U.S. Department of Transportation
Federal Aviation Administration

Federal Aviation Administration

Commercial Space Transportation Advisory Committee
COMSTAC

May 15, 2013

Meeting Minutes

I. Introduction and Guest Speakers

a. Mike Gold, Chairman

i. Chairman Gold opened the meeting by welcoming everyone, and made note the change in leadership. Along with his new position as Chairman, Michael López-Alegría is the new Vice-Chair.

ii. He also thanked the outgoing Chair, Will Trafton, under whose leadership was created the Export Controls Working Group, which has witnessed progress and success in that topic area. He also thanked outgoing Vice-Chair Chris Kunstadter for his hard work. Chairman Gold then presented both of them with ceremonial gavels.

iii. Chairman Gold then introduced the leadership for each working group, starting with Debra Facktor Lepore, returning to chair the Operations Working Group, and her new Vice-Chair Dan Collins, from United Launch Alliance; then moving to Patricia Cooper, Satellite Industry Association, taking over as Chair, and her new Vice-Chair Mark Sundhal, Cleveland State University; and again recognizing Chris Kunstadter, XL Insurance, for chairing the Business and Legal Working Group, and his new Vice-Chair Russ McMurry, Boeing; and finally, the Systems Working Group with returning Chair Livingston Holder, Holder Aerospace, and Vice-Chair Charlie Precourt from ATK.

iv. Chairman Gold began listing the recent progress in the commercial space, including ULA's four Atlas V launches in four months, another historic SpaceX mission on Falcon 9, and the Bigelow Expandable Activity Module (BEAM) contract. At the same time, he identified critical reauthorization issues for both NASA and the Commercial Space Launch Act. Mr. López-Alegría has been involved with the Working Group chairs to proactively tackle these issues, so as not to lose progress.

v. He then introduced Dr. Nield as the next speaker, and thanked him for being given the opportunity to work alongside him.

b. Dr. George Nield, Associate Administrator, FAA Office of Commercial Space Transportation (AST)

i. Dr. Nield began by asking how many times everyone has heard the pre-takeoff safety speech by a flight attendant on an airplane, and said it would be easy to take it for granted. However, when passenger service began in the 1920's, there were no flight attendants. It was not until 1928, when a German airline added a third crewmember aside from pilot and co-pilot, a steward, specifically to take care of passengers.

ii. The United States followed suit, and eventually Ellen Church, a nursing graduate originally from Cresco, Iowa with a passion for flying applied to be a stewardess. She was turned down, until she convinced the airline to carry nurses aboard planes. She became the world's first stewardess, with the primary responsibility to care for

sick or scared passengers; but they were also expected to perform other passenger and plane service, even pushing planes back into the hangar.

iii. The first flight under this trial stewardess program took place 83 years ago, on May 15, 1930, on a 20 hour flight from Oakland to Chicago with 13 stops and a total of 14 passengers. By 1935, 2,000 nurses applied for 43 openings with Transcontinental and Western Airlines.

iv. In World War II, nurses were in higher demand in civilian and military hospitals. Ms. Church became a captain and flight nurse in the Army Nurse Corps and earned an air medal, among other decorations for service. And in 1965, her hometown named their airport Ellen Church Field in her honor.

v. Dr. Nield compared and contrasted this history with the future needs of commercial human spaceflight. While the FAA already regulates the number of flight attendants needed for airplanes, the same requirements may not need to be the same for commercial space missions. One on hand, the extra weight of crew might outweigh efficiency; on the other, movies like 2001: A Space Odyssey show flight attendants assisting passengers with the challenges of microgravity.

vi. In fact, commercial space tourism might attract customers unused to the rigors of spaceflight, requiring medical assistance, or help getting back to their seats. Carriers may design spacecraft to make it easier for passengers to fend for themselves, or train passengers more extensively before flight. Either way, current human spaceflight regulations are very top level and primarily focused on public safety.

vii. Congress has limited new regulations until at least October 2015, but encouraged discussions and cooperation with industry to prepare the FAA to appropriately regulate in the future. The FAA has conducted public teleconferences with COMSTAC to better understand the challenges, like levels of safety, oversight, types of requirements, terms and definitions, aborts and systems, fault tolerance, margin, reliability, medical best practices for crew and spaceflight participants, and communications in commanding.

viii. Dr. Nield thanked those who have participated, and said the lead time before the normal rulemaking process can start will ensure the industry will know what to expect from the FAA, and the FAA will have a good understanding of industry's perspective.

ix. Other issues aside from human spaceflight include: orbital debris mitigation practices, safe and efficient authorization of hybrid systems, assessing the need for federal grants towards space transportation infrastructure, flexibility in issuance and use of launch licenses and experimental permits, and reaching stakeholder agreement on a long-term liability and risk-sharing regime.

x. Dr. Nield then introduced the new Deputy Associate Administrator for Commercial Space Transportation, George Zamka, a distinguished graduate of the United States Naval Academy and Florida Institute of Technology with a Master's degree in engineering management. He also graduated from the Air Force Test Pilot School, with more than 5,000 flight hours in more than 30 different types of aircraft. He was a Marine Corps officer and pilot, flying the F/A-18 on 66 combat missions during

Desert Storm. Mr. Zamka was elected as a NASA astronaut in 1998, and flew on two space shuttle missions to the International Space Station ("ISS"): on STS-120 as the pilot, and STS-130 as the commander.

c. The Honorable Michael Huerta, Administrator, Federal Aviation Administration

i. Introduction by Dr. Nield

a. Dr. Nield concluded by introduction the next speaker, FAA Administrator Michael Huerta, who leads an organization with over 47,000 employees and a budget of $15.9 billion, responsible for the safety and efficiency of the largest aerospace system in the world. Administrator Huerta was nominated by the President and on January 1st, 2013, unanimously confirmed by the Senate for a five-year term.

b. Administrator Huerta has had to balance the effects of sequestration along with bringing online a multi-billion dollar NextGen air traffic control modernization program, while dealing with new technologies like unmanned aerial vehicles and suborbital spaceships; all while continuously being called to testify on Capitol Hill.

ii. Administrator Huerta thanked Dr. Nield for the introduction, and for his advocacy, and spoke of how fascinating it is to speak with him every month and discuss the huge accomplishments in commercial space transportation.

iii. The Administrator echoed Dr. Nield's comparison of commercial space transportation today and the history of aviation. He also recognized the advancement in space since President Kennedy 50 years ago, and said the partnership of government and industry was a significant part of moving forward, including putting potential issues out in the open.

iv. Administrator Huerta then took a moment to thank former COMSTAC Chair Will Trafton for his leadership and service. Mr. Trafton himself thanked everyone for their effort, including employees of the FAA. He also wished the current COMSTAC leadership luck going forward.

v. Administrator Huerta also took a moment to thank former COMSTAC Vice-Chair Chris Kunstadter for his excellent guidance and advice. Mr. Kunstadter echoed Mr. Trafton's thanks to everyone, and his well wishes to the current leadership.

vi. Administrator Huerta himself congratulated the new COMSTAC Chair and Vice-Chair and thanked them for their volunteer effort.

vii. He then began describing recent industry accomplishments: SpaceX completing the COTS demonstration, and delivering cargo to the ISS twice more; Orbital Sciences launching from Wallops Island, VA; SpaceX Grasshopper testing; Virgin Galactic powered test flights; and XCOR's Lynx. These efforts to lower the cost for accessing space benefit not only business but science and public access as well.

viii. The Administrator also noted that the FAA has licensed spaceports in several locations, with interest building elsewhere.

ix. He recognized that Boeing, Sierra Nevada, and SpaceX continue to work on commercial crew vehicles for the ISS, and Bigelow Aerospace is developing alternative space stations.

x. Meanwhile, the FAA faces tough fiscal times. Congress has allowed the FAA to move funds to end employee furloughs, but there is still a hiring freeze. While the Office of Commercial Space Transportation continues to receive an increased number of requests and applications, they remain focused on safety. There have been a total of over 200 commercial launches licensed since 1989 with no loss of life, serious injury, or property damage to the public.

xi. In 2012 there were three licensed and permitted launches, while in fiscal year 2013 there have already been 13.

xii. Looking forward, the Administrator said one priority will be the continued, safe integration of commercial space operations into our national airspace; working not only with industry partners but also with other government agencies. For example, the MOU signed between the FAA and NASA for the future licensing of commercial crew vehicles.

