



U.S. Department  
of Transportation  
**Federal Aviation  
Administration**



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Administration**

**Commercial Space Transportation Advisory Committee  
COMSTAC  
October 30, 2008  
Meeting Minutes**

COMSTAC Chairman Will Trafton convened the 48<sup>th</sup> meeting of the Commercial Space Transportation Advisory Committee (COMSTAC), at 8:31 a.m. The meeting was held at Federal Aviation Administration Headquarters in Washington, DC. He welcomed members and guests and acknowledged FAA Associate Administrator for Commercial Space Transportation Dr. George C. Nield, in the Office of Commercial Space Transportation (AST). He congratulated James Van Laak as the newly-selected FAA Deputy Associate Administrator for Commercial Space Transportation and acknowledged Hank Krakowski, Chief Operating Officer for the FAA Air Traffic Organization (ATO).

Chairman Trafton announced the resignation of COMSTAC member Dr. John Logsdon in connection with his retirement from George Washington University. He acknowledged Dr. Logsdon's outstanding contribution to the Committee during his 10-year membership. The Chairman also welcomed and introduced five new COMSTAC members, appointed by U.S. Secretary of Transportation Mary Peters on August 26th: Michael Lounge, Director of Business Development, Space Exploration Division, The Boeing Company; Brett Alexander, President, Personal Space Flight Federation; Michael Gold, Corporate Counsel and Director, Washington, D.C. Area Office, Bigelow Aerospace; Peter Stier, Vice-President for Sales and Marketing, Sea Launch Company LLC; and Berin Szoka, Chairman, Space Frontier Foundation and Visiting Fellow at the Progress and Freedom Foundation. He mentioned the successful Falcon 1 launch by Space Exploration Technologies Corporation (SpaceX) on September 28<sup>th</sup> and the successful return of Richard Garriot from the International Space Station aboard the Soyuz launch vehicle.

Chairman Trafton reported on work done by the Committee since the May meeting, including a paper on how the FAA can help the industry internationally (besides ITAR) in response to a request by AST; the draft report by the RLV Working Group Task Force on Human Spaceflight Training; and suggestions for R&D projects for FY10, also requested by AST.

**Report on AST Activities**

Jim Van Laak, FAA Deputy Associate Administrator for Commercial Space Transportation provided an update on AST and industry activities since the last COMSTAC meeting in May 2008. He discussed some of his perspectives on the current and future U.S. commercial space transportation industry and noted that he was focusing

on “new space,” i.e., human spaceflight and space tourism and the challenges faced by that sector, adding that an indicator of change for the industry is that NASA is taking steps to contract with private companies to do turnkey operations.

He mentioned some of the major milestones since the last meeting, including three successful launches by Sea Launch, the successful Boeing Launch Services launches of the GeoEye and the Cosmo SkyMed 3 on the Delta II, the successful launch of the Falcon 1 for SpaceX, the White Knight 2 roll-out at Mojave, the debut of the Rocket Racing League’s rocket-powered aircraft with the XCOR rocket engine, and the start of the development of a new spacecraft by Orbital Sciences Corporation. Mr. Van Laak also mentioned the third manned flight by the Chinese, and the successful ride by Richard Garriott. He mentioned the Lunar Lander Challenge in Las Cruces, New Mexico which took place the previous week and acknowledged the work by AST staff for this event and Armadillo Aerospace’s success as the winner of Phase I.

Mr. Van Laak put forth several challenges to the Committee members and meeting attendees. He urged the representatives of the “new space” to “make good decisions, to exercise good judgment and to be mature and responsible leaders...” because of the extreme risks that come with testing and flying the new launch vehicles. He challenged representatives of “new space” and “old space” to think and act like a community as opposed to “my company” and/or “my project.” And he challenged the “new space” companies to develop safety reporting systems similar to the systems that FAA incorporates in the operations and maintenance of aircraft, noting that this type of reporting system establishes communication which can save lives, money and display respect within the industry.

