U.S. Department
of Transportation
Federal Aviation Administration

Federal Aviation Administration

Commercial Space Transportation Advisory Committee
COMSTAC
May 21, 2009
Meeting Minutes

COMSTAC Chairman Will Trafton (Will Trafton & Associates, LLC) convened the 49th meeting of the Commercial Space Transportation Advisory Committee (COMSTAC), at 9:06 a.m. The meeting was held at Federal Aviation Administration (FAA) Headquarters in Washington, DC. Chairman Trafton welcomed members and guests.

Chairman Trafton reported on the Committee's tasks and activities since the last meeting, including the establishment and work of the Export Controls Working Group and the recent report by the Human Space Flight Training Task Force. He thanked COMSTAC member Brett Alexander for taking over the work of the RLV Working Group (RLVWG) after the departure of George Whitesides and noted that Mr. Alexander has agreed to chair the RLVWG and COMSTAC member Jeff Greason (XCOR Aerospace) has agreed to be deputy chair. He reported on a newly-assigned task for the Committee—the development of a white paper which will discuss Department of Defense (DoD) procedures, policies, and/or regulations that hinder U.S. commercial space transportation operations or activities.

Mr. Trafton acknowledged the 2009 Commercial Space Transportation Forecast Team, led by Team Lead Gwynne Shotwell (Space Exploration Technologies Corporation), Deputy Team Lead Kevin Reyes (Boeing Launch Services), and Ken Davidian, liaison from the FAA Office of Commercial Space Transportation (AST), who took this task over from AST staff member John Sloan.

Chairman Trafton next reported on the death of long-time COMSTAC member Dr. Alexander Liang, who represented The Aerospace Corporation. He read the following dedication to Dr. Liang:

> We want to take the time to honor and say farewell to a longtime COMSTAC member, Alex Liang. Alex died suddenly of a heart attack on Saturday, May second. Alex was first appointed to COMSTAC by Secretary of Transportation Federico Peña on October 28, 1996. He became Chairman of the Technology and Innovation Working Group in 2002 and has led the committee in the work on the annual GSO forecast since then. He was an outstanding member and we will miss him.

He described Dr. Liang as a "tremendous member of our community….a family man and a tremendous contributor to the aerospace industry." Chairman Trafton acknowledged

Ray Johnson, who was present for Dr. Liang and who was representing The Aerospace Corporation.

Chairman Trafton advised the meeting attendees of the change in format for the COMSTAC meeting, noting that the meeting would last all day with a break for lunch and the agenda would include more time for discussion by members and meeting attendees. He noted that for the first time, AST solicited comments from the public on specific issues, including the impact of the current economy on the space industry, space situational awareness, space traffic management, and FAA's role in these areas. He said that the goal of the changes is to make the work of the Committee more effective.

Operationally Responsive Space

Dr. Peter Wegner, director, Operationally Responsive Space Office at Kirtland Air Force Base in New Mexico, provided an overview of activities and programs for his office over the last year. He listed four key reasons for ORS: budget pressures within the Department of Defense (DOD), increased global demand for space protection and robust space capabilities, the global war on terrorism, and the advance of small satellites that can be used by the military, e.g., the three CubeSats launched from Wallops on May 19th. He defined ORS as "assured space power focused on timely satisfaction of Joint Force Commanders' needs," reporting that this definition was approved by the Deputy Secretary of Defense in 2008.

He explained that he had two jobs – to respond to the urgent needs from U.S. Strategic Command to support Joint Forces Commanders' needs for space capabilities around the world and to develop end-to-end enablers for ORS, including every part of the space enterprise from the spacecraft buses and payloads to the launch vehicles, the ranges, and responsive command control and data dissemination.

He discussed the 2015 desired end-state for ORS:

- Tier 1- The ability to employ existing space capabilities very rapidly, take existing systems and employ them on demand in a matter of minutes or hours to meet an urgent need;
- Tier 2 - The ability to launch and deploy a new system in a matter of days, if there are no space capabilities already in orbit, to meet whatever the need and the capability to anticipate ahead of time what will be needed to launch and deploy; and
- Tier 3 - The ability to develop a new system in a matter of months for unanticipated needs (Tier 3).