xiii. And even though the FAA may not propose new human spaceflight regulations, thanks to COMSTAC, they continue to prepare for potential issues.

xiv. Congress also passed a one-year extension to the public-private risk-sharing regime. While there have been no claims involving the request for congressional appropriated funds, the Administrator stated the FAA fully understands the lack of long-term certainty is challenging for industry, and will continue to engage with Congress on this issue.

xv. The Administrator again noted that when government and industry work together to address matters of concern, it opens dialogue and moves everyone forward. Both parties have the same goal, of safe flight and successful integration of innovative space transportation into our national airspace.

xvi. Administrator Huerta thanked COMSTAC for the opportunity to speak, and welcomed any questions.

xvii. Questions

a. COMSTAC Member Brett Alexander, Blue Origin, asked about the impact of sequestration on an office as small as AST, and in particular asked the Administrator to help ensure ongoing licensing and research activities.

i. Administrator Huerta described the financial structure of the FAA, first by four categories: operations, facilities and equipment, research, and airport improvement. Under Congressional law, airport improvement is exempt from sequestration, as are other grant programs. Therefore, cuts fall on the first three categories, by equal percentage to each program, project, and activity.

ii. The recent Flight Delays Act of 2013 allowed the FAA to take money from airport improvements, one time only, to offset furloughs. The issue is what the next 9 years of mandatory sequestration cuts will look like.

iii. The Administrator stated that the final limit on budget flexibility is appropriations for the upcoming fiscal year.

b. Dr. Nield asked if there were particular areas the industry could provide input.

i. Administrator Huerta responded that the public may not fully understand the significant transformation taking place in space transportation. It is important to be able to tell the story of industry stepping into new roles traditionally held by the government. This ensures people understand what it can mean for the economy as a whole.

c. Chairman Gold asked about FAA's relationship with other agencies, and NASA in particular.

i. The Administrator said the relationship with NASA was good, and communication was important to have a clear understanding of respective roles. The FAA itself benefits from NASA research. And both agencies have people up and down coming together on day-to-day activities. He has been impressed with NASA Administrator Bolden's willingness to come together and form a shared vision in a collaborative relationship.

d. Member Sundhal asked how the Administrator views the understanding from members of Congress of what the industry is doing, and asked what COMSTAC can do to help.

i. Administrator Huerta suggested that Congress ultimately reflects the public's view, but could also benefit from the same story telling. While they have valid concerns not to limit options in the future, the dialogue is important, and COMSTAC is in a position to share their experiences with Members and committees.

xviii. Administrator Huerta again thanked COMSTAC for the opportunity to speak.

xix. Dr. Nield, noting the meeting was ahead of schedule, adjourned it for five minutes.

d. The Honorable Charles Bolden, Administrator, National Aeronautics and Space Administration

i. Introduction by George Zamka

a. George Zamka, Deputy Associate Administrator of AST, began to introduce the next speaker. NASA Administrator Charles Bolden graduated from the Naval Academy in 1968 with a Bachelor of Science in electrical science and was commissioned as a second lieutenant in the United States Marine Corps. He completed flight training in 1970, and as a naval aviator flew more than 100 combat missions over North and South Vietnam, Laos and Cambodia from 1972 to 1973. He subsequently graduated from the Naval Test Pilot School in 1979, and was selected as an astronaut candidate in 1980. He traveled to orbit aboard the Space Shuttle four times between 1986 and 1994, twice as commander, including the deployment of the Hubble telescope and the first joint U.S.-

Russian shuttle mission with a cosmonaut crew member. He logged over 680 hours in space, and inducted into the U.S. Astronaut Hall of Fame in May 2006.

b. Administrator Bolden's decorations include the Defense Superior Service Medal, the Distinguished Flying Cross and the NASA Outstanding Leadership Medal. He was nominated by President Obama and confirmed by the Senate in 2009 as the 12th Administrator of NASA.

c. Deputy Associate Administrator Zamka also took the opportunity to draw out his personal connection to Administrator Bolden. The NASA Administrator served as commander of STS-45 in 1992, with a pilot named Brian Duffy. Mr. Duffy commanded STS-92 in 2000 with first-time pilot Pam Melroy, who later commanded STS-120 in 2007, with Mr. Zamka as a first-time pilot. Under the tradition of passing down leadership during Shuttle missions, Mr. Zamka introduced Administrator Bolden as his great-grandfather.

ii. Administrator Bolden thanked Deputy Associate Administrator Zamka for the introduction, and congratulated him on his new position in the FAA. He also thanked FAA Administrator Huerta, and Associate Administrator Nield for the invitation to speak at the meeting.

iii. He began by describing the indispensable partnership between NASA and the FAA, and how it has strengthened under COMSTAC. He also highlighted their overlap, with new Deputy Associate Administrator Zamka and Vice Chairman López-Alegría both as former astronauts.

iv. Mr. Zamka had joined the Astronaut Corps four years after Administrator Bolden had left, and has logged 692 hours in space on two shuttle missions while traveling 12 million miles. Mr. López-Alegría had logged more than 257 days in space during four space shuttle missions, and performed ten spacewalks, including a record five in a single mission, which he also commanded.

v. Administrator Bolden contrasted this with his time as an astronaut, in which his longest mission was just nine days, a mere "camping trip." However, living and working in space requires more, and that progress is evident in the success of the ISS. NASA may have pioneered it, but that access to low Earth orbit should be passed on.

vi. Congress, on the other hand, is harder than space. One way to navigate the terrain is through the President's annual budget roadmap, and the priorities agreed to jointly by the administration and Congress. In fiscal year 2014, the President has proposed $17.7 billion for NASA, in line with the run-out of the proposed 2013 budget. Het also noted that the President and Congress must solve the sequester issue, which would be disastrous over 10 years.

vii. The budget would ensure the U.S. remains the world's leader in space exploration and scientific discovery while making critical advances in aerospace and aeronautics, and align NASA's activities under today's fiscal realities to meet the challenge to send humans to an asteroid in 2015, and Mars in the 2030s.

viii. NASA is also developing a first ever mission to identify, capture and relocate an asteroid, bringing together the best of NASA science, technology and human exploration efforts at a lower cost to taxpayers, rather than business as usual.

ix. Meanwhile, industry partners are developing new ideas to reach space, create jobs and enable NASA. SpaceX began resupplying the Space Station with cargo launched from the U.S. And Orbital Sciences completed a successful test, inaugurating Wallops Flight Facility in Virginia, America's newest spaceport, opening up additional opportunities for commercial and government use.

x. The budget also provides for launching American astronauts from U.S. soil within the next four years, but because the funding for the Commercial Crew Program was reduced, NASA cannot support American launches until 2017, and had to sign a new contract for Russian Soyuz transportation flights. Further cuts would delay the program even more.

xi. As for industry development: last August, NASA selected Boeing, SpaceX and Sierra Nevada to complete designs of fully integrated commercial crew transportation systems; and in January, NASA announced a contract with Bigelow Aerospace to test expandable space habitat technology on the ISS. Pratt & Whitney Rocketdyne completed hot fire tests of a launch abort engine. Blue Origin successfully tested the aerodynamic design of its next generation space vehicle.

xii. Administrator Bolden also commended last year's agreement between NASA and the FAA to coordinate standards for commercial space travel of government and non-government astronauts to and from the ISS, which brings the business of launching Americans back to American soil while ensuring high safety and reliability standards.

xiii. The current primary destination in space is the ISS, and it's the springboard to the next great leap in exploration. It is a convergence of science, technology, and human innovation, but the President's budget continues investments to develop the rocket and crew vehicle that will take astronauts to deep space, driving development of space technologies such as solar-electric propulsion to power tomorrow's missions and help improve life on Earth.

xiv. The fiscal year 2014 budget includes funding another rover mission to Mars in 2020, to follow Curiosity, which was the most daring mission to Mars in history, as well as the Maven mission launch in November, to study the Martian upper atmosphere, followed by the launch of the InSight lander in 2018. And the planned launch of the James Webb Space Telescope that same year will again revolutionize our understanding of the universe.

xv. The budget also creates new jobs for the next generation of American scientists and engineers, and supports the plan to consolidate and improve the many STEM education programs.

xvi. NASA is using its resources strategically for a unified, cohesive exploration program raising the bar for human achievement, and freeing NASA to take the next big leap into deep space, and put the first footprints on Mars.