### **The FAA Air Traffic Organization**

Hank Krakowski, Chief Operating Officer for the FAA Air Traffic Organization (ATO), provided an overview of ATO activities and programs, focusing on the National Airspace System (NAS). He noted that the ATO is made up of 33,000 employees and manages 75% of the world’s controlled airspace, from Europe across the U.S. to the west side of the Pacific, adding that the ATO also controls new entrant vehicles, such as unmanned aircraft used for fire fighting and identifying forest fires, Customs and Border Patrol aircraft; and light jets.

He pointed out that in spite of continuous change and evolution, the NAS is antiquated, with air traffic controlled in the same way for the last 40-50 years, causing efficiency and capacity problems and creating the need for the Next Generation Air Transportation System or NextGen. He explained that by 2025, GPS would be one of the foundations of NextGen, replacing radars which get less accurate with distance; transmitting through a network called Automatic Dependent Surveillance B (ADSB) and displayed on a controller’s screen. He listed other advantages of NextGen and ADSB, including the capability for aircraft to fly closer together in bad weather as well as good weather; more flexibility in the system since the aircraft will be the center of surveillance, i.e., constantly sending its position; elimination of voice controlled traffic by replacing it with data link and computer-generated solutions creating more efficiency; and savings on fuel

and enhanced environmental safeguards. He added that by 2025, there will be need for 17,000 highly-trained controllers and that the roles of pilots, controllers, and technicians will all change. He concluded by emphasizing the need to safely and fairly integrate space transportation operations in the NAS, and stressing to U.S. commercial space transportation representatives that they are ATO customers and encouraging them to bring ideas and issues on ways to do this.

Dr. Nield asked about the airline industry's reaction to frequent commercial space launches and when should launch companies begin incorporating ADSB systems. Mr. Krakowski responded that airlines would not be happy about delays especially with the increased fuels costs but that the situation should be manageable since spaceports are being built in areas less saturated with air traffic. He also responded that Europe has a proposed regulation that calls for ADSB systems on all aircraft by 2015 and that ATO has a rulemaking committee that is examining the timing for ADSB in the U.S. He noted that ground-based infrastructure would be in place by approximately 2011 and that all radars, ILSs, VORs, and NDBs<sup>1</sup> would be in the ADSB system by 2025.

COMSTAC member Frank Culbertson (Orbital Sciences Corporation) asked whether backup capability would be maintained. Mr. Krakowski noted that there would be backup, including radar surveillance systems for national security, though not the primary radar systems that we use now. Mr. Culbertson also asked whether NextGen could handle the proposed manned space systems and Mr. Krakowski pointed out that there are details to work out such as controller reaction times for returning rockets and worst scenarios to consider; however, the current system handles daily emergencies and that over the last two years, there have been no commercial airline fatalities.

Chairman Trafton asked whether the system is ready for UAVs and Mr. Krakowski explained that UAVs are currently flying in very controlled environments since they vary and are fragile and susceptible to turbulence. He added that the biggest risk with UAVs is Visual Flight Rule (VFR) operations and a need to have sense and avoid situations for UAVs.

Mr. Culbertson asked whether there were issues that the COMSTAC could work on with the ATO and Mr. Krakowski responded that it will be very useful to begin discussions about mission profiles and operations. COMSTAC member George Whitesides asked whether GPS was being adapted quickly enough. Mr. Krakowski described a situation wherein GPS was used to make an approach at the Baton Rouge airport, showing that GPS has the potential to save money since it won't require infrastructure and noting that it has many other capabilities that need to be explored. COMSTAC member John Vinter asked if the U.S. plans to work with Galileo (Europe's global navigation satellite system). Mr. Krakowski replied that the U.S. uses foreign airspace and Europe uses U.S. airspace so to ensure complete interoperability, the U.S. will be using Galileo.

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<sup>1</sup> ILSs – Instrument Landing Systems; VORs – Very High-Frequency Omni-directional Ranges; NDBs – Non-Directional Beacons

### **Google Lunar X Prize**

Brett Alexander, COMSTAC member and president of the Personal Spaceflight Federation, provided a report on the Google Lunar X Prize. He began by commending AST's work for the Lunar Lander Challenge and emphasizing the importance and utility of FAA's promotional role for the U.S. commercial space transportation industry.