He explained that these ORS approaches would support the warfighting efforts to reconstitute lost capabilities if they are lost or degraded to either manned or unmanned events; augment and surge capabilities in the event of troop deployment to remote regions of the world where there is minimum space coverage; to fill in anticipated gaps; to exploit new innovations; to respond to unforeseen events; and to enhance survivability and deterrents.

Dr. Wegner discussed the ORS 2015 Blueprint, developed to outline how the desired capability could be achieved, explaining that for Tier 1, they are developing the ORS

Playbook, a database of every space asset on orbit today, including government, commercial, international, academic systems, etc. and cataloging these systems to see how they can be used in warfighting situations. Dr. Wegner reported that for Tier 2 and Tier 3, his office is establishing the Rapid Response Space Center which will contain ISR, communications, and space protection mission Kits, spacecraft buses, and a team of people that will be trained to select the right payload, process it, transport it to the launch site, integrate with the launch vehicle and launch within a week, like a U-2 Reconnaissance Wing for space, complete with an air traffic control center support, data distribution, mission planning, and wing maintenance.

Dr. Wegner reported on the TacSat missions 1-5. He explained that the TacSat-3, the most recent mission, is a 400-kilogram smallsat that carried a hyperspectral sensor, which can be used to identify objects by its spectral signature, e.g., a tank hiding under a tree can be identified by its specific spectral signature. TacSat-4 is a communications satellite developed by the Naval Research Laboratory, and will provide UHF communications capabilities for naval fleets deployed globally and the capability to relay data from navy buoys to Navy Headquarters. He also described future missions and capabilities for TacSat-1A and TacSat-5.

Dr. Wegner also expressed his goal to enter into international collaborations that would allow the development of ORS-class satellites and enter into data sharing and tasking agreements, thereby having large constellations available that could be tasked during a crisis. He concluded by stating that ORS has a very challenging job to deliver operational capability for space, thereby creating an innovative environment and developing international collaborations. He also described his experience at Wallops Island for the TacSat mission and emphasized the need for systems such as autonomous flight termination, GPS metric tracking, space-based telemetry, streamlined range operations, and streamlined range safety approvals.

COMSTAC member Lou Gomez (Spaceport America) asked how Spaceport America assets could be included in the database. Dr. Wegner advised that his office has been looking at Spaceport America but the challenge for now is orbital launch capability in the database. COMSTAC member Chris Kunstadter (XL Insurance) commented that he agreed with Dr. Wegner's concerns regarding the last TacSat mission, because his company was involved in that mission and he hoped that improvements could be achieved. He also asked if ORS was planning to have hosted payloads or work with the commercial sector to develop some of the desired capabilities. Dr. Wegner noted that they were already working with commercial companies on hosted payloads including the Commercially Hosted Infrared Payload (CHIRP) and several others and that it will be easy to have hosted payloads in the Tiers.

COMSTAC member Frank Culbertson (Orbital Sciences Corporation) expressed his appreciation regarding Dr. Wegner's comments regarding Orbital's Minotaur launch and asked what industry could do to further the ORS mission. He also commented that it is good that ORS is working on programs like CHIRP because it is very difficult to get payloads ready in six months. Dr. Wegner responded that one of the biggest problems is the

lack of human processes as opposed to lack of technology, sensor systems and payload concerns. COMSTAC member Bob Davis (Northrop Grumman) asked how the reusable booster systems fit into the ORS plans. Dr. Wegner reported that his office is working closely with the Air Force on that issue. COMSTAC member Debra Lepore (AirLaunch LLC) commented that the commercial companies have been proposing responsive systems for years, but the knowledge gained from past work doesn't fit with what the ORS is trying to do, emphasizing the need for leadership to help navigate this problem. She also expressed the concern that the ORS plan did not include a concept of operations (CONOPS) or a vision about how the user really benefits. Dr. Wegner advised that he was getting top leadership support and also assured that the plan does include a CONOPS that focuses on the warfighter supported by the desired architecture.

COMSTAC member Livingston Holder (Holder Aerospace) pointed out that ORS concern that commercial satellites are not used for telemetry but DOD is concerned about the level of use of commercial satellites in the overall communications architecture. Dr. Wegner advised that are looking at this issue and looking at commercial satellites and military systems for communications. COMSTAC member Brett Alexander (Commercial Spaceflight Federation) commented that, in his opinion, the proposal to piece together existing technology and launching in a week will not work. Dr. Wegner disagreed and pointed out a demonstration conducted by Space Exploration Technologies (SpaceX) wherein a six-day period, a satellite was taken out of a clean room on a Sunday, integrated onto a launch vehicle and launched the following Saturday. Mr. Alexander pointed out that the launch was delayed several times. Dr. Wegner agreed but noted that the ORS focus is to change range operations, streamline them using such capabilities as autonomous flight termination, GPS metric tracking, and space-based telemetry and that leadership wants these capabilities in the next two years.