xvii. Administrator Bolden again thanked COMSTAC for the opportunity to speak, and opened for questions.

xviii. Questions

a. COMSTAC Member Steve Isakowitz, Virgin Galactic, first thanked Administrator Bolden for speaking, and asked about the false debate between commercial space versus NASA's efforts, and whether COMSTAC could do anything to address it.

i. The Administrator agreed that a false debate exists in Congress, and described it as his inability to convince critical members of Congress. Also, the public may not want to risk the time schedule that private entities enjoy, and that do not have a commitment to the American public like NASA does. NASA should take the risks that private companies cannot.

ii. He also said the Administration could not continue sending over the same budget, but needed to repeat the efforts achieved in 2010 to compromise on NASA's priorities, which included commercial cargo and crew as part of extending the Space Station's life. The Shuttle was retired because it had served its purpose, and NASA had to make a budgetary decision to bring commercial on to take over access to low Earth orbit.

iii. Chairman Gold took the opportunity to note the two Congressmen and the legislative director scheduled to speak immediately after, as part of COMSTAC's opportunity to address the issue directly.

iv. Administrator Bolden continued to describe the ISS as critical to learning more about the human system in a deep space environment, and possibly needing it beyond 2020. Scientists are waiting to see if it will be extended, and that would demand an American capability to reach it. Without that development, there would be no exploration program.

v. The heavy lift launch vehicle and Orion exists for deep space exploration, and would be a horrible investment of taxpayer dollars if used as an emergency vehicle for the Space Station. The Administrator also compared the $454 million spent on a one-year Soyuz contract, with the shortfall in commercial crew funding which is less than that. Once that capability is developed, commercial crew services would just be another service procured for "crew support" in the budget.

b. Administrator Bolden also took a moment to recognize Congressman Aderholt as an incredible partner in Congress.

c. COMSTAC Member Oscar Garcia, InterFlight Global, asked about NASA's suborbital strategy and budget commitments.

i. Administrator Bolden described suborbital as critical and under-discussed, and the need to supplement sounding rockets and high-altitude balloons. He said it also provides multiple capabilities in one, including tourism, so more people can experience the sight of the planet from space, at incrementally decreasing costs over time.

ii. Suborbital will also provide for scientific experiments, perhaps with scientists on board to work in real time for a few minutes at a time, as opposed to 20-30 seconds on the vomit comet.

iii. The Administrator emphasized that the nation needs reliable, redundant methods to get us places. It is not a good posture for the greatest nation in the world to have to assume international partners are the only option, which limits his range of available resources. If Soyuz were no longer available, it would mean de-manning the ISS.

iv. Administrator Bolden closed by restating that he has to be a better partner to Congress to help them understand the critical importance of commercial crew and how the success of the heavy lift rocket and multi-purpose crew vehicle are tied to that.

xix. The Administrator closed by again thanking COMSTAC for the opportunity to speak.

e. Legislative Session

i. Congressman Robert Aderholt, for the 4th District of Alabama

a. Introduction

i. Chairman Gold noted that Congressman Robert Aderholt was sworn in for his ninth term representing Alabama's Fourth district, a member of the Appropriations Committee, and chairman of the Subcommittee on Agriculture. The congressman also supports greater transparency, accountability and oversight to the appropriations process, and has been a vigorous advocate for NASA and spaceflight.

b. The Congressman said it was an honor to be invited to speak, and that the Space Program represents the best qualities of scientific research, human sense of curiosity and desire to explore, creative applications of engineering and energy, and the best and brightest ideas on how to do business.

c. He noted that unlike most agencies, the NASA budget has not grown, really since the Apollo missions. Exploration and public excitement is a key component of growing the budget incrementally over the years. Robotic missions, like that to Europa, are important, but human exploration is a must.

d. Even though we have gone to the Moon before, the Congressman believes it is a rallying point for many countries to come together, and many things about life sciences, engineering, equipment and suit testing can be done on the Moon in a more near-term way.

e. If a lunar lander and moon base are too expensive, the heavy lift rocket can take commercially-sponsored modules to lunar orbit. The Congressman also suggested considering how to mine the Moon in a way that is environmentally responsible. Countries can work together in a way that is more efficient to procure truly commercial material related to energy and science.

f. But Congressman Aderholt stated that America should lead, and Congress was working to fund the programs that are necessary, like a full capacity heavy lift rocket of 130 metric tons, and a full-fledged Orion capsule capable of three weeks or more in deep space.

g. He also recognized that Bigelow, Virgin Galactic, Sierra Nevada, Dynetics and other companies were using their funds to explore commercial activities maintainable without taxpayer subsidies.

h. The Congressman voiced his hope and that of his colleagues that NASA be able to make very focused choices the next few years, and with sufficient funding to carry out those missions. He stated that his Subcommittee of Appropriations focuses on NASA quite a bit. And he encouraged everyone to reach out to them.

i. Congressman Aderholt thanked COMSTAC again for the opportunity to speak.

j. Chairman Gold took the opportunity to recognize that commercial space does not stop at low Earth orbit, and companies like Planetary Resources, and even SpaceX's interest in Mars, show that commercial space can, will, and must go beyond low Earth orbit.

ii. Tom Culligan, Legislative Director for Congressman Frank Wolf

a. Introduction

i. Chairman Gold noted that Tom Culligan's father had worked for Raytheon, that his wife works for the National Air and Space Museum, and therefore that Tom has space in his blood. Also, Mr. Culligan and Congressman Wolf have spent a tremendous amount of time and resources on the issue of space.

b. Mr. Culligan thanked Chairman Gold for the introduction, and COMSTAC for the invitation to speak. He apologized that Congressman Wolf could not join, but that he would have agreed with the previous speaker, Congressman Aderholt, who is very active in committee, and has consistently fought for NASA.

c. Mr. Culligan began discussing the post-sequestration environment, and in particular the appropriations challenges under the Ryan Budget, which is $91 billion below the Senate, and falls mostly on non-defense discretionary spending. Doing what one can with those limits, Congressman Wolf always believes that space is a priority.

d. Equally important is what the House authorizers choose in terms of missions and destination and guidance for space programs, including a push to for the Moon. It has been two years since the last Space Shuttle launch, and there is a drought in terms of human spaceflight before the first commercial launch, and in planetary missions. This requires Congress and the administration to develop a pipeline that is serious and interesting, incredible and compelling, without that, it will be increasingly easy for Members of Congress to consider more cuts to NASA.

e. Mr. Culligan said it was a critical time for the advocacy community to get involved, and, again, he appreciated the opportunity to speak. He noted that the next speaker had arrived, and deferred his time.

iii. Congressman Steve Stockman, for the 36th District of Texas

a. Introduction

i. Chairman Gold quickly introduced Congressman Steve Stockman, from the 36th District of Texas, which includes the Johnson Space Center. He described the Congressman as a tireless advocate for NASA and spaceflight, and personally as a man generous with his time and office.

b. Congressman Stockman introduced himself by mentioning that his wife has worked at NASA for 30 years, and described how his wife has advocated to him about science and NASA. So he thanked COMSTAC for inviting him to speak.

c. The Congressman described the early vision and excitement of the space program, and today's disappointing lack of vision, which does not provide the excitement and inspiration to create a generation of people involved in science and mathematics.

d. While the private sector developed independently from the limits of Congress, there is still a need for a Government vision. And this requires informing the general public, and other congressmen, and allocating resources to public relations. Towards that end, he encouraged industry to help publicize the cause of spaceflight.

e. Congressman Stockman also agreed with the previous speaker Mr. Culligan about a drought in terms of spaceflight, and losing the public's attention, and he commended Congressman Wolf on his pro-space work.

f. The Congressman closed by stating his gratitude for the vision of people back in the '60s and '70s to pursue the space program, and the need to describe to people today the excitement of spaceflight. He again thanked COMSTAC for the opportunity to speak.

g. Chairman Gold also stated his concern for an industry that spends too much time talking to itself, and not enough reaching out to people, including finding common ground with those in the traditional space industry.

iv. Tom Culligan, Legislative Director for Congressman Frank Wolf, taking Questions

a. Chairman Gold welcomed Mr. Culligan back for questions, and asked for his thoughts on the future of the Commercial Crew program.

i. Mr. Culligan responded that the choice of funding comes from how much is available and voiced frustration with the lack of clear strategy on the program, preventing confident Congressional buy-in. He stated there were no bad actors, just conflicting factors, like stakeholders, protracted appropriations, and authorization battles.