He explained that the Google Lunar X Prize is a \$30 million collection of prizes, consisting of \$20 million to the winner; \$5 million to the second place winner; and \$5 million in bonus prizes; and in order to win, a privately-financed team must land a robot on the surface of the Moon, control motion across the lunar surface for 500 meters and transmit two data packages, i.e., high and low-definition video and images of the lunar surface (mooncasts). He pointed out that the focus of the Google Lunar X Prize is to enable the private sector to reach the Moon, open up exploration to beyond low Earth orbit, and lower costs, adding that bonuses are offered for going further than 500 meters, finding and photographing old hardware left from past missions, surviving a lunar night, and finding water ice.

Mr. Alexander reported that the event has generated over 1500 inquiries from 80 countries, 14 fully-registered teams from the U.S., the Isle of Man, Italy, Malaysia, and Romania, and over 30 countries performing work. He noted that a company called Frednet is attempting an open source approach and stressed the innovation coming from the companies that are interested in participating. He also reported that organizations are partnering with Google Lunar XPrize to provide services, e.g., SpaceX is offering a 10% discount on Falcon; Universal Space Networks is offering a 50% discount on communication services; SETI is offering free downlink through the Allen Telescope Array; Space Florida is providing a \$2 million bonus if the grand prize winner launches from Florida; and Analytical Graphics is offering a free seat license for software and have already provided free training.

Mr. Alexander stressed that the program is designed to educate the public about the benefits of space exploration; to inspire and excite the world about science, engineering, and math; to lower costs of space exploration; and to spin off new beneficial technologies. He noted that a goal is to have one of the teams land on the Moon between 2010-2012. He discussed some of the challenges, including financing (price estimated to be between \$20-50 million) and he discussed the educational benefits of the program as an online interactive learning tool and a teaching tool. Mr. Alexander also provided a brief report on the recent Northrup Grumman Lunar Lander Challenge.

COMSTAC member Michael S. Kelly (AMPAC Technology Group) inquired about prize programs that award one-third of what it costs to do the mission. Mr. Alexander pointed out that a winner has the potential to gain financing and sponsorship, donations, intellectual property, and the possibility of selling services and technology to industry and to NASA. COMSTAC member Berin Szoka asked what lessons have been learned from the attempts by Blast Off! and LunaCorp, what can enable the business models for these companies, what about the availability of spectrum, and how can NASA help

enable the market? Mr. Alexander pointed out that the lesson gained from the attempts by Blast Off! and LunaCorp was that commercial sponsorship and interest was available. To the second question, he responded that the X Prize Foundation has been actively talking to NASA, the European Space Agency, and to other organizations to emphasize the benefits of the program and encouraging these organizations to prepare to use the services from the Google teams. In response to the question regarding spectrum, he replied that it may be a problem in the long-term.

Mr. Kelly asked whether the program was running into problems because of ITAR issues and Mr. Alexander explained that the companies involved would have to handle the ITAR issues on their own and several of the companies deal with ITAR on a regular basis. He added that the robotics and lunar landers are not impacted by ITAR. COMSTAC member Mike Gold asked whether the 90% private financing rule applies to launch services and Mr. Alexander explained that it does but not for the development. Mr. Gold also asked if the Google program was doing anything to broker payload opportunities among government sponsors. Mr. Alexander explained that because it would be difficult to determine the real cost of a launch and the amount of government subsidies, they are not. In response to Mr. Gold's question about China's interest in the program, Mr. Alexander noted that Google is trying to generate interest throughout Asia. Mr. Szoka asked whether a NOAA sensing license would be required and Mr. Alexander said that it is dependent on the type of system being used and that for a 10 kilometer resolution satellite, NOAA does not require a license.

