U.S. Department
of Transportation
Federal Aviation Administration

Federal Aviation Administration

Commercial Space Transportation Advisory Committee
COMSTAC
October 11, 2007
Meeting Minutes

COMSTAC Executive Director Brenda Parker from the Office of Commercial Space Transportation (AST), Federal Aviation Administration (FAA), convened the meeting at 8:40 a.m. Ms. Parker reported that due to health reasons, COMSTAC Chairman Wilbur Trafton, President, Will Trafton and Associates LLC, was unable to attend the meeting. She read a message to the Committee from Mr. Trafton, which acknowledged the Committee's work on drafting a report on the International Traffic in Arms Regulations, noting specifically the work of Michael S. Kelly and Bob Davis. Ms. Parker next acknowledged the presence of the Honorable Thomas J. Barrett, Deputy Secretary of Transportation and the Honorable Robert A. Sturgell, Acting FAA Administrator.

Remarks by FAA Acting Administrator Robert A. Sturgell
Administrator Sturgell thanked Committee members for their work and noted that other nations were beginning to see the promise of commercial space transportation. He also highlighted the significance of having the private sector entrepreneurs taking on the challenges of the U.S. commercial space transportation industry, rather than the government. He emphasized the FAA's role of ensuring safety during all types of commercial launch operations and at commercial launch sites, especially through the development of effective regulations. Finally, Mr. Sturgell expressed the need to continue the close collaboration between FAA and the industry.

Remarks by Deputy Secretary of Transportation Thomas J. Barrett
Deputy Secretary Barrett acknowledged the support provided by COMSTAC and the leadership role of the FAA Associate Administrator for Commercial Space Transportation Patricia Smith. Mr. Barrett, a former Coast Guard Admiral, pointed out that the Coast Guard was present at the flight of the Wright Brothers, and was called the U.S. Life Saving Service at the time. He called representatives of the U.S. commercial space transportation industry visionaries and pointed out that commercial space transportation generates $100 billion of economic activity and supports half a million jobs. He added

> "…..Your future is filled with enormous promise… it allows people to see a world they've never seen before and reshape commerce and business and activity in the air and above the air in ways we haven't seen before. [Commercial space transportation] has the potential to create more jobs, produce revenues, strengthen our economy, and actually, I think, fundamental to me, is inspire the young people of this country …. to excellence, to science, to technology, to a world of possibility that's out there, and I think that's one of

> the most important functions you can play in this nation, is just to provide inspiration again to people, to what they can reach for in their lives."

Deputy Secretary Barrett discussed the risk associated with space launch and emphasized the Department's commitment to safety. He also emphasized, on behalf of the Secretary of Transportation, the support of the Department of Transportation for the industry.

Report on AST Activities

Dr. George C. Nield, FAA Deputy Associate Administrator for Commercial Space Transportation provided an update on AST and industry activities since the last COMSTAC meeting in May. He noted that a year ago when he reported on AST and industry activities there were many successes, but due to challenging nature of space launch, there cannot always be good news. To put this in historical perspective, Dr. Nield provided a brief history of space activities between May and October of 1957. He highlighted several successful, historical events, including the International Geophysical Year, the Boeing production contract for the BOMARC guided missile; the Air Force B-58 Hustler bomber; the first supersonic flight from California to New York by John Glenn; the launch of the Air Force's Thor rocket, and the Soviet's successful Sputnik flight. He also pointed out the historical failures, including the June 1957 Atlas failure; and later failures of the Thor and Vanguard rockets. For the present, he reported on the tragic accident at Mojave in July where three people died; the Rocketplane Kistler's funding difficulties under the NASA COTS Program; and Armadillo Aerospace's failed Texel flight.

Dr. Nield also reported on the Bigelow Aerospace's Genesis 2 joining with Genesis 1 and further plans to move on with the Sundance program; the announcement of the $30 million Google Lunar XPRIZE challenge to put a functioning vehicle on the Moon; the successful launches of the Cosmos Skymed and the Digital Globe Satellite by Boeing Launch Services. He reported on several AST milestones, including the Notice of Proposed Rulemaking for Amateur Rocket launches issued on June 14; the start up of work on the congressionally-mandated report on Safety Issues Related to Launching Humans into Space; and the signing of a Memorandum of Understanding between AST and the Office of Space Commercialization in the Department of Commerce.