ii. He mentioned the negotiated down-select process to have NASA focus and narrow investment to companies that would be most likely to succeed in expediting American crew in space.

iii. Mr. Culligan stated it was the most interesting year since the NASA Authorization of 2010, and driven less by ideology and more by political and appropriations factors.

b. COMSTAC Member Tim Hughes, SpaceX, asked for Mr. Culligan's reaction to the recent Russian Soyuz contract, in light of relative priorities.

i. Mr. Culligan said the situation exists because of previous decisions, and again from lack of Congressional buy-in. Meanwhile, the Russians have been good partners. Yet, members of Congress want to see American rockets and America capsules, in a program that get American astronauts to low Earth orbit and the ISS as quickly and affordably as possible, without providing development subsidies to a large number of entities.

ii. For those reasons, Congress intervened last year to push for a down-select process. More people believe we should have this program, but are still upset about how it was run. He stated the hope that Congress and the Administration will move forward together.

c. Member Hughes followed up by commending Congressman Wolf's efforts in pushing for a down-select, and asked if further intervention would be necessary?

i. Mr. Culligan responded that it was up to NASA. The budget allocation depends on what funds are available, but Congress does not want to see the completion date for Commercial Crew capabilities slip.

d. Chairman Gold noted Congressman Wolf's work on human rights, in Darfur, but particularly in China, and asked Mr. Culligan to describe the Congressman's position.

i. Mr. Culligan encouraged everyone to visit Congressman Wolf's website and read about his work on China with human rights and religious dissidents over the last 30 years.

ii. In terms of the position affecting trade and technology, Mr. Culligan noted that the People's Liberation Army runs the Chinese space program. And the PLA is responsible for a number of actions, including aggressive cyber-attacks against U.S. companies, which in one instance stole a billion dollars' worth of research in two days. Where America still has a competitive advantage in space, Congressman Wolf believes cooperation there must be earned by positive behavior.

iii. Mr. Culligan contrasted this with China's integration into the WTO, which did not lead to the expected progressive shift in China. Instead, China's behavior has changed us.

iv. He summarized Congressman's Wolf belief that we must see positive changes from China before cooperating with them in space.

v. Chairman Gold applauded Congressman Wolf's actions in standing up for human rights in Darfur.

e. Member Sundhal asked whether more can be done to explain how commercial space transportation is a national security issue, and provides for military use of space operations.

i. Mr. Culligan said it was a terminology issue, and that "commercial" has become a loaded term, because every private company in America is technically commercial. The issue now is what commercial space means moving forward with fewer subsidies to go out to develop new space entities.

ii. He described it as an opportunity to reframe the issue, so that NASA is not spending its time investing, but rather developing the mission, and providing a clear, national vision, then more people will be willing to invest private money. The reauthorization process may help diffuse the issue and redefine what commercial space will mean.

iii. Member Garcia added a distinction between commercial services for government, and commercial services for private use, and encouraged AST to clarify that. Mr. Culligan agreed.

f. Vice-Chair López-Alegría asked whether further down-selection will decrease the competition and cost/development efficiency for NASA of the previous phases of Commercial Crew development.

i. Mr. Culligan responded that there was a lot of concern about the lack of oversight in funded Space Act Agreements. Congress will likely return to traditional acquisition models, in consensus with NASA.

ii. As far as competition, Mr. Culligan stated that in a perfect world, it would be a good idea but under a constrained budget, and limited timeframe, it is not. He again stated that NASA had not adequately explained the development process before, and Congress's lingering frustration leads their concern.

g. Chairman Gold with the final question asked what COMSTAC could do to be more productive in the debate to help commercial space issues in the upcoming appropriations and reauthorization process.

i. Mr. Culligan said everyone should be cognizant of the constraints Congress is under, and come in with realistic expectations, and that, as general advice, that everyone should encourage Congress and the Administration to deal with the drivers of debt and deficit.

ii. The more that industry and the business community talk about and tackle the governments autopilot spending and long-term budget problems, the sooner the constraints can be lifted.

iii. Equally important has been efforts from all sides to recognize the important role all parties have to play, as described by Administrator Bolden, between commercial and government, to gain support and excite the nation.

iv. Mr. Culligan also agreed with Vice-Chair López-Alegría's statement that the industry cannot remain insular, and must talk to other people who may disagree or have concerns. He also encouraged speaking with newer members of Congress, who will be dealing with these issues in the future.

v. Mr. Culligan concluded by describing the Shuttle flying over Washington, bringing people out of their office buildings to watch. A surprising number of people think NASA is no longer in the business of human spaceflight, and their excitement is not going to be recaptured until we start launching Americans from this country again. Until then, they need to see that industry is still vibrant and engaged.

h. Chairman Gold led a round of applause for Mr. Culligan, and adjourned the meeting for 10 minutes.

II. Out-Briefs

a. Operations Working Group

i. Working Group Chair Debra Facktor Lepore began by discussing how full the agenda was for the Working Group meeting yesterday, and asked COMSTAC to agree to an 80/20 approach on approving items today. For those issues needing further discussion, it can be done offline. She registered an affirmative response.

ii. Overview

a. For On-Orbit Operations, Chair Lepore thanked AST for coming back with new proposed wording that was more reflective of discussions. She noted that AST had taken on the previous recommendation of looking at space traffic coordination as a use case, but under a constrained budget, has not started an analysis.

b. For Spaceport Licensing, AST accepted the Working Group's final report from last October, and is using it as input for the next revisions to Part 420 of licensing operations at a launch site.

c. For International Standards, the Working Group asked that AST continue monitoring it, and they agreed.

d. For International Developments in Space operations, again the Working Group asked AST to continue monitoring the issues, particularly in long-term sustainability of space.

e. For Title X Commercial Space Launch Cooperation at Federal Ranges, AST is monitoring the issue, and the Working Group received an update.

iii. Long-Term Sustainability of Space

a. Industry input was requested through activity with UN COPUOS, and COMSTAC appointed representatives, Member Chris Kunstadter to Group B on Space Debris, and former Member Rachel Yates to Group D on regulatory

regimes and guidance, with John Sloan, AST, working on the later in more detail.

b. Amber Charlesworth, Department of State, gave an update yesterday, reporting significant progress, especially in Group B. There are draft voluntary guidelines open for industry comment by May 21st. Once the guidelines are finalized, the Group will disband. Members are encouraged to submit feedback directly to John Sloan. The Chair expressed her appreciation for AST's work, enabling industry to stay engaged on the international level.

c. Ms. Charlesworth also spoke on the Code of Conduct, which is evolving, including incorporation of U.S. points on preserving self-defense.

d. Finding & Recommendation: International Space Developments

i. Finding (Same as May 2012)

1. Private sector engagement by COMSTAC and others is effective and continues to be welcome.

2. The communication mechanisms being used by FAA AST to keep industry informed and engaged continue to work well.

3. COMSTAC participation in the UN COPUOS process on Group B and Group D should continue.

ii. Recommendation #1 (Same as May 2012)

1. FAA AST continues to play this facilitation role and keep COMSTAC informed of key issues and any key actions needed.

iii. Recommendation #2

1. This subject move to the newly re-named COMSTAC "international" working group, especially as it is maturing beyond the OWG.

iv. The Chair noted the second recommendation referred the issue to the as-yet-to-be renamed Export Controls Working Group. Vice-Chair López-Alegría asked whether the recommendation was directed to AST or COMSTAC itself, and the Chair said it would be discussed in the closed session. Hearing no other comment, she continued.

iv. Title X Commercial Space Launch Cooperation

a. Major Justin Sutherland, Air Force, gave an update yesterday on new authority in the FY13 Defense Authorization to accept non-federal contributions in support of Defense space transportation infrastructure. And they are working with OSD on an implementation plan.