### **Falcon 1 Launch**

Tim Hughes, vice president and chief counsel for SpaceX provided a report on the successful launch of the Falcon 1 rocket on September 28 from the Reagan Test Center, Kwajalein Atoll in the Republic of the Marshall Islands. He reported that there were three previous attempts to launch Falcon 1 and the third launch failure was due to the switch from an ablatively-cooled engine to a regeneratively-cooled engine. He thanked and acknowledged Dr. Nield and AST for their work in analyzing the third launch and licensing the fourth launch in a short time. He reported that the launch team at Kwajalein consisted of less than 25; the command van was situated in Los Angeles; the insertion was 330.5 kilometers and the inclination was 8.99; and the final destination was 621 kilometers by 643 kilometers.

He reported that the next Falcon 1 launch is scheduled for February/March 2009 with plans for 2 additional launches in the second half of 2009. He also provided an update on that company's activities and plans for the COTS Program. He reported that SpaceX has almost 575 employees and has recently moved to 550,000 square foot facility in Hawthorne, California with state-of-the-art propulsion testing facilities in central Texas. He added that SpaceX has launch complexes at Kwajalein and Cape Canaveral and that the company is debt free with a positive cash flow. He noted that the COTS launches are proposed from SLC-40 at Cape Canaveral.

Mr. Hughes reported that the Falcon 9 launch vehicle would be on the pad at Cape Canaveral in December 2008 and that the first launch is scheduled for first quarter 2009.

He reported that SpaceX has satisfied 13 out of 22 milestones, including multi-engine tests, and that the SpaceX Space Act Agreement (SAA) includes three demonstration cargo missions with an option for manned missions. He added that due to the significant interest from various customers who want to fly payloads on the Dragon without going to the International Space Station, SpaceX has developed the Dragon Lab which highlights the Dragon capabilities.

In response to a request by Dr. Nield, Mr. Hughes discussed the status of Capability D and funding under the Space Act Agreement, reporting that Capability D is the \$308 million manned portion of the SAA, with a two-year period to convert the Dragon capsule to man-capable with a \$308 million option. He noted that a life support system and an escape tower must be added. In response to a question from the audience, Mr. Hughes reported that SpaceX is planning an enhanced version of the Falcon 1, called the Falcon 1-E, for larger payloads which is scheduled to be available in the 2010 time frame, adding that currently there is not a strong market for a Falcon 5. He stressed that the Falcon 9 is still probably the lowest cost vehicle at the firm fixed price of \$36.75 million. In response to a question about space tourism, Mr. Hughes noted that space tourism is not part of the SpaceX business model, noting that SpaceX is currently working toward the market for carrying humans to the ISS.

#### **Analysis of Human Space Flight Safety: Report to Congress**

Robert Seibold, senior project manager, Space Launch Projects for The Aerospace Corporation, provided a summary of the report entitled *Analysis of Human Space Flight Safety*. He noted that the report team consisted of representatives from The Aerospace Corporation, the George Washington University School of Engineering, the George Washington University Space Policy Institute, and the Massachusetts Institute of Technology Department of Aeronautics and Astronautics.

Mr. Seibold noted that the report was conducted to fulfill the requirement outlined in the Commercial Space Launch Amendments Act of 2004, P.L. 108-492, December 23, 2004 (CSLA), which “required the Secretary of Transportation in consultation with a NASA administrator to enter into an arrangement with a non-profit entity for a report analyzing safety issues related to launching humans into space. In designing the study, the Secretary should take into account any recommendations from COMSTAC and NASA's Aerospace Safety Advisory Panel. The report is to be submitted to the Senate Committee on Commerce Science and Transportation and the House of Representatives' Committee on Science by December 23rd of 2008.” He discussed the findings of the report which address eight specific topics in the CSLA.

**Topic 1:** What are the standards of safety and concepts of operation that should guide the regulation of human spaceflight? Should they vary by class or type of vehicle, the purpose of flight, or other considerations?

**Finding:** There is a need to define a balanced and evolutionarily regulatory approach that provides acceptable levels of public spaceflight participant and crew safety survivability, but does not stifle the emerging industry. The study provided three viable initial regulation options, i.e., to collect design, test and flight data for early operators, refine analytical tool

sets for safety calculations, and plan for evolutionary changes as the industry matures with a goal of creating informed customers.