He reported that AST is also planning to sign a Memorandum of Cooperation between AST and the FAA Office of Aerospace Medicine. He pointed out that AST has been working with that office for 10 years, and that with the new regulations on crew and passenger requirements, the Office of Aerospace Medicine would be helping AST with medical safety issues connected with physiological training.

China: Five Years and Beyond in Space

Dr. Larry Wortzel, Commissioner, U.S.-China Economic and Security Review Commission, provided a comprehensive briefing on current space activities of the People's Republic of China. He indicated that the information in his briefing is based on his readings of Chinese books on the People's Liberation Army (PLA), the war fighting doctrine of the PLA from the Chinese Academy of Military Science, the PLA press, and the National Defense University. His briefing focused on China's work to make space the focal point for advanced science and technology, driving economic development and military power and securing space as the High Ground for military operations. He noted that the Chinese are working on future commercial programs with Argentina and Venezuela, and they are developing earth observation services, space launch services, communications, ground equipment and stations, and Geostationary and near-Earth satellites.

Dr. Wortzel discussed the PLA's approach to warfare, explaining their goal to fight and win in the five domains of war-- land, sea (and undersea), air, the electromagnetic spectrum, including information and cyber warfare, and space; and the PLA's key issues, including sovereignty in space, offensive and defensive activities in space, how space supremacy relates to information warfare, the military use of civilian satellites, and how to apply the laws of war. Dr. Wortzel noted that the goal of the PLA is to make sure that when and if there is a war, there will be military operations in space, pointing out that the Chinese have already demonstrated the ability to knock out a satellite with a direct launch kill vehicle, blind satellites with a ground-based laser, and jam satellites.

He discussed the Chinese sovereignty debate, i.e., whether territorial airspace is as high as the PLA can shoot or maneuver space bodies, equating peacetime reconnaissance and observation from the air, sea or space as battlefield preparations; and questioning the right of foreign observation of China. He also discussed their use of legal warfare and their belief that attack on a civilian satellite is permitted if the satellite belongs to a belligerent power. He reported that the Chinese have direct ascent weapons, laser blinding, jamming and colliding capabilities, upper atmosphere fighters, space deterrence, aircraft as launch platforms, and space-to-ground attack capability. Dr. Wortzel expressed his opinion that the Chinese are serious about attacking the Earth from space.

COMSTAC member Chris Kunstadter asked whether the Chinese had expressed remorse about their destruction of a weather satellite. Dr. Wortzel responded that the Chinese have not expressed remorse and, in his opinion, the Chinese view it as demonstration of their capability in space deterrence, especially since they don't have strong space observation and real-time imagery capabilities. COMSTAC member John Logsdon asked if the Chinese have this type of space deterrence at geosynchronous orbit. Dr. Wortzel responded that he believes that they do have that capability because they have spacecraft in Geosynchronous Orbit.

To view this presentation, go to:
http://www.faa.gov/about/office_org/headquarters_offices/ast/industry/advisory_committee/meeting_news/media/Space%20-%20Wortzel.ppt

International Developments in Space Transportation

COMSTAC member Dr. John Logsdon, Director of the Space Policy Institute at George Washington University discussed recent developments relevant to the commercial space transportation industry. Before he began his presentation, he mentioned some additional historical information from 1957, including the fact that the Thor rocket became the Delta launch vehicle, the workhorse of the U.S. industry. He added that in 1957 the Soviets successfully launched the first Soyuz rocket, which was called the Semyorka at that time which led to the successful launch of Sputnik. The Soyuz launch vehicle is still in use.

Dr. Logsdon began his presentation with a discussion of China's activities noting that, in the case of China, there are things of interest to the commercial space transportation area, including the way that China is approaching the commercial market by entering into deals with Nigeria and Venezuela, which includes packaging the DH-4 communications satellite, a launch on the Long March rocket, the construction of a ground station, and training the engineers from these countries. He expressed the concern that the choice of Nigeria and Venezuela is significant since these two countries control oil and both are leaders in the left political perspective, part of the Chinese strategy to find allies around the world, and to use Chinese space capabilities to establish relationships.