b. Finding & Recommendations: Commercial Space Launch Cooperation (CSLC)

i. Finding

1. It remains useful for COMSTAC and FAA AST to remain apprised of this issue.

2. COMSTAC is concerned that the implementation process has many challenges that are not being considered.

ii. Recommendation #1

1. FAA AST continues to play a role in facilitating dialogue between the Air Force and industry on this issue.

2. FAA AST, as a federal range stakeholder, engage with the Air Force on how to implement the CSLC.

iii. Recommendation #2

1. FAA AST submits the following questions on behalf of COMSTAC to the Air Force:

- Will all improvements be made available to all users, or will there be accommodation for proprietary improvements; if the latter, how will this be implemented
- How will the account be administered to ensure the private funds are spent in the way the contributor intended
- Can the funds be used to sustain or increase the operational tempo at the range, such as to compensate for the effects of sequestration
- What is the involvement of other federal range stakeholders, such as FAA AST and NASA, in the Air Force Working Group on the implementation of CSLC

iv. The Chair described the recommendations as reaction to concern over whether the CSLC implementation process may have challenges not considered from a broader perspective, and thanked the work of Members in putting the recommendations together (helped in part by the table setup in the room providing direct engagement). Hearing no comments, she continued.

v. Air Force Capability-Based Assessment of Launch Ranges

a. This new topic was introduced on behalf of Air Force Space Command. Major Jennifer Biesel introduced the topic yesterday in discussing a study on how to right-size the ranges, and what could be eliminated or changed to reduce cost but keep risk levels the same.

b. Part 1 of the study just finished after three months to identify some opportunities to right size. Part 2 kicked off by Aerospace Corp to examine more material options and asking for industry input by the end of June. This input should not come from COMSTAC, but individual companies and stakeholders in their current experience, use of services, launch manifests, possible policy impact, etc.

c. The Chair did agree to share the spaceport licensing white paper finalized by the Working Group last fall with Jim Vedda at Aerospace Corp, because of overlap with Part 2 of the study.

d. Finding & Recommendation: Air Force Capability-Based Assessment of Launch Ranges

i. Finding

1. FAA AST role in facilitating industry engagement with the Air Force is useful and appreciated.

2. Receiving a copy of the Part 1 study results outlining the options under consideration to "right-size" the range would be very useful in shaping industry inputs to the questionnaire.

3. Government launch and range stakeholders, such as FAA AST and NASA, should have an opportunity to review the list and provide input to the Part 2 analysis.

ii. Recommendation

1. FAA AST request the Air Force provides COMSTAC, the FAA AST, and NASA a copy of the Part 1 results as soon as possible.

2. FAA AST engages with the Air Force on this topic and provides input to the Air Force on the Part 1 results.

iii. After a pause, the Chair continued.

vi. Operations Licensing

a. The Chair noted that the topic was postponed to the fall, but opened for comment. New Member Patricia Cooper shared activities in the FCC with regard to licensing of spectrum for use by non-federal small satellites, as well as launch spectrum allocation for temporary use in the launch phase, with a public notice on the former and a notice of proposed rulemaking on the latter.

b. Finding & Recommendation: Operations Licensing

i. Finding - FAA AST plays an important role in keeping industry stakeholders, through COMSTAC, aware of and engaged with the diverse policy and regulatory developments across the federal government that may affect commercial space. This role should continue.

ii. Recommendation - FAA AST, in its role to encourage and promote, coordinate closely with the FCC and other federal agencies on regulatory issues of interest to commercial space, such as the activities underway at the FCC on small satellites and launch phase spectrum allocation.

iii. The Chair described this as the best way to address the issue before anyone was prepared to go into the details, and recognize that it was eye opening to the roles of other stakeholders.

iv. COMSTAC Member Greason expressed surprise that COMSTAC or other industry groups involved in space were not part of the consultation before the notice of proposed rulemaking, and suggested the federal government should coordinate future rule makings to include all stakeholders.

v. Associate Administrator Nield commented that all federal parties involved in space transportation have their respective roles, but AST appreciates being reminded that it is important to view the entire mission holistically, and asked for support in stewarding that holistic responsibility.

vi. The Chair concurred that was the correct interpretation of their message.

vii. Commercial Space Launch Act (CSLA) Reauthorization Discussion – STIM Grants

a. There was a lot of discussion on space transportation infrastructure matching grants, of how money is allocated, how grants are funded and specifically that they are not funded in the President's FY14 budget. Jim Muncy, who had helped write the original legislation, gave his perspective.

b. Observations & Recommendations: STIM Grants

i. <u>Observations</u>

1. The President's FAA AST FY14 Budget Request does not include STIM grants.

2. The STIM-Grants program is a useful mechanism to encourage public private partnerships in space transportation infrastructure. To ensure that it remains useful requires appropriated funding and an appropriate matching requirement that promotes private investment. In particular, the 10% private sector threshold may be an obstacle to participation.

ii. <u>Recommendations</u>

1. FAA AST pursues funding for STIM Grants in appropriations and future budget requests, and at an increased level over previously authorized amounts.

2. Reexamine the requirements and ratio of matching funds in the context of today's industry, with the goal to encourage increased participation and investment in space transportation infrastructure.

c. The Chair paused for comment, then continued.

viii. Commercial Space Launch Act (CSLA) Reauthorization – License & Permit Flexibility

a. There was discussion of the gap between licensing a plane for spaceflight, but needing to move it back to experimental status, as done for aircraft.

b. Observations & Recommendations: License & Permit Flexibility

i. **<u>Observation</u>** – In 2004, experimental permits were introduced to the CSLA legislation as an innovative mechanism for new vehicles to start operations. However, the need for vehicles to move back and forth between an experimental permit and a license was not contemplated. There is some flexibility for aircraft that may serve as a useful model.

ii. **<u>Recommendation</u>** – Amend the CSLA to allow the FAA AST and a license-holder to have the flexibility to move a space vehicle between licensed flight and experimental flight categories.

c. The Chair asked for questions, and receiving none, continued.

ix. Final Topics

a. There were no telecoms in the past six months because there were no issues. But there was a proposal to have one in mid-June as a continuation of issues at this meeting. The goal being to do so before inputs are due on range assessments.

b. The Chair let everyone know how to join the distribution list by signing in with AST.

c. Chairman Gold took the opportunity to mention the outstanding work of the FAA Center of Excellence for Commercial Space Transportation, and asked Associate Administrator Nield to respond to COMSTAC on the funding and resources issues facing the program. Dr. Nield agreed and Chairman Gold further encouraged members to be proactive about supporting the program.

d. The Chair also concurred. Member Alexander asked if the Working Group could submit this issue as an action. The Chair suggested bringing it up in new business. Chairman Gold supported the effort, and suggested Member Alexander write up a draft. The Chair seconded the idea.

x. Chairman Gold took the opportunity to thank the Chair for her hard work, and led a round of applause.

b. Export Controls Working Group

i. Chairman Gold announced a change to the agenda, where the Business/Legal Working Group was scheduled to report, and introduced the new Chair of the Export Control Working Group, Member Patricia Cooper, who played a vital role with the Satellite Industry Association in advancing export control reform, as did the Export Control Working Group.

ii. The Chair thanked the FAA and COMSTAC for inviting her to join, and described the topic as a mission of love. She also recognized her Vice Chair, Mark Sundhal, and thanked him for his work.

iii. The Chair then summarized the work of the group from yesterday. There were two guest speakers, starting with David Fite, senior professional staff member for the minority on the House Foreign Affairs Committee, who reported on the 2013 National Defense Authorization bill passed in December. He looked at Sections 1261 and 1267, which restore the President's authority to determine export jurisdiction of satellites and related items under Category XV.

iv. The second speaker was Kevin Wolf, Assistant Secretary of Commerce for Exports, who reported that the Administration has finalized its draft implementing regulations, and will be published in the Federal Register open for a 45-day comment period.

v. The speaker also detailed the proposals, noting they are rooted almost entirely in the Section 1248 report by the Department of State, Commerce and Defense. Once implemented, they will ease trade with 36 close, mostly NATO, allies; with STA

license exceptions, but still significant constraints on any Category XV trade with China and other State sponsors of terrorism.

vi. The speaker also said the Administration and Commerce Department in particular welcomes feedback from the satellite and space industry to ensure the regulations have the intended effect, whether for suborbital, launch, human spaceflight experience, or the space industrial base in general.

vii. Chairman Gold spoke up that progress was not complete, and that industry needs to provide positive input during the comment period to ensure the reforms go through. The Chair agreed, and noted that was the view of the speakers as well.

viii. After the speakers, the Chair noted the meeting discussed staying informed on the regulations, and a commitment to circulate the draft when it was published. And aside from filing their findings, observations, and recommendations to show the working group's long support for export control reform, the meeting discussed other international trade issues to engage on; which led to the idea of potentially reframing the working group to an international policy focus.