**Topic 2:** How effective is the commercial licensing and permitting regime under Chapter 701 of Title 49 United States Code, particularly in ensuring the safety of the public, crew and spaceflight participants during launch, in-space transit, orbit and reentry? Are any changes needed to that chapter?

**Finding:** The current license application, application review and launch monitoring operations are sufficient for now; however AST should continue examining options for safety approval standards for systems, sub-systems, and mission assurance processes and develop and exercise procedures in collaboration with other federal agencies for investigation of possible accidents or mishaps. AST licensing authority should be revised to include orbital ventures in the future. Other issues under Topic 2 include the diversity in approaches for developing RLVs for human space flights, the need for an effective U.S. Governmental Response to commercial spaceflight mishaps, and the recommendations made by the GAO in an earlier study.

**Topic 3:** Is there a need for commercial ground operations for commercial spaceflight including provision of launch support, launch and reentry, control, mission control, range operations and communications and telemetry operations through all phases of flight? If such operations are developed, should they be regulated and, if so, how?

**Finding:** Commercial ground operations are needed and will be largely the responsibility of the launch vehicle operators for the foreseeable future due to the diversity of design concepts. FAA/AST already is laying the groundwork for incorporating commercial spaceflight into the National Airspace System while allowing industry efforts in this area to mature at their own pace. Ground operations are an essential component of space launch systems and statutory requirements are in place. Air Force and NASA flight termination practices already exist but are not appropriate for commercial human space flights. GPS will be used for tracking in the future.

**Topic 4:** Should expendable and reusable launch and reentry vehicles be regulated differently from each other? Should either of these types of vehicles be regulated differently when carrying human beings?

**Findings:** Launch of expendable vehicles when used as a first stage to lift reusable rockets carrying crew and spaceflight participants, as well as launch and reentry of reusable launch vehicles with crew and spaceflight participants aboard, should be regulated differently than launch of expendable vehicles without humans aboard. Range safety controls, regulation and licensing may have substantial areas of commonality regardless of whether the vehicle is expendable or reusable, or has humans aboard. Regulation of expendable and reusable launch vehicles should be done on a case-by-case basis until more experience is acquired.

**Topic 5:** Should the Federal Government separate the promotion of human space flight from the regulation of such activity?

**Findings:** These duties should remain in AST and that current programs and activities under “encourage, facilitate and promote” such as the AST conference and other reports and outreach reinforce safety responsibilities rather than conflict.

**Topic 6:** How should third parties be used to evaluate the qualification and acceptance of new human spaceflight vehicles prior to their operation?

**Findings:** No specific recommendations at this time, since in the current early stage of development each situation will require different expertise and will be best handled on a case-by-case basis.

**Topic 7:** How can non-government experts participate more fully in setting standards and developing regulations concerning human space flight safety?

**Findings:** No specific recommendation at this time. The government uses outside expertise to augment its own personnel, often experts from the specific industry being regulated. Advisory boards and panels are one way that industry expertise is used.

**Topic 8:** Should the Federal Government regulate the extent of foreign ownership or control of human space flight companies operating or incorporated in the U.S.

**Finding:** Commercial human spaceflight is an emerging industry that does not yet have a significant impact on the U.S. economy, play a role in national security or control militarily significant technologies that are unique to the U.S. Therefore, it does not have characteristics that traditionally have provided the rationale for regulating foreign ownership. Imposition of foreign investment limits could undermine the industry's ability to succeed and grow. Restrictions already exist for defense, airlines, shipping, mining, communications and energy and existing laws, including export control regime and Exon-Florio are sufficient safeguard.

Mr. Seibold noted that Congress required NASA coordination and acknowledged the input of NASA's Office of Safety and Mission Assurance, the Flight Crew Operations Directorate and representatives from the Astronaut Office both at the Johnson Space Center. He noted that NASA provided detailed information relating to the appropriate levels of redundancy and reliability needed for human rating launch vehicles. He reported that the final report is due to Congress on December 23rd.