COMSTAC member Bob Dickman (American Institute of Aeronautics and Astronautics) asked if Dr. Wegner would be willing to provide input for the DoD task and noted that during the TacSat mission, that another launch was delayed, indicating the current difficulty for multiple users at a range. Dr. Wegner agreed and pointed out that even the Shuttle launch from the Cape affected the launch schedule for the TacSat launch at Wallops because they were using the same downrange sites, and emphasized the need for change in launch operations.

Mr. Culbertson noted that to achieve these capabilities in two years, there must be standardization in the systems and Dr. Wegner agreed, noting that his office has been putting a great deal of work in standards, working with the Air Force and Naval Research Laboratories. He added that General Kehler would like industry to adopt these standards. Mr. Culbertson suggested that to develop a monthly launch capability, launches would have to be rotated between launch sites, contractors, launch vehicles repeatedly, so that companies could keep production lines moving, noting that this would be similar to the ICBM and Strategic Submarine Force programs. Dr. Wegner reported that the Department is examining the resources issue and his office is working with other agencies to address the standardization issue.

COMSTAC member Dan Collins (United Launch Alliance) pointed out the progress being made on space-based ranges and autonomous self-destruct systems on the EELVs. Dr. Wegner agreed and advised that his office is working with Air Force Space Command and the EELV program office to develop compatible systems.

Report on AST Activities

Dr. George C. Nield, FAA Associate Administrator for Commercial Space Transportation provided an update on AST and industry activities since the last COMSTAC meeting in October 2008. Dr. Nield began his report by noting that May 21st is significant as the day that Charles Lindbergh landed in Paris in 1927, Amelia Erhardt landed in Ireland in 1932, and as the birthday of Glenn Curtis, a famous motorcyclist, also known as the Father of Naval Aviation and the founder of the Aerial Experiment Association. He explained that in 1907, this Association was on the leading edge of the aviation industry due to their extensive nightly discussions about aviation technology and other areas, which were held in a room called the "thinkorium." Dr. Nield called the COMSTAC, a modern-day "thinkorium" because of the insight, original ideas, and expertise of the members, adding that for this meeting, AST is allowing more time for discussions with fewer presentations.

Dr. Nield highlighted the commercial space transportation accomplishments since the October 2008 meeting, including the release of the congressionally-mandated report by The Aersopace Corporation, entitled Analysis of Human Space Flight Safety; a full mission duration test firing of the Falcon 1X first stage by SpaceX; the test firing of the Lynx engine by XCOR; the first test flights of the White Knight II by Scaled Composites; AST's release of the Amateur Rockets regulation and awarding of a site operators license to Spaceport America; NASA's selection of SpaceX and Orbital for the $3.5 billion contracts to service the ISS; AST's 12th Annual Commercial Space Transportation Conference; and the completion of a second space mission in March by Charles Simonyi making him the first private explorer to complete two missions.

Dr. Nield reported on AST's enhanced international activities including visits by Japanese and French space representatives and his speaking engagement at the United Nations Committee on the Peaceful Uses of Outer Space in Vienna in March. Dr. Nield emphasized the need for the important work that COMSTAC members provide to support the FAA and the U.S. commercial space transportation industry. He concluded his report by acknowledging the passing of Dr. Liang and stated that the "… COMSTAC, the FAA, the Department of Transportation have lost not only a fine mind and devoted professional, we have also lost a good friend."

2009 Commercial Space Transportation Market Forecasts

2009 COMSTAC GSO Demand Model

Kevin Reyes, director of business development, Boeing Launch Services, provided the briefing for the ***2009 COMSTAC Commercial Geosynchronous Orbit Launch Demand Model***. For this year's results, he reported an average of 20.8 launches, a quantity of 27, and a demand of 21 launches with an average of 15.7 over the 10 year forecast, down by

one from 2008. He identified the 15 team members and said that they used the same methodology to develop a 10-year forecast. To gather data, letters were sent to 90 companies. 21 responses were received.