ix. Observations & Finding:

a. <u>Observations</u>

i. COMSTAC applauds the passage of the National Defense Authorization Act for Fiscal Year 2013 restoring authority to the President to transfer satellites from the United States Munitions List ("USML") to the Commerce Control List ("CCL") to allow for the appropriate control of technology and promote the competitiveness of the domestic space industry.

ii. COMSTAC strongly encourages the timely implementation of the provisions in the FY2013 NDAA and the transfer of certain defense articles on Category XV of the USML to the CCL as proposed by the Departments of Defense and State Report to Congress pursuant to Section 1248 of the National Defense Authorization Act for Fiscal Year 2010 ("Section 1248 Report").

b. **<u>Finding</u>** - COMSTAC encourages the FAA and other space stakeholders to pro-actively evaluate current export controls on space technology, in order to strike the appropriate balance between national security and supporting a strong and competitive domestic space manufacturing industry. This assessment should evaluate not only whether additional space-related technology should be recommended for transfer from the USML to the CCL, but also whether the current level of control applied under the Export Administration Regulations are appropriate or should be adjusted.

c. The Chair described the observations as recognizing the working group's long support, and encourage continuing action. She summarized yesterday's meeting as a very informative session. She thanked Chairman Gold for handing over leadership of the working group, and for immediately suggesting a name change.

d. Member Lepore suggested holding a yay or nay vote, and Chairman Gold conducted a vote, with all Export Control observations and finding passing.

e. Member Lepore then proceeded to vote on individual observations for the Operations Working Group, when Chairman Gold suggested voting on the entire report. Member Lepore held the vote, and it passed.

f. Chairman Gold then brought up the topic of changing the Export Control Working Group name to International Policy, which had unanimous support at yesterday's meeting. Member Trafton suggested the vote should technically be to recommend to Associate Administrator Nield to make the name change. Chairman Gold asked Dr. Nield, who consented. Chairman Gold then held a vote, and it passed.

c. Systems Working Group

i. Chair Livingston Holder introduced himself and his new Vice Chair Charlie Precourt, then proceeded to review the three topics discussed in yesterday's meeting: Human Spaceflight Guidelines, Lesson Learned Database, and the NASA and CSLA Reauthorization Bills.

ii. On Human Spaceflight Guidelines, Randy Repcheck, AST, gave a review of all eight telecon meetings conducted, with good participation mostly between 40 and 60 callers, keeping the group quite busy between meetings. It also informs the FAA on what the industry is thinking on various topics, and provides a better basis going forward.

iii. Draft guidelines will be produced sometime this year, with additional solicitation from COMSTAC, in lieu of regulations, which AST cannot issue until 2015. The goal from the FAA is to provide final guidelines by 2014, reflecting a consensus view.

iv. On Lessons Learned, Mike Kelly, AST, reported they are working to update the internal lessons learned database. And the STAR database, which has a large number of orbital launches worldwide, is being modified so it is easier to use and the information is not proprietary.

v. The FAA will make the new lessons learned/STAR database available as a beta test for COMSTAC members, and industry stakeholders, to evolve the database with inputs from industry, and determine the actual feasibility and suitability.

vi. On the Reauthorization Bills, COMSTAC Vice Chairman López-Alegría spoke on a broad range of issues. First, he discussed restoring the learning period for regulation of human spaceflight.

vii. Observation & Recommendation

a. **Observation** - The initial learning period was eight years from the enactment of the CSLAA, or December 2012. It was assumed in 2004 that this period would

allow a flourishing of multiple spaceflight providers, giving FAA the extensive data needed to regulate effectively.

b. **Recommendation** - The human safety regulatory learning period should be restored to eight years from the first licensed flight of a spaceflight participant.

c. The Chair described the recommendation as addressing the fact that lack of extensive data on human spaceflight is needed to regulate effectively. Chairman Gold asked for comment, then held a vote, and they passed.

viii. Finding

a. **Finding** - Sufficient and ongoing government funding for key space transportation systems and services will be critical to the future of the commercial space industry.

The domestic commercial space industry would benefit substantially from breaking the U.S.'s existing dependence on Russia for crewed spaceflight, and from the development of opportunities for private sector operations in and beyond LEO. Moreover, the industry would benefit from offering space services that are unique or at potentially lower cost.

The COMSTAC supports robust funding for the commercial crew program as part of a balanced human exploration program and for Suborbital Flight Opportunities Program to enable valuable scientific research.

b. The Chair discussed having made additions to Vice Chairman López-Alegría's draft from yesterday, concerning unique space services at lower cost, and the suborbital flight opportunities program.

c. Member Garcia noted that the suborbital flight opportunities program was critical to developing suborbital transportation, and the Chair agreed it broadened the scope of the initial finding to be more inclusive. COMSTAC Member Janet Karika asked about the inclusion of "in and beyond LEO," and Chairman Gold said it was to emphasis the desire to fund both kinds of operations. Vice Chairman López-Alegría characterized it as preserving the possibility for future development. Member Lepore's suggestion led to the edit.

d. Member Greason took the moment to emphasize the need to propose creative business models to overcome NASA budget constraints. The Chair agreed it was in the industry's best interest, and Chairman Gold noted NASA has taken advantage of that, including in a contract with Bigelow Aerospace.

e. Vice Chairman López-Alegría suggested a vote accepting all visible edits, and the Chair finalized the "in and beyond LEO" edit. Chairman Gold moved for a vote, it was seconded, and the vote passed.

f. The Chair closed the meeting for lunch. Chairman Gold led a round of applause, and meeting was adjourned for lunch.

d. Business/Legal Working Group

i. Chairman Gold introduced the Chair, Member Kunstadter, to lead the meeting. The Chair noted yesterday was a long meeting, and barely covered half of what was intended. So some issues will be presented for limited discussion. The list of topics were: MPL methodology review, GSO and NGSO forecasts, waivers for many payloads and other Part 440 mods, private exploitation and utilization of space resources, long-term extension of third-party risk-sharing regime, informed consent protection, inclusion of third-party indemnification for spaceflight participants, and NASA termination liability.

ii. MPL Methodology

a. AST had asked COMSTAC for the most cost-effective means of engaging external experts, originally suggested by the GAO report regarding the indemnification regime. There was a telecon in January with lots of participation, which identified three types of organizations: ACTA, White Sands Research and Development, and cat modelers.

b. The recommendations were submitted to AST, which has shelved the issue due to budget constraints.

c. **Finding** – COMSTAC finds that FAA AST's assigned task has been addressed, and remains ready to support further work on the MPL methodology review.

iii. GSO and NGSO forecasts

a. The Chair described the forecasts as a keystone product of COMSTAC, produced for 20 years. They show a strong near-term growth in LEO, from communication satellite, scientific crew flight to station, et cetera; and a level but strong business in GEO. The Tauri Group supported on that, and the forecasts are now done and available on the AST website.

b. **Finding** - COMSTAC finds that the annual GSO and NGSO reports are important resources, not just for FAA AST but also for industry and other government agencies. These reports are extensively used for planning and business development throughout the space industry, and should continue to be produced annually.

c. The Chair returned to the first finding to ask for comments, then asked for a vote, and it passed. He then asked for comment on the second finding, then asked for a vote, and it passed. He thanked Pete Stier, Sea Launch, and Rob Unverzagt, Aerospace, for their work.

iv. Waivers for many payloads and other Part 440 Mods

a. Randy Repcheck, AST, had given a briefing, and talked about waivers between customers and how many branches the agreements would have to go down from the top tier. The discussion also involved Laura Montgomery, FAA, and the Chair thanked AST for their work. The change would require licensees to sign

cross-waivers only with the customers that have directly contracted with the licensee.

b. There were a couple of other cleanup issues having to do with third-party beneficiaries and cross-waivers with no customers.

c. **Finding** - COMSTAC finds that FAA AST's work on (a) the customer flowdown issue, pending clarification of the relationships and potential interactions of contractors, customers, and others (e.g., aggregators); and (b) the "clean-up" issues should be pursued.

d. The Chair asked for comment, held a vote, and it passed.

v. Private Utilization of Space Resources

a. Joanne Grabynowicz, University of Mississippi – Remote Sensing, Air & Space Law, presented her analysis, which involved multiple treaty provisions, and the distinction between private commercial in the U.S., and revenue commercial in Europe. She modeled the issue as the intersection of law, politics, and enlightened self-interest.

b. The conclusion was that interested parties need to get together, including companies and the government, to address this issue now in anticipation of these activities.