COMSTAC member Lou Gomez (Spaceport America, New Mexico) asked whether the issue of the difference between a commercial spaceport and a spaceport located on government facilities was discussed in the report. Mr. Seibold replied that that issue was discussed in detail in the report. Mr. Szoka inquired about the need for the regulation of on-orbit activity. Mr. Seibold noted that there are very strong opinions about this issue and the COTS program may create the need for the FAA to expand its authority to protect the safety of humans on board maybe as soon as 2012. Mr. Gold expressed his concerns that it is premature to begin discussions of on-orbit authority. COMSTAC alternate Randall Clague (XCOR Aerospace) emphasized the point that there are no "passengers" in the commercial launch industry currently or in the future and the term "spaceflight participant" is used in the CSLA. Mr. Gold added that he believes that AST has the ability to look at on-orbit issues and Mr. Szoka added that he believes that there is already authority for governing debris under the Federal Communications Commission.



### **AST International Strategy**

John Sloan, AST Program Lead for International Outreach (FAA), began his briefing by highlighting a new publication entitled *Introduction to U.S. Export Controls for the Commercial Space Industry*, jointly developed by AST and the Department of Commerce's Office of Space Commercialization. Mr. Sloan prefaced his discussion about AST's new International Strategy by noting that AST has been addressing the issue of ITAR for several years, but would like to develop new strategies to better reflect the changes in the industry, especially the emerging human spaceflight activities. He identified two items under the strategy: (1) the promotion of the FAA commercial space transportation regulations as a model for other countries to adopt which would put the U.S. in a leadership role, create harmonization of international space transportation safety regulations, and eventually address new regulations and laws for point-to-point travel; and (2) the recognition that ITAR and U.S. export policies are still in effect.

Mr. Sloan reported that the goals of the strategy are to:

- Increase the international competitiveness of the U.S. commercial space transportation industry;
- Advance international safety by facilitating the adoption of U.S. regulations;
- Fulfill AST's mission, i.e. to ensure protection of the public, property, and the national security and foreign policy interests of the U.S. during commercial launch or reentry activities, and to encourage, facilitate, and promote U.S. commercial space transportation;
- Fulfill the portion of FAA Flight Plan goals that apply to commercial space transportation; and
- Establish a baseline to work from.

He reported that so far AST has received internal FAA approval of the strategy (early spring); increased activities with FAA's Office of International Policy (API) and noted that API has offices in several countries providing an international resource for the AST implementing the AST strategy; received State Department approval to promote FAA regulations to other countries; participated in the International Astronautical Congress in Scotland in early October and while there held discussions with representatives from the United Kingdom (British National Space Centre); Sweden (Swedish Space Corporation and Sweden National Space Board) and Singapore (Economic Development Board); and established the Commercial Spaceflight Safety Commission under the International Astronautical Federation. Mr. Sloan noted that the Commission has open membership and will address ELVs, RLVs, robotic spacecraft. He added that the Commission will be chaired by FAA, Virgin Galactic, and the Swedish Space Corporation, plans to develop new relationships and identify common interests, and will convene regular meetings.

He noted that the emerging government positions are that it is too early for international safety standards for human space flight and for "ICAO for space" and that all international matters should go through the United Nation's Committee on the Peaceful Uses of Outer Space (COPUOS). He also reported that COMSTAC provided preliminary recommendations on ways the government could help industry other than ITAR, including: adoption of FAA regulations as a model for other countries; awareness of the

FAA's international influence; FAA facilitation of U.S. companies during international launch operations; and advocacy of the purchase of U.S. products and services. He reported that additional recommendations from COMSTAC focused on international competitiveness issues such as indemnification renewal and opposition of foreign subsidies. Mr. Sloan mentioned other international issues, including the fact that European entities want to establish global safety standards, certification, and regulations before new vehicles emerge; currently there is no pan-European authority in charge of commercial space transportation and the European Space Agency will not be supporting the European space industry and human spaceflight; regulatory authority will likely be established by the host country for early space operations; and Sweden, United Kingdom, Japan and Singapore are developing commercial space launch regulations.