Dr. Logsdon also reported on Chinese efforts to develop a next-generation Long March 5 launch vehicle by 2013, which will have the capacity for 14 tons to Geosynchronous Transfer Orbit and 25 tons to Low Earth Orbit, two new engines which will use kerosene and LOX (non-polluting fuels) and three core stages ranging from 2.5 meters to 5 meters in diameter; and the development of a new launch site closer to the Equator, the Wenchang Satellite Launch Center, located on Hainan Island, 19 degrees north Longitude in China's southernmost province, adding that the Chinese propose to use this site for launching deep space probes and possibly manned lunar missions. He expressed his belief that China is working to develop the capability to do a lunar landing mission, but that the decision whether to use that capability for such a mission has not yet been made.

For Europe, Dr. Logsdon reported that the European Space Council, an organization consisting of the 25 members of the European Union and two additional countries, Switzerland and Norway, approved a new European Space Policy on May 22, restating European commitment to assured access to space. He discussed other European plans and objectives, including plans to have a full range of launch vehicles operational from Kourou by 2009. He reported that the Ariane-5 is considered to be a valuable European asset and that the European governments are committed to keeping it viable for commercial and non-commercial missions. He added that it will be upgraded by 2013 with a new upper stage, and will stay operational for another 15 years. He also reported on Europe's plan to develop cheaper and smaller launch capabilities by entering into agreements with Russia to launch the Soyuz launch vehicle from French Guiana in 2009 in a launch complex that is separated from the main Ariane facilities due to technology control issues; to launch a smaller Vega launch vehicle built by Italy also in 2009; and noting that Arianespace would market and manage all three launch vehicles. He emphasized that these plans when completed would give Europe small, medium, and large launch capability.

He described the development of a suborbital passenger-carrying spaceship by EADS Astrium which was unveiled at the Paris Air Show, June 13th. He reported that the vehicle would take off and land using conventional jet engines; at 12 kilometers, the rocket engines would ignite and the vehicle would reach an altitude above 100 kilometers with three minutes of weightlessness. He noted that the interior of this vehicle has been designed by Robert Laine, EADS' top designer, and that EADS is seeking investors for an estimated one billion Euro project, and a proposed first flight by 2012.

Dr. Logsdon reported that India has launched seven satellites for other countries on the Polar Satellite Launch Vehicle (PSLV), with an additional future launch of the Israeli TechSAR observation satellite. He reported that the Indian Department of Space established the ANTRIX Corporation in 2002 to manage commercial business, although they don't have commercial customers yet. He reported that the Geosynchronous Satellite Launch Vehicle (GSLV), which failed on July 10, 2006, had three successes before that, and returned to flight on September 2, 2007. He added that the GSLV will be upgraded to carry 4 ton payloads to GTO.

For Japan, he noted that the H-II, developed in the 1980s and early 1990s, was expensive and not commercially viable. He reported that the H-IIA is back after its failure two years ago with 12 successes, including the recent successful launch of the Selene Lunar Mission, the largest lunar mission since the Apollo and that satellite is returning very high resolution imagery. He reported that the Japanese Aerospace Exploration Agency (JAXA) has given Mitsubishi Heavy Industries the right to market the H-IIA commercially, noting that Japan is planning to upgrade with the H-IIB which will carry 8 tons to GTO and will launch in 2009.

COMSTAC member Mike Kelly asked whether Dr. Logsdon had any information about India's plan to develop a reusable launch vehicle which could fly at Mach 7 and would be ready to launch by 2010. Dr. Logsdon responded that he had no information about that proposal. COMSTAC alternate Jim Muncy asked about reports that India was being considered as an international partner for the International Space Station (ISS). Dr. Logsdon responded that India is currently a very popular country for space partnerships and may be considering developing human space flight capability; however, he had no information about India participating in the ISS. When asked by FAA Associate Administrator Patricia Smith what would be important for a new Congress and/or a new Administration to understand from the global perspective, Dr. Logsdon responded that there are two main things: first that the intent of the National Space Policy needs to be clarified for international partners, especially regarding "reserving the right to protect our freedom of action;" and secondly that they need to understand that there are more space participants now and the U. S. will have to earn its leadership in space in a very different world than the 60s, 70s, 80s and 90s.