Mr. Reyes described the two-part methodology to examine addressable commercial payloads, i.e., those that are open for internationally competitive launch service procurement and sorted by mass category: less than 2500 kg (small), 2500-4200 kg (medium), and 4200-5400 kg (large), and 5400 kg (extra large). They also looked at the near-term forecast, covering the years 2009-2011, and a long-term forecast covering 2012-2018. He pointed out that 13 satellite operators responded (17 in 2008), 6 of which responded in 2008 and 2009, and 7 new responders in 2009. He explained that launches are delayed due to factors such as satellite and launch vehicle issues, manifesting and scheduling issues, funding, weather and regulatory delays and he discussed the satellite launch "realization" factor, which is based on the maximum and minimum variations of forecast vs. actual satellite launches calculated over a 5-year rolling period.

He reported that last year there was the prediction of 27 satellites, with only 23 actually launched and of those 4 satellites, one satellite program was cancelled and three slipped into 2009. Two of those satellites have been launched and the next one is scheduled for June that slipped from 2009. For satellite mass, he reported that all of the satellites fell out of the 2.5 metric ton category with a larger than normal demand for medium satellites (2.5- 4.2 metric tons). He noted that for the projected 21 launches, 6 are dual manifested and for the satellite operator assessment, he reported that financing and the global economic conditions are having the most negative impacts. For trends, he noted that it is relatively stable in the near term, i.e., satellites and launch demand are flat, and satellite mass and number of transponders show slight increases. For the long term, he reported that it is average for launch demand and satellites.

Mr. Reyes summarized the report findings:

- 21 launches for 2009 satellite demand (a combination of single and dual manifests);
- 16 launches for 2010 satellite demand (a combination of single and dual manifests);
- Projected average annual demand for 2009-2018 is 20.8 satellites and 15.7 launches;
- Other factors were identified that may affect launch demand and launchers, include new launch vehicle entrants dual manifest launches, hosted payloads, and ITAR-free satellites; and
- Operator assessments are negative compared to 2008 due to responder changes, uncertain economic conditions, and launcher/satellite reliability.

Mr. Culbertson asked why 11 companies dropped out as responders and Mr. Reyes responded that the team is not sure why. Ms. Lepore commended the work of the 2009 team and suggested that responders and non-responders be listed in the 2010 report. Mr. Culbertson asked about the percentage of capacity utilization or over capacity for world launch demand based on 15 launches per year. Mr. Reyes noted that the report did bit examine that issue, but that the satellite community is looking for more participation from EELV and Mr. Culbertson pointed out the situation wherein EELV was outbid by Ariane and then Ariane was underbid by Proton. COMSTAC member Mike Gold,

Bigelow Aerospace asked if the team looked at whether the impact of taking communication satellites off the U.S. Munitions List and listing them on the Commerce Control List (CCL) would be negative or positive for the domestic industry. Mr. Reyes reported that the team did not look at that specifically, but that he would recommend that they do so next year.

2009 Non-GSO Forecast

Ken Davidian, EFP Program Lead in AST's Space Systems Development Division, provided the briefing on FAA's *2009 Commercial Space Transportation Forecast for Non-Geosynchronous Orbit*s. He highlighted several changes in the process for the complete report, i.e., that surveys for the Non-GSO portion were sent electronically for the first time; that for the GSO portion, a draft was made available to the public for comments on the AST website and that the final publication would be released soon. He identified the companies and the launch vehicles used in the report. He discussed the methodology, noting that with the help of Futron (an AST contractor) data is collected through open sources and direct communication with companies, the demand is tabulated by year, and the draft is reviewed by industry and government. Mr. Davidian stated that the NGSO forecast uses internationally competed launch services procurement and those licensed by the FAA. The report findings are summarized below:

The 2009 NGSO forecast projects a slight decrease in demand for worldwide commercial launches to non-geosynchronous orbits (NGSO) during 2009–2018 compared to last year's forecast. A total demand of 110 launches is forecast compared to 112 launches in the 2008 forecast.

Satellite Forecast: 260 satellites for 2009-2018 a decrease of 6% compared to the 2008 forecast of 276. This includes international scientific and other satellites (39, 34%); little LEO telecommunications satellites (3, 3%), OFAS (36, 33%); big LEO telecommunications satellites (16, 15%); commercial remote sensing satellites (14, 13%).