Mr. Szoka asked whether there was any interaction with the United Arab Emirates and expressed concern about using COPUOS for international issues since it has the reputation of being slow and bureaucratic. Mr. Sloan responded that AST has not interacted with the United Arab Emirates and that there are advantages and disadvantages in using COPUOS. COMSTAC member Mike Gold recommended that AST have two-way conversations with Europeans and other countries, including Russia which has made major milestones in commercial space transportation such as launching the first commercial space tourists. Mr. Sloan responded that AST has not approached the Russians as yet but plan to make contact with all countries involved in space launch.

#### **Lunar Lander Challenge October 2008**

Michelle Murray, AST Program Lead for Experimental Permits, provided a briefing on the October 2008 Lunar Lander Challenge, noting that it is administered by the X Prize Foundation and sponsored by Northrup Grumman. She described the event:

- Basic flight profile: 50 meters up, 100 meters over, and 50 meters down;
- Two levels in which the basic difference is engine burn time;
- Level 1: 90 second flight, land on flat surface, \$350 thousand for first place, \$150 thousand for second place;
- Level 2: 180 second flight, land on simulated lunar surface, \$1 million for first place, \$500 thousand for second place.

Ms. Murray provided background information noting that the 2005 event was called Countdown to X Prize Cup, and held at Las Cruces Airport, New Mexico; the 2006 event was also at the Las Cruces Airport and was the first year for the Lunar Lander Challenge; the 2007 event was at Holloman Air Force Base in conjunction with a military air show with 80,000 attendees; and finally in 2008, the event again took place at the Las Cruces Airport and Armadillo Aerospace won Level 1.

She detailed FAA's role, explaining that the launch vehicles received FAA experimental permits and under the experimental permit process, AST conducts a policy review; a safety review consisting of hazard analysis, operating area containment, operating restrictions, and mishap and emergency response; an environmental review; and a financial responsibility determination. She also stated that FAA coordination was required for the Las Cruces Airport from the FAA Airports, the ATO and the local Flight

Standards District Office. She reported that AST issued three experimental permits: two renewals for Armadillo's Mod and Quad rockets and one new permit for the TrueZero Ignignokt rocket. She reported that with the five launches in 2008, there have now been 20 experimental permit launches since 2004. For the 2009 Lunar Lander Challenge, Ms. Murray reported that there are still three prizes left, i.e., Level 2 1<sup>st</sup> and 2<sup>nd</sup> places and Level 1 2<sup>nd</sup> place). Mr. Kelly inquired about the time it took for TrueZero to complete the experimental permits process and the answer was 78 days.

### **COMSTAC Working Group Reports**

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

Chris Kunstadter, vice president, XL Insurance, provided a report on the RMWG meeting on the previous day, listing the four topics discussed by the working group: including informed consent, state legislation affecting personal spaceflight, in-orbit operations liability, and the extension of indemnification which expires on December 31, 2009. Mr. Kunstadter encouraged all to read the new report on informed consent (*Study on Informed Consent for Spaceflight Participants*, September 2008) and to provide input to the working group. He reported that the RMWG has set up a study group to look at the issue of whether there should be federal guidelines or other legislation to review the various state personal spaceflight legislations, e.g., the differences in the regimes for satellites, etc. He noted that the on-orbit authority discussion covered the European approach of regulating space activity as a whole and that this approach could be a model for the U.S. He reported that there was a lot of discussion about the difference between "spaceflight participants" and "passengers" and the way these terms are used in different industry sectors. He added that other discussions focused on treaty obligations and third-party liability, e.g., collisions with satellites on orbit, and the fact that there would not be much investment until it is clear how the liability and/or responsibility is allocated. He reported that a second small group has been established to look at that issue. Mr. Kunstadter reported on the working groups discussion of the extension of indemnification and that a letter will be drafted by the RMWG to go to the full committee, and finally to the FAA, stressing the important of this issue.

Ray Duffy, senior vice president, Willis Inspace and RMWG member provided a briefing on launch and space liability insurance which included an historical perspective on how space launch insurance developed, a comparison with the aviation insurance industry, current rates associated with space launch liability premiums, how government and foreign commercial launches are covered, and in-orbit liability.