To view this presentation, go to:
http://www.faa.gov/about/office_org/headquarters_offices/ast/industry/advisory_committee/meeting_news/media/Logsdon.ppt

Operationally Responsive Space

Mark Berube, Northrup Grumman ORS Support Lead for the National Security Space Office (NSSO), briefed the Committee on the Operationally Responsive Space (ORS) initiative in the NSSO. He explained that the ORS program had problems in the first year due to different requirements and emphases by the interested parties, i.e., the combatant commanders wanted operational control of the satellites, people concerned with schedules and costs wanted smaller, simpler satellites for enhanced responsiveness; space lift providers wanted responsive launch; and TACSAT wanted to demonstrate new technology. He reported that several things converged to redefine the ORS program and establish common understanding, including Congressional action which helped to redefine the AReS program; the need to enhance U. S. responsiveness; TACSAT programs; NSSO's responsive space operations architecture; and emerging threats. He noted that Congress specifically directed that no funds be used for the AReS program; established a U.S. Policy on ORS; authorized DoD to establish an ORS Office reporting directly to the DoD Executive Agent (EA) for Space with a mission to develop low-cost, rapid reaction payloads, buses, spacelift, and launch control capabilities and coordinate and execute ORS efforts across the DoD; and directed DoD to submit a plan for ORS. He reported that his office rescoped the ORS Program; advocated for increased funding for ORS in the Air Force budget; and delivered a plan for ORS to Congress. He reported that the plan was signed by the Deputy Secretary of Defense on April 20. He also reported that STRATCOM released an ORS CONOPS, established and stood-up the ORS Office, defined ORS within DoD, and energized a national effort to define and support ORS.

He described the ORS program as an affordable, rapid reaction combination of responsive spacecraft, spacelift and ground processing, dissemination and command and control, delivering capabilities focused on the timely satisfaction of Joint Force Commanders' needs, focusing on reconstituting lost capabilities, augmenting or surging existing capabilities, exploiting new technical/operational innovations, and enhancing survivability and deterrence. He also described the 3-tiered approach to responsiveness: Tier-1 on-demand employing existing assets within minutes to hours; Tier-2 (launch/deploy) on-call with ready-to-field assets within days to weeks; and Tier-3 development of new technology with delivery of new or modified capabilities within months instead of years.

Mr. Berube defined ORS as assured space power focused on the timely satisfaction of Joint Commanders' needs. He also reported on the on-going activities, including;

- Completing detailed implementation plans for the ORS Office;
- Refining ORS strategic framework and near term plans;
- Developing a long-term ORS Roadmap;
- Working with USSTRATCOM and the services/agencies to
    - Identify and prioritize urgent warfighter needs
    - Define the long-term enabling needs for ORS;
- Establishing requirements and acquisition processes to meet ORS responsiveness goals;

- Institutionalizing ORS Office and service/agency supporting relationships; and
- Educating the community on ORS;
    - Defense, intelligence, and civilian stakeholders
    - Industry, academia, and international partners

COMSTAC alternate Elaine David asked Mr. Berube to describe the international partners and international outreach. Mr. Berube indicated that his office has begun work with Australia and the United Kingdom and he also described Coalition ORS, an initiative to enhance interoperability with international partners. COMSTAC member Tracy Knutson asked how Mr. Berube's office handles ITAR issues when dealing with international partners and he responded that they are working with the Defense Trade Controls Policy office.

To view this presentation, go to:
http://www.faa.gov/about/office_org/headquarters_offices/ast/industry/advisory_committee/meeting_news/media/Berube.pdf

Defense Trade Control Policy: Update

Ann Ganzer, Director of the State Department's Office of Defense Trade Controls Policy, updated the Committee on defense trade control policy issues, reporting on several personnel changes in her office, including the positions of Deputy Assistant Secretary, Managing Director, Under Secretary, and Assistant Secretary. She reported that her Office is in the process of reviewing the proposals by the Coalition on Competitiveness and Security and that the review process is headed by the National Security Council and the White House.

Ms. Ganzer reported that rockets used by the commercial space transportation industry are considered to be military technology and would remain on the munitions list. She also reported that the response team that handles inquiries is at full strength, and works to respond to all inquiries within 24 hours. She noted that her Office has made progress in processing electronic licensing and that they receive all DSP-5, DSP-73, and DSP-61 export licenses electronically and that there would be additional enhancements to electronic processing soon. She also mentioned the State Department's Defense Trade Advisory Group (DTAG) and suggested that the COMSTAC Chair contact the DTAG Chair to discuss ways of working together.

