open communication, including information on scheduling changes.

Ms. Lepore asked Christine Bonnicksen (OSD Space Programs) to provide comments regarding the DoD White Papers. Ms. Bonnicksen commented that the Committee's work on the paper has started a dialogue to begin understanding some of industry's concerns, adding that she would be working with Mr. Wassel to draft comments in response to the



White Paper and continuing to work with COMSTAC in this area. She emphasized the DoD's willingness to address the concerns of industry and to maintain open dialogue.

Mr. Van Laak discussed the need for establishing an ethic of information sharing on close-calls and other safety-related information to improve quality and reliability. He encouraged the commercial launch community to think of ways to establish an effective communication ethic. Mr. Szoka expressed his interest in this and recommended the development of a clearing house for such information, e.g., a vehicle to submit data in a structured format and a vehicle for others to access the data. Mr. Van Laak explained that AST has been examining the possibility of developing a lessons-learned database. COMSTAC member Frank Culbertson commented that a pilot program would be useful to show industry that such information sharing can protect proprietary information as well as disseminate useful life-saving information. Mr. Larson commented that there are already several well-developed databases that are free which contain this type of information. Troy Thrash (DaVinci Science Center) commented that there are several tools available for knowledge management that would be useful for capturing information and he also suggested the establishment of a COMSTAC working group for outreach. Mr. Van Laak stressed the importance of open communication and information sharing. Mr. Gold commented that his company, Bigelow Aerospace, has close relationships with Virgin Galactic and SpaceX and also with larger companies, including United Launch Alliance.

Mr. Culbertson asked if FAA had any involvement in the NASA human rating requirement studies. Mr. Van Laak advised that FAA is part of the team, looking at roles and responsibilities, e.g., will FAA be responsible for the safety of a NASA crew on a commercial vehicle flying to the ISS, adding that the term "human rating" needs to be defined.

Chairman Trafton thanked the group for the comments and discussions and urged meeting attendees to provide input to the Committee regarding issues that need to be addressed. He asked for new business. Bill Khourie, Oklahoma Space Industry Development Authority, recommended that, due to the tightening budgets, FAA consider holding one COMSTAC meeting in conjunction with the annual FAA conference. Chairman Trafton responded that the Committee and AST would explore that recommendation.

There being no further discussion, Chairman Trafton adjourned the meeting at 1:45 p.m.

Signed by  
Wilbur C. Trafton  
Chairman, COMSTAC

*Wilbur C. Trafton* 2/19/2010

**COMSTAC Members Present**

1. Wilbur C. Trafton, Will Trafton & Associates, COMSTAC Chair
2. Eleanor Aldrich, American Institute of Aeronautics and Astronautics
3. Andrew J. Aldrin (Alternate for Daniel J. Collins, United Launch Alliance)
4. Frank Culbertson, Orbital Sciences Corporation
5. Elaine David (Alternate for Gerald Musarra, Lockheed Martin Corporation)
6. Robert S. Dickman, American Institute of Aeronautics and Astronautics
7. Michael N. Gold, Bigelow Aerospace
8. Jeffrey Greason, XCOR Aerospace
9. Timothy Hughes, Space Exploration Technologies Corporation
10. Ray Johnson , Interim Member, The Aerospace Corporation
11. Michael S. Kelly, ATK Tactical Propulsion and Controls
12. Christopher Kunstadter, XL Insurance, COMSTAC Deputy Chair
13. Debra Facktor Lepore, DFL Space LLC
14. John M. Lounge, Cisneros Innovation Strategies
15. Dr. Billie M. Reed, Virginia Commercial Space Flight Authority
16. Frank Slazer (Alternate for Robert M. Davis, Northrop Grumman)
17. Berin M. Szoka, Space Frontier Foundation
18. John W. Vinter, Consultant

**Federal Aviation Administration Representatives**

Dr. George C. Nield, Associate Administrator for Commercial Space Transportation  
James Van Laak, Deputy Associate Administrator for Commercial Space Transportation  
Brenda A. Parker, COMSTAC Executive Director, Federal Aviation Administration