Launch Forecast: 110 total launches for 2009-2018 (112 launches in 2008). This decrease is attributed in part to uncertainty in the financing for deploying next generation communications constellations. The forecast shows an average demand of 10.8 worldwide launches per year during 2009-2018.

Demand is divided into two vehicle size classes with an average of 8.1 medium-to-heavy launch vehicles per year and about 2.7 small vehicle launches per year during the forecast period. Telecommunications makes up more than half of the satellite market (19 % of the launch market because of multiple-manifesting). Launches for the second-generation Iridium, Globalstar, and ORBCOMM fleets are expected to be multi-manifested at a rate of six satellites per launch. Depending on the launch vehicle, the new O3b Networks constellation will launch at a rate of six to eight satellites per vehicle. About 28 % of the satellite market is comprised of international science and other satellites, such as technology demonstrations (34 % of the launch market) The new orbital facilities assembly and services category accounts for 33% of the launch market. Commercial remote sensing satellites about 13%.

COMSTAC Working Group Reports

Risk Management Working Group (RMWG)
Chris Kunstadter provided a report on the RMWG meeting on the previous day. He reported on the discussion about the extension of indemnification (expires on December 31, 2009). He said that the RMWG still agrees with the result of the 2006 report by The Aerospace Corporation, which concluded that the CSLA's risk allocation regime remains the best option for the U.S. government, the U.S. taxpayer, and the U.S. commercial launch services industry, and the regime should include elimination of the Sunset Provision or at least extension for ten years and elimination of the cap on indemnification. He reported on the letter drafted by the RMWG in April to send to the FAA.

Mr. Kunstadter reported on the discussion about whether space flight participants should be included in the CSLA waiver scheme, i.e., whether the waivers should be extended to include space flight participants, e.g., passengers on suborbital vehicles. He reported that a subgroup has been established to look at this issue and will be led by Paul Eckert from The Boeing Company and Pamela Meredith from Zuckert, Scoutt and Rasenberger. He noted that the third issue discussed was controversial - whether the CSLA should be extended to in-orbit operations since in-orbit operations are adequately covered by available insurance, extension of the CSLA is really not necessary; and the insurance market is robust and there is certainly a lot of capacity and willingness on the part of the insurance industry to support insurance for in-orbit operations. The fourth issue discussed by the RMWG was the definitions for launch and reentry and when does launch start and end and when does reentry start and end. He reported that COMSTAC member Berin Szoka would take the lead on that issue.

Export Controls Working Group (ECWG)
Mike Gold (Bigelow Aerospace) reported on the ECWG meeting. He began by listing some improvements in the export control process, including faster and more efficient processing of Technical Assistance Agreements (TAAs), Technology Transfer Control Plan (TTCPs), and other licenses largely due to the work of Bob Kovacs, who is now Director of Defense Trade Controls within the State Department; the fact that the requirement to have DTSA monitors present has been limited to launch campaigns; and new legislation that will transfer certain items from the USML to the CCL.

Mr. Gold discussed Bigelow's experience with the export controls process during the course of the Genesis I and II spacecraft project using primarily Russian components. He explained that Bigelow filed a commodity jurisdictional request (CJR) in December 2007 and that Bigelow was finally successful when the CJR was approved in February 2009. He also reported that Congressman C. A. Dutch Ruppersberger, who represents Maryland's Second District and is the Chair, House Subcommittee on Technical and Tactical Intelligence (under the Permanent Select Committee on Intelligence), will be in the center of the export controls process politically and legislatively and he discussed other types of reform currently being considered.

Mr. Gold discussed the work of the ECWG, noting that he asked COMSTAC member Tim Hughes (SpaceX) to be the deputy chair and that the first meeting of the group was held in February. He discussed the ECWG recommendations:

1. Under the auspices of the Office of Science and Technology Policy (OSTP), or a revived National Space Council, the White House must lead an effort to review and revise the United States Munitions List (USML) and the Commerce Control List (CCL). Technologies that are obsolete, militarily benign, or widely available in the international commercial marketplace should be placed on the CCL. Moreover, inconsistencies, overlap, and contradictions between USML and CCL should be identified and addressed.

2. The White House should establish a standing entity, again under OSTP or a new Space Council, to support this review process on an ongoing basis. 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 basis, with input from all of the relevant stakeholders in the private sector. Congress, for its part, must 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, including the text of the requests themselves, (redacted as necessary), should be publicly released in a timely fashion and in an easily accessible manner. (He noted that SpaceX and Virgin Galactic are filing CJRs and information about Bigelow could be helpful for these companies).