COMSTAC alternate Elaine David asked Ms. Ganzer to comment on the Bilateral Defense Cooperation Treaties recently announced and the possible impact on the license processing for the activity under these treaties. Ms. Ganzer reported that two treaties were signed with the United Kingdom (UK) and Australia; that the UK treaty is in the Senate for advice and consent, and that her Office is working on the implementing arrangements. She explained that the treaties focus on support of interoperability, research and development, and government programs, and consist of three lists: the approved community (the specific company or government entity to deal with), the projects; and the technologies that may be excluded from the treaty. If a company meets all criteria, then it may not need a license to begin meeting.

In response to a question from the audience regarding what her office is doing to assist small, entrepreneurial companies, Ms. Ganzer responded that her office is engaged in outreach efforts, including speaking to groups such as COMSTAC and constantly working to streamline and update the process.

COMSTAC alternate Jim Muncy asked how companies could submit proposals for things that should be included in the implementing arrangements. Ms. Ganzer recommended sending proposals to her Office and to the DTAG. Elaine David asked whether the State Department was laying the groundwork for broader project-based licenses for government programs. Ms. Ganzer replied that for now there are only the treaties with the U.S. and Australia.

COMSTAC Working Group Reports

Ms. Parker reported for COMSTAC member Alex Liang of the Aerospace Corporation and Chairman of the Technology and Innovation Working Group. She reported that Gwenn Shotwell, Vice President of Business Development for Space Exploration Technologies Corporation, would be the lead for the 2008 Forecast Team (which produces the annual Commercial Geosynchronous Orbit Launch Demand Forecast) and that 2007 Team Lead, Beth King of Lockheed Martin, would assist with the transition.

Risk Management Working Group (RMWG)

Chris Kunstadter, Vice President, XL Insurance, provided an update on the space insurance industry and provided a report on recent RMWG activities and the October 10th RMWG meeting. For the space insurance industry, he reported that 2007 losses for first-party (i.e., physical damage insurance which covers the actual hardware and satellites) exceeded the premiums, adding that the Sea Launch delays and the Proton failure also had significant impacts on premiums. He reported that the Proton vehicle was found in large pieces (the first and second stages had not separated) and toxic fuel was released causing the Government of Kazakhstan to charge the Russians $60 million for clean-up and monitoring the health of the affected population. He reported that the January 2007 Chinese ASAT test created over 2000 pieces of debris in LEO and has affected the satellites there and has impacted insurance prices.

He indicated that the market has increased due to the addition of capital from hedge funds and venture capital and, as a result, increased market capacity and lowered rates. He reported that the number of insured launches is from 20 to 30 over the last few years and the actual value of the satellites currently in orbit is approximately $14.5 billion. He summarized that for 2007 so far, claims amount to $490 million and premiums are only $420 million; and over ten years, the total cumulative return to the insurance market is 8%.

He next reported on the RMWG meeting, noting that the group has formed a Commercial Human Space Flight Task Force to examine possible issues that may arise in that area. He also reported that the RMWG decided that a study on the availability of insurance for

personal space flight is premature at this time. He reported on other topics from the meeting including:

- FAA safety regulation of human space flight (what are the triggers for this regulation);
- Inter-party waivers of liability (the issues of informed consent and comparison with parallel areas such as adventure sports);
- State-based legislative initiatives (which sometimes conflict with Federal laws);
- MPL calculation methodologies (the different methodologies used and how to choose the most appropriate one);
- Definition of third parties under concurrent operations (first party vs. third party); and
- Application of industry standards (will operators follow industry standards and use as a competitive advantage?).

To view this presentation, go to:
http://www.faa.gov/about/office_org/headquarters_offices/ast/industry/advisory_committee/meeting_news/media/Kunstadter.ppt

Reusable Launch Vehicle Working Group

Michael S. Kelly, President, AMPAC Technology Group, reported on the activities and meeting of the Reusable Launch Vehicle Working Group (RLVWG), noting that the October 10th meeting was the 18th meeting of the RLVWG and that the 10th anniversary for the Working Group would be in May 2008. He stated that one of the major issues discussed at the October 10th meeting was the AST Research and Development Biomedical Data Monitoring, noting that the presentation was given by AST staff member Chuck Larsen and focused on the work of AST, NASA, and the FAA's Civil Aerospace Medical Institute to develop a database of information on human physiological response to space flight.