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

George Whitesides, executive director, National Space Society provided the report on the Reusable Launch Vehicle Working Group (RLVWG) meeting on Wednesday, October 29, beginning with the announcement that Brett Alexander had agreed to become the RLVWG Deputy Chair. He reported on the AST Research and Development Program briefing by Chuck Larsen, a program that provides 3 to 5 research projects per year in support of the FAA Flight Plan goals of increased safety and greater capacity.

Mr. Whitesides announced the call for new topics for FY 10. He also reported on the work done by the RLV Task Force on Training for Human Spaceflight and acknowledged the work of Maurice Kennedy and Kent Adams from United Launch Alliance and Michelle Christgen, Wyle Laboratories. He reported that the Task Force has submitted an interim report to the working group.

Mr. Whitesides reported on the briefing on crisis preparation in the event of a human spaceflight disaster by Cassie Kloberdanz, a recent graduate student from the University of Colorado. He noted that the briefing focused on lessons learned from other industries, the importance of crisis management, and the interaction between public opinion and media and the impact on industry regulations. He added that Ms. Kloberdanz has produced three products: a “Getting Started” binder that includes instructions on how to create a crisis management plan and lists the needs of major stakeholders (media, pertinent government agencies and victims’ families); a Day-of-Crisis Book for on-site operations; and a research paper.

Mr. Whitesides stressed that the goal of the working group is to bring together all members of the RLV community and called for concepts and ideas for future business.

#### **New Business and Wrap Up**

Chairman Trafton began new business by putting forth a motion to establish an Export Controls Working Group. COMSTAC member Eleanor Aldrich (American Institute of Aeronautics and Astronautics) recommended that the new working group work together with other groups, such as AIAA, that have done work in this area. COMSTAC member John Vinter commented that companies need to take the lead in reforming the export controls system and COMSTAC is willing to assist. Mr. Gold commented that COMSTAC can bring together companies that deal with ITAR on a regular basis and can be a powerful voice that will help speed up improvements in the Export Controls process. He added that some improvements have been made, e.g., technical assistance agreements are coming out without monitoring provisions. The motion to establish an Export Controls Working Group was adopted by the full Committee and Chairman Trafton appointed Mike Gold as the chair. Chairman Trafton also reminded the group to send in nominees for a “deputy chair” for the 2009 GSO Forecast Team. Since there was no new business, Chairman Trafton adjourned the meeting at 12:55 p.m.

Signed by  
Wilbur C. Trafton  
Chairman, COMSTAC

A handwritten signature in black ink, reading "Wilbur C. Trafton", with a long horizontal line extending to the right from the end of the signature.

**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. Bretton Alexander, Personal Spaceflight Federation
5. Randall Claque, (Alternate for Jeffrey Greason, XCOR Aerospace)
6. Katie Coleman (Alternate for Charles J. Precourt, ATK Launch Systems)
7. Frank Culbertson, Science Applications International Corporation
8. Michael N. Gold, Bigelow Aerospace
9. Louis R. Gomez, Spaceport America New Mexico
10. Timothy Hughes, Space Exploration Technologies Corporation
11. Ray Johnson (Alternate for Dr. Alex Liang, The Aerospace Corporation)
12. Michael S. Kelly, AMPAC Technology Group, LLC
13. David Keslow, Orbital Sciences Corporation
14. Tracey L. Knutson, Knutson & Associates
15. Christopher Kunstadter, XL Insurance
16. Debra Facktor Lepore, Air Launch LLC
17. John M. Lounge, The Boeing Company
18. Dr. Billie M. Reed, Virginia Commercial Space Flight Authority
19. Robin Ricketts, (Alternate for Gerald Musarra, Lockheed Martin Corporation)
20. Berin M. Szoka, Space Frontier Foundation
21. John W. Vinter, International Space Brokers, Inc.
22. George T. Whitesides, National Space Society

**Federal Aviation Administration Representatives**

Dr. George C. Nield, Associate Administrator for Commercial Space Transportation  
James Van Laak, Deputy Associate Administrator for Commercial Space Transportation  
Henry "Hank" Krakowski, Chief Operating Officer, Air Traffic Organization  
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