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 practical experience such as present and former Defense Technology Security Administration Space Directorate monitors.

5. The DDTC should be commended for the significant improvements that have been made in response times. To leverage this progress, the DDTC should review and, in coordination with the industry and relevant stakeholders, make recommendations to establish realistic ceilings for issuing responses to license applications, Commodity Jurisdiction Requests, and other relevant export control inquiries.

6. 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.

Mr. Alexander asked if the first five recommendations were successful, would the sixth recommendation be necessary. Mr. Gold responded that it would depend on the type of technology being considered.

Reusable Launch Vehicle Working Group (RLVWG)
Brett Alexander provided a report on the RLVWG. (Jeff Greason, XCOR Aerospace, was asked to be deputy chair for the RLVWG). He reported on the work of the RLVWG Task Force on Training for Human Spaceflight, which had completed phase I of a report on training standards, which was reviewed by the full COMSTAC in April, adding that this work will be on-going. He discussed other items from the RLVWG meeting, noting a report by AST staff on international activities for the office, including participation on the International Astronautical Federal Commercial Spaceflight Safety Committee, established in 2008. Mr. Alexander reported that the dialogue between RLVWG members and AST staff focused on how U.S. regulations could be affected by an international environment and ways to ensure that the international community understands the U.S. regulatory framework.

Mr. Alexander reported that the working group identified several issues as top priorities for the RLVWG which will be aligned with FAA/AST needs. He also noted that the group engaged in extensive discussions about the AST proposal to develop a "lessons learned" database.

Ms. Lepore asked about the Task Force report and Mr. Alexander advised her that the work on training for human spaceflight would continue at the working group level. He also acknowledged the work done by Maurice Kennedy of United Space Alliance.
Mr. Culbertson asked whether the proposal to develop a lessons-learned database really needed COMSTAC recommendation or was it already a good idea. Jim Van Laak, FAA Deputy Associate Administrator for Commercial Space Transportation, responded that even though there are concerns regarding proprietary data that, such a database, which could be called a "safety reporting system," could be very helpful in sharing information about mishaps and near misses and preventing future incidents and AST needs COMSTAC support behind this. He added that the industry should "break the bubble" and share information for the benefit of all. Mr. Alexander pointed out that this was different from a safety reporting system.

Space Transportation Operations Working Group (STOWG)
Bob Davis (Northrop Grumman) provided the report on the STOWG meeting, and discussed the newly-assigned DoD. He asked Ms. Christine Bonniksen from DoD to provide additional information regarding this task. Mr. Bonniksen explained that her office is trying to get information on the specific types of problems that companies are having at U.S. launch bases and ranges in order to try to develop practical solutions. Mr. Davis described the proposed steps to begin gathering information for the draft paper, noting that he would be talking to launch providers and launch site operators as well as other types of companies like Astrotech.

Mr. Davis focused on the discussions at the May 20th STOWG meeting, reporting that the group discussed the need to begin addressing the issues of reentry vehicles and standardization for all aspects of RLV operations, e.g., ways to configure a spaceport using standards for processing a launch vehicle, including refueling and standards for training the personnel who do the refueling. He reported that the discussion also focused

on certification and its ramifications, the future when travel on launch vehicles will be routine, and the need to help develop strategy for the evolution from early experimental/informed consent environment to a certification and social contract environment. COMSTAC alternate Randall Clague (XCOR Aerospace) expressed the idea that the transition from informed consent to certification should be voluntary instead of having the FAA set certification requirements.

A comment was made about the need to begin addressing the issue of on-orbit operations and in response, Mr. Gold expressed his concern that it would be presumptuous and dangerous to begin examining an on-orbit regime since no one knows how the transportation system will look. Dr. Nield responded that it is not too soon to begin addressing this issue because currently there are no guidelines for operations for the Space Station and also because the international community has expressed interest in this area, especially regarding collision avoidance. During the course of the discussion, Mr. Hughes stated that the launch and reentry segment are covered by FAA regulations, but on-orbit operations are not. Mr. Van Laak emphasized the need to begin addressing the issue of on-orbit operations because of the current unstructured situation and the potential for other problems including orbital debris.