Mr. Kelly noted a reported on the presentations at the RLVWG meeting, including a report on the "Commercial Space Transportation Workshop: Developing Space Vehicle Technologies," held at Langley Research Center in August; a discussion on the development of human space flight safety performance targets (a measurement for determining how well FAA regulations protect the public during commercial space launch accidents for ELVs and RLVs); a report on the Human Space Flight Training Survey conducted by the Futron Corporation for AST; a report on Crew Duty and Rest Restrictions for Commercial Space Flight; and a call for R& D topics by AST. Mr. Kelly also reported on the development of a Task Force on Training Standards for flight crews and space flight participants, which will be led by Maurice Kennedy, Director of Research and Strategic Planning at United Space Alliance.

To view this presentation, go to:
http://www.faa.gov/about/office_org/headquarters_offices/ast/industry/advisory_committee/meeting_news/media/Kelly.ppt

Launch Operations and Support Working Group

Robert Davis, Director of Business and Strategy Development, Air Combat Systems, Northrup Grumman Corporation, reported on the Launch Operations and Support Working Group (LOSWG) meeting on October 10, noting that this was his first meeting as LOSWG chair after taking over from former COMSTAC member Don Pettit. He discussed the issue of the development of a range test bed and listing some of the issues related to such a project, including its purpose; the possibility of its location at Vandenberg; whether it would be physical or virtual; whether it focused on the range or the insertion of new technologies; and whether certification is appropriate. He reported that this also led to a discussion of launch ranges in the future and an action item to collect input from LOSWG members on their ideas by December 14th.

He reported that the LOWSG discussed the need to develop a good statement of objectives and the call to get input for drafting a clear purpose for the LOSWG. He discussed the need for a change for the name of the working group to the Space Transportation Operations Working Group, which, if changed, will reflect a broadening of the purpose to include spaceports and ranges, as well as expendable and reusable vehicle systems, and the people involved in operations.

To view this presentation, go to:
http://www.faa.gov/about/office_org/headquarters_offices/ast/industry/advisory_committee/meeting_news/media/Davis.ppt

New Business and Wrap Up

Since there was no new business, Ms. Parker adjourned the meeting at 12:23 p.m.

Signed by
Wilbur C. Trafton
Chairman, COMSTAC

COMSTAC Members Present

Eleanor Aldrich, American Institute of Aeronautics and Astronautics
Robert Bocek, Sea Launch, LLC (Alternate)
Randall Claque, XCOR Aerospace (Alternate for Jeffrey Greason)
Sandy Coleman, ATK Launch Systems (Alternate for Charles Precourt)
Elaine David, Lockheed Martin Corporation (Alternate)
Robert M. Davis, Northrop Grumman
Louis R.Gomez, New Mexico Spaceport Authority
Timothy Hughes, Space Exploration Technologies Corporation
Michael S. Kelly, AMPAC Technology Group, LLC
David Keslow, Orbital Sciences Corporation
Tracey L. Knutson, Knutson & Associates
Christopher Kunstadter, XL Insurance
Dr. John Logsdon, George Washington University
James Muncy, AirLaunch LLC (Alternate for Debra Facktor Lepore)
Dr. Billie M. Reed, Virginia Commercial Space Flight Authority
Dr. George Sowers, United Launch Alliance (Alternate for Daniel J. Collins)
John W. Vinter, International Space Brokers, Inc.
George T. Whitesides, National Space Society

Department of Transportation/Federal Aviation Administration Representatives Present

The Honorable Thomas J. Barrett, U.S. Deputy Secretary of Transportation
The Honorable Robert Sturgell, Acting Administrator, Federal Aviation Administration
Patricia Grace Smith, FAA Associate Administrator for Commercial Space Transportation
Dr. George C. Nield, FAA Deputy Associate Administrator for Commercial Space Transportation
Brenda A. Parker, COMSTAC Executive Director, Federal Aviation Administration