c. **Recommendation** - COMSTAC recommends that FAA AST support efforts in Congress and through the Department of State to confirm the right of private sector companies to enjoy the benefits of resources extracted from the surface or subsurface of the Moon and other celestial bodies, subject to appropriate supervision by a relevant U.S. government entity.

d. Member Holder asked whether AST was the relevant government entity for extraterrestrial work. Chairman Gold said AST could be relevant in the current regulatory vacuum. Member Greason noted that Department of Transportation was the relevant agency for current space supervision regulation. The Chair noted the original wording in the recommendation was "regulate," and suggested changing it to "supervision."

e. Vice Chairman López-Alegría asked about removing the final reference any jurisdiction by a relevant entity. Member Holder supported leaving it in. The Chair noted a recommendation requires AST's response, and Member Holder said there was safe room for them to respond.

f. Chairman Gold also recalled the language of appropriate supervision was meant to comply with treaty provisions, but also to acknowledge when they have a right to these activities.

g. Members Greason and Holder supported leaving it in. Member Lepore did not, suggesting it was premature to ask for ambiguous regulation for unknown problems. Chairman Gold was sympathetic, but again said it was to comply with treaty provisions. Member Sundhal agreed, and noted it would attract negative attention to suggest something in violation of international law.

h. Member Lepore then suggested directly referencing the Outer Space Treaty, and Member Greason disagreed, preferring the wording that referenced it without direct recognition.

i. COMSTAC Member Carl Rising, Stellar Solutions, asked about the vague term "enjoy the benefits," and Chairman Gold responded that it covers the discussion from yesterday of the untested limits of property rights in space, and this phrasing narrowly addresses extracting resources without claiming property rights. The Chair and Member Rising confirmed their interpretation.

j. Chairman Gold suggested taking a vote, which the Chair held, and it passed.

vi. Long-term extension of third party risk-sharing regime

a. The Chair noted this topic continuously comes up. Jim Muncy gave an impassioned plea yesterday for a permanent extension.

b. **Finding** - COMSTAC finds that, under the current U.S. launch indemnification regime, licensees are required to protect the U.S. government from legal liability up to the maximum probable loss (MPL), at no direct cost to the government, with the expectation that the government will continue to be authorized to seek an appropriation to pay certain excess claims above the MPL, on behalf of all launch participants.

c. **Recommendation** - COMSTAC recommends that FAA AST urge Congress to permanently extend the current U.S. launch indemnification regime because it protects the U.S. government from substantial third-party liability claims up to the MPL, at no direct cost to taxpayers.

d. The Chair noted that instead of asking again for a limited-term extension, it was time to step up and strongly encourage Congress to permanently extend it.

e. The Chair asked for comment on the finding, held a vote, and it passed, then the Chair asked for comment on the recommendation.

f. Vice Chairman López-Alegría asked whether the FAA is allowed to urge Congress to do things. Associate Administrator Nield stated it was helpful to know the sense of COMSTAC. Member Holder said FAA would filter the recommendation through the authority provided to them. Chairman Gold asked if a finding would be more appropriate. The Chair disagreed. Member Holder described the recommendation as a tool for the FAA to show Congress. Member Lepore repeated the fact that this topic comes up over and over again.

g. COMSTAC Member Eleanor Aldridge asked if there was an insurance industry perspective. The Chair said the insurance industry will continue supporting the commercial launch industry, as they have been doing up to the MPL, for as long as possible.

h. Member Hughes suggested COMSTAC additionally take action to directly speak with Congress and change the attitude to prevent further short-term extensions. The Chair said it would be beyond COMSTAC's charter, but it does not preclude individuals from acting that way. Member Greason agreed it was

possible, and the Chair emphasized that COMSTAC has repeatedly recommend members to do.

i. Member Karika suggested the need for talking points, and asked Chairman Gold if this was comparable with the efforts to reform export controls. The Chairman said that lobbying was beyond what the committee could do, but encouraged Member Hughes as an individual to do so.

j. The Chair asked for further comment, then held a vote, and the recommendation passed.

vii. Strengthening of informed consent protection from unrestricted second-party litigation

a. The Chair deferred to COMSTAC Vice Chairman López-Alegría to brief this topic, who in turn deferred to Dr. Alex Saltman, Commercial Spaceflight Federation. He described the issue as a problem of whether waivers by spaceflight participants against a launch company would be enforced in court, and which court would have jurisdiction.

b. The proposed solution is to include the waivers in the existing chain under the CSLA, and insist they be restricted to federal court. Dr. Saltman credited Member Russ McMurry with working on this.

c. Chairman Gold asked Member Hughes for his opinion, and Member Hughes said he thought the problem was stated succinctly. However, enforcement in court is still unknowable.

d. The Chair suggested reading the four related observations and findings before further discussion.

e. Observations & Findings:

i. **Observation** - COMSTAC observes that, while the Commercial Space Launch Act requires that licensees obtain informed consent from their spaceflight participant customers, it does not preclude potential claims from participants and their heirs and estates in the event of a flight incident or accident.

ii. **Finding** - COMSTAC finds that, to encourage the successful growth of the commercial space flight industry, operators, manufacturers, suppliers, and other contractors, should be able to operate in a predictable and consistent legal environment where they may be held accountable for deliberate malfeasance or gross negligence, but not for the inherent risks associated with human spaceflight.

iii. **Observation** - COMSTAC observes that commercial spaceflight activities legally implicate the federal government because the U.S. is a signatory to international treaties making nation-states liable for certain losses arising from space activities of non-governmental entities.

iv. **Finding** - COMSTAC finds that cross-waivers of liability among all parties on the licensee side of the launch activity should be required, and Federal

courts should decide legal cases regarding any element of the federal license, including the legal validity of any waivers of claims signed by spaceflight participants, after being fully informed as to the risks of the spaceflight.

f. On the first observation, Member Trafton asked about claims from survivors of participants, and the Chair agreed it was silent. Member Hughes did not completely agree. Vice Chairman López-Alegría said it was not specifically prohibited. The Chair adjusted the language, and Member Holder agreed. The chair held a vote, and it passed.

g. On the first finding, the Chair asked about the legal implication of the language used, and Member Greason responded that it was written as a finding, not law. Member Cooper asked what predictable and consistent applied to. Member Greason said applied to liability, it was preferable. Member Karika suggested changing "enjoy" to "should operate in" as a more mandatory phrase, and Member Hughes preferred changing "can" to "may" in terms of accountability.

h. The Chair made the changes, asked for further comment, held a vote, and it passed.

i. On the second observation, the Chair asked whether it was accurate, whether the committee agreed, and whether it added to the argument. Member Greason said it did add to the argument for limiting these issues to federal court. Member Sundhal asked whether the international aspect applied to domestic customers.

j. Member Hughes further commented that the treaties made nations liable for losses, not activities. Dr. Saltman suggested either limiting or changing the word liable. Member Greason supported the concept of liability for certain losses.

k. The Chair made the changes, asked for comment, held the vote, and it passed.

l. On the second finding, the Chair suggested taking out "the" before "spaceflight," but Dr. Saltman said it was important to denote risks associated with the specific spaceflight. Vice Chairman López-Alegría asked why it was limited to the licensee side of launch activity, when the entry activity is equally risky. Dr. Saltman, and then the Chair, agreed.

m. Member Lepore asked whether using the word "any" was overly inclusive. The Chair and Vice Chairman López-Alegría responded that it was designed to move all cases to federal court, and Member Greason said it worked as intended. Chairman Gold even suggested extending the wording to "any and all."

n. The Chair asked for further comment, held a vote, and it passed.

viii. Inclusion of spaceflight participants in third-party indemnification

a. **Recommendation** - COMSTAC recommends that FAA AST work towards modifying CSLA language to specifically include spaceflight participants in third-party indemnification. Spaceflight participants are explicitly excluded

from Federal indemnification, and not listed in law as a party to be protected by the licensee's insurance.

b. Vice Chairman López-Alegría said it was addressing a specific exclusion in the CSLA. Member Hughes described the original legislative history, and summarized the problem as a lack of indemnification for spaceflight participants against third-party claims.

c. Member Karika asked if "work towards" was a strong enough phrase. The Chair suggested having FAA AST modify the rule, but Member Karika disagreed. Vice Chairman López-Alegría asked who the recommendation was really targeted to. Chairman Gold said the recommendation served as COMSTAC taking a position, which the Associate Administrator could cite to when speaking to Congress. In his experience, it was submitted as a finding.