COMSTAC member Beriz Szoka (Space Frontier Foundation) noted that there were three reasons for on-orbit authority: 1) government oversight so that the government covers the expense of liability, 2) law, not regulations, that govern the interaction of two parties, and 3) regulations or standards to protect the public and property. Mr. Van Laak agreed and emphasized that there is no structure in place currently, and COTS launches are scheduled within the next two years. He noted that orbital debris and the potential for collisions are real threats, that the FAA is not pushing a regulatory agenda for this issue; but that government and industry need to start discussing this issue.

Mr. Alexander commented that industry is afraid that everything will fall under an on-orbit regulation, when some areas such as orbit-raising maneuvers, approach of objects, need to be addressed specifically. Mr. Culbertson commented that in the future there will be regulations for various phases of commercial operations in order to reduce risk but that now all parties need to work together. Mr. Van Laak commented that maneuvering and operating in space create complex and non-intuitive events thereby creating the need for some type of regime to mitigate. Mr. Gold emphasized his opinion that it is a “slippery slope” and that it is too soon to be discussing regulations for on-orbit operations.

Mr. Culbertson emphasized that a “serious engagement of risk” is needed now and discussions about what government can do to reduce risk of debris creation. He also discussed debris removal, the need to begin considering it and ways to incentivize companies to begin this type of operation. Mr. Van Laak agreed and commented that he would like to see a methodology developed that make organizations and/or people responsible for the articles that they launch into space. Mr. Alexander commented that he thought that the current FAA licensing regime’s payload review and foreign policy review covered the issue of what a company launches into space. Mr. Gold commented

that from his experience with Bigelow's Genesis I and II, he knew that this issue is reviewed in the course of seeking an FAA launch license.

Chairman Trafton introduced the final portion of the public meeting as an /open discussion/public comment period, the first time for the COMSTAC meeting and turned the podium over to Mr. Van Laak, who led the discussions. The discussions centered on the topics of orbital debris, collision avoidance, orbital debris removal and government financing of orbital debris removal, orbital debris prevention, space traffic management and space situational awareness, training for human spaceflight operations, standards and/or regulations for personnel involved in human spaceflight operations. Some of the major discussions points included:

- The need to identify ways that industry could work together with the FAA to begin sharing data and information about orbital debris, and work that the COMSTAC could do to assist in this effort.
- The need to be proactive since debris mitigation and other on-orbit operations will probably be regulated in a few more years.
- The high cost of debris removal, the lack of technology, and the legal ramifications (e.g. removal of Russian materials).
- Working together to develop ways to decrease orbital debris before it is on orbit.
- The psychological aspects of human space flight.
- Financial incentives, including the stimulus funds to encourage the commercial launch industry.

Wrap Up

Chairman Trafton adjourned the public portion of the COMSTAC meeting at 2:51 pm.

Signed by
Wilbur C. Trafton
Chair, COMSTAC

Date: _____

COMSTAC Members Present

1. Wilbur C. Trafton, Will Trafton & Associates, COMSTAC Chair
2. Eleanor Aldrich, American Institute of Aeronautics and Astronautics
3. Bretton Alexander, Commercial Spaceflight Federation
4. Michael Bender, (Alternate for Charles Precourt, ATK Launch Systems)
5. Randall Claque, (Alternate for Jeffrey Greason, XCOR Aerospace)
6. Daniel J. Collins, United Launch Alliance
7. Frank L. Culbertson, Jr., Orbital Sciences Corporation
8. Robert M. Davis, Northrop Grumman
9. Robert S. Dickman, American Institute of Aeronautics and Astronautics
10. Michael N. Gold, Bigelow Aerospace
11. Louis R.Gomez, Spaceport America New Mexico
12. Livingston L. Holder, Jr. , Holder Aerospace
13. Timothy Hughes, Space Exploration Technologies Corporation
14. Ray Johnson (Alternate for Dr. Alex Liang, The Aerospace Corporation)
15. Michael S. Kelly, AMPAC Technology Group, LLC
16. Christopher Kunstadter, XL Insurance
17. Debra Facktor Lepore, Air Launch LLC
18. John M. Lounge, The Boeing Company
19. Robin Ricketts, (Alternate for Gerald Musarra, Lockheed Martin Corporation)
20. Janet Sadler, AIG UK Limited
21. Berin M. Szoka, Space Frontier Foundation
22. 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