d. Vice Chairman López-Alegría disagreed with a finding, describing it as reporting on something that exists; while a recommendation is the strongest signal that COMSTAC would like to see action on the issue. Chairman Gold characterized his understanding that there was no difference in importance between the categories, but only a reaction requirement from AST. Member Greason suggested standardizing the language in the future to avoid this confusion.

e. Paul Eckert, AST, stated his understanding between the categories, and the fact that the original framework only required a response to recommendations, but the office has in fact responded to all three categories.

f. Chairman Gold suggested moving this discussion to executive committee.

g. The Chair asked for further discussion, held a vote, and the second recommendation passed.

ix. NASA Termination Liability

a. Vice Chairman López-Alegría deferred to Member Precourt, who said this was a very complex issue, especially for commercial launch companies who procure long-lead items for a government customer who then cancels, leaving the purchaser liable for the expense.

b. Member Holder said this was an issue which should definitely be addressed in contracts. Member Precourt agreed, and said he was unsure if the problem statement was fully understood. This included termination for convenience, and the various risk management approaches used, including Department of Defense.

c. Member Precourt concluded this issue warranted further discussion offline, and Member Isakowitz stated he would oppose the current statement because of the lack of understanding of what the problem actually is. Member Greason agreed. Member Karika also had a problem with singling out NASA in the statement, and Member Lepore said there was more to the issue to understand.

d. Member Holder suggested tabling the statement on the issue, and the Chair agreed. The Chair then suggested Member Precourt work up the issue for the

October meeting. Member Precourt suggested an analysis of the change in risk management approaches and appropriated dollars would be good. Chairman Gold said he would also be willing to contribute.

e. The Chair withdrew the statement on this topic, asked for any further discussion, and closed his time.

f. Chairman Gold led a round of applause for the Chair.

III. New Business/Public Comment

a. Chairman Gold opened for comments on new business.

b. Hybrid Vehicles

i. Member Isakowitz suggested the committee study the issue of hybrid vehicles, including the complex jurisdictional issues within the FAA of an air-launch platform for a sub-orbital or orbital vehicle.

ii. Chairman Gold agreed, and asked which Working Group would be best. Member Alexander suggested Business/Legal, and Chairman Gold asked Member Kunstadter to work with him.

iii. Member Greason noted that the issue had "an awful lot of buried mines". Chairman Gold suggested Member Greason help on the topic. Member Garcia said he would also contribute.

c. Center of Excellence

i. Member Lepore suggested looking at the funding issue for the Center of Excellence. Member Alexander presented draft language proposing that AST have a research and development funding line separate from the current operations budget, so it remains in some form despite mandatory sequestration percentage cuts.

ii. Member Holder asked what effect the recommendation would have, and Member Alexander confirmed it would restructure AST's budget. Member Greason was worried a mandatory budget restructuring would further reduce flexibility for AST, and the FAA. COMSTAC Member Christine Anderson, New Mexico Spaceport Authority, agreed and suggested specifying whether this would come from new money. Member Alexander said it did not, but hoped it would lead to more money.

iii. Associate Administrator Nield called on Ken Davidian, AST, to speak. Mr. Davidian said because of the increased level of activity in the industry, it takes up more operations money and leaves less for the Center of Excellence. Because there are no other source of funds from FAA, regardless of the good work the Center does, safety is the first priority for funding.

iv. Member Holder asked whether the FAA could then allocate their funds to a separate R&D line for AST, and Mr. Davidian said with the encouragement of an external advisory committee, they may actually consider that. Paul Eckert again spoke to what COMSTAC can comment on, including the importance of the program, without having to discuss funding.

v. Member Karika observed that in her experience, R&D is always underfunded in government budgets, and is the first item to get cut. However, if it were a separate line, then it would raise the visibility when the program gets cut to zero. She asked whether having this separate line would help.

vi. Dr. Nield stated that Congress has the ability to manage individual lines, and sometimes does. Currently, this is handled under the FAA, and COMSTAC could make the observation of how the FAA is currently handling AST's lines.

vii. Member Karika asked if the FAA would fund a new line without cutting the existing ones, and Dr. Nield said there was no guarantee, but there would be a discussion. The money would possibly come out of the FAA's R&D budget.

viii. Member Anderson clarified the proposal as the FAA should designate some R&D money for AST. And Dr. Nield agreed. Member Alexander concurred on the original intent of the proposal, and observed that Dr. Nield said it would be helpful.

ix. Member Alexander further emphasized that under sequestration, the cuts to R&D could last 10 years, and would hold back research for the commercial space transportation industry.

x. Member Greason disagreed, pointing to AST's job as first and foremost the licensing and permitting agency. Without the industry, the research is pointless, and under the tough budget decisions being made, valuable research is not necessarily more important than other priorities. If there is no more money, than research should not be made co-equal to other lines of spending.

xi. Chairman Gold suggested in the interest of time moving the proposal to a vote. Dr. Nield suggested adding "commercial space transportation line" as part of the R&D that FAA does. Member Isakowitz agreed, based on his experience, that typically in a budget the same amount of money would go to AST no matter the number of lines. Chairman Gold asked Member Alexander to update the proposal's language.

xii. Member Holder voiced concern that the proposal was making changes without knowing what affect they will have, and said he would need to know more about how the FAA budget works before being comfortable.

xiii. Member Alexander responded by relying on Dr. Nield's response that the proposal would be helpful to AST. Member Karika concurred, saying it would at least provide AST with a certain low level of funding, and in her experience, it is helpful to have a separate line.

xiv. Chairman Gold stated that if COMSTAC did not look out for commercial space R&D, no one would. He then moved for a vote. Vice Chairman López-Alegría asked for the final language of the proposal.

xv. **Recommendation** – COMSTAC recommends that in order to assist FAA in accomplishing its mission to encourage, facilitate, and promote a safe commercial space transportation industry, commercial space transportation R&D funding be provided within the FAA's research, engineering and development account to carry out its portfolio of research activities.

xvi. Chairman Gold held the vote, and it passed.

d. Chairman Gold asked for any more new business, and heard none.
e. Chairman Gold asked for any public comment, and heard none.

IV. Conclusion

a. Chairman Gold then asked for a motion to adjourn, made by Member Greason, which was seconded.
b. Chairman Gold moved to closed session, and thanked everyone in the public.

Signed by

Michael N. Gold
Chairman, COMSTAC

COMSTAC Members Present

1. Mike Gold, Bigelow Aerospace, Chairman
2. Michael López-Alegría, Commercial Spaceflight Federation, Deputy Chair
3. Debra Facktor Lepore, Ball Aerospace, Operations Working Group
4. Chris Kunstadter, XL Insurance, Business/Legal Working Group
5. Livingston Holder, Holder Aerospace, Systems Working Group
6. Patricia Cooper, Satellite Industry Association, Export Controls Working Group
7. Eleanor Aldridge, Consultant
8. Brett Alexander, Blue Origin
9. Christine Anderson, New Mexico Spaceport Authority
10. Mark Campbell, M.D., Aerospace Medical Association; Space Medicine Association
11. Daniel Collins, United Launch Alliance
12. Peter Fahrenthold, Northrop Grumman
13. Oscar Garcia, Interflight Global
14. Jeff Greason, XCOR Aerospace
15. Tim Hughes, SpaceX
16. Steve Isakowitz, Virgin Galactic
17. Janet C. Karika, Jacobs-NASA
18. Russ McMurray, Boeing
19. Charles Precourt, ATK Launch Systems
20. Carl Rising, Stellar Solutions
21. Peter Stier, Sea Launch
22. Mark Sundhal, Cleveland State University
23. Berin Szoka, Space Frontier Foundation
24. Will Trafton, Will Trafton & Associates

Federal Aviation Administration Representatives

The Honorable Michael Huerta, Administrator
Dr. George C. Nield, Associate Administrator, Office of Commercial Space Transportation
George Zamka, Deputy Associate Administrator, Office of Commercial Space Transportation

Other Speakers

The Honorable Robert B. Aderholt, Congressman, 4th District of Alabama
The Honorable Steve Stockman, Congressman, 36th District of Texas
The Honorable Charles Bolden, Administrator, National Aeronautics and Space Administration
Tom Culligan, Legislative Director for Congressman Frank Wolf