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COMSTAC

May 15, 2023

Questions can be sent in through: YouTube Live Stream Chat https://youtu.be/9aTnMo03PZU

Agenda

- 1:05 1:15 **Lox/Methane Testing**, Brian Rushforth, Manager, Innovation Division, Commercial Space Transportation (with support from NASA and DoD)
- 1:15 1:20 **Introduction to CSWG**, Dr. Paul Wilde, Office of Operational Safety, Commercial Space Transportation
- 1:20 1:25 **Update on SpARC 440 and 460**, Sabrina Jawed, Manager, Space Regulations and Standards Branch, Commercial Space Transportation
- 1:25 4:25 Discussion and Vote on COMSTAC Observations and Recommendations
- 4:25 4:30 Closing Remarks by DFO
- 4:30 4:35 Closing Remarks by COMSTAC Chair and Vice-Chair
- 4:35 Adjournment by DFO James Hatt



LOX/Methane Testing

Brian Rushforth, Manager, Innovation Division Commercial Space Transportation (with support from NASA and DoD)

May 15, 2023



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Outline *

- Background
- Status
- Next Steps



Background

- Five launch vehicles (LVs) under development use LOX/LCH4 propellant (Starship Super Heavy, New Glenn, Vulcan, Neutron, and Terran 1).
- Established formulas for LOX/LCH4 propellant net explosive weight (NEW) and associated modeling capability do not exist.
- Significant uncertainty in TNT yield equivalent for intact LV impact
 - $\circ\;$ versus total mass; and
 - \circ versus impact speed.



Background (Cont.)

- LOX/Methane is a liquid propellant combination that has several advantages:
 - Launch vehicles can gain altitude and velocity more quickly. This is because LOX/Methane has a higher "specific impulse" than other propellants.
 - More fuel stays in the launch vehicle before launch. Unlike Refined Petroleum-1 (RP-1) and liquid hydrogen (LH), LOX and methane can exist as liquids at similar temperatures and mix to increase its explosivity.
 - Burns cleaner. LOX/Methane also burns cleaner than some other liquid propellants, producing less residue. This can reduce the time and costs when processing reusable launch engines.



Background (Cont.)

- One of the big challenges in using LOX/Methane that they are both "miscible" substances, meaning both can physically mix in liquid form (like alcohol and water). This makes the fuel highly explosive and presents greater risks when fueling the launch vehicle.
- FAA is currently conducting research on the explosive effects of liquid oxygen (LOX) and methane fuel combinations.
 - This research will help ensure the FAA, Department of Defense, NASA, and the commercial space industry have for the first time a statistically valid set of explosive yield data for LOX/Methane propellants.
 - This will ensure consistent safety determinations that will more accurately provide safe launch criteria for public safety, including, for example, Maximum Probable Loss.



Status: FAA Test Effort -



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Status: FAA Test Effort .

- FAA has begun intact impact testing at Dugway Proving Grounds.
- Phase 1: Constant impact velocity with varying mass
 - Includes eight tests: C-4 Calibration, Liquid Nitrogen Inert Drop, and six drop tests of LOX/Methane in containers holding from 500 pounds to 20,000 pounds.
 - First test of C-4 used 1,000 pounds to calibrate sensors.
 - $\circ\,$ Next inert test due last week of May.
 - First test with LOX/Methane planned in June, with additional tests about every three weeks after.



Status: *FAA Test Effort +

- Phase 2: Tests of constant mass with varying impact velocity
 - More technically challenging
 - Will use lessons learned from Phase 1
- FAA will share intact impact test results with USG agencies and LOX/LCH4 vehicle developers
 - Whole of government/industry problem requires nonproprietary data



Status: *DOD/NASA Test Effort,

- DOD and NASA are also concerned about the lack of data on LOX/Methane and potential issues at federal ranges.
- FAA has worked closely with NASA and DOD to ensure that each organization will conduct LOX/Methane R&D that complement each other without overlap.
- DOD/NASA are leading efforts for a multi-year plan.
 - The first efforts are focusing on data to support ground safety and siting; as well as developing models on yields to support federal range safety requirements.
 - Additional testing is intended to reduce conservatism, support risk assessments for unique flight config aspects, and satisfy flight safety analysis requirements





Questions?

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Understanding the Common Standard Working Group (CSWG)

Dr. Paul Wilde, Office of Operational Safety, Commercial Space Transportation

May 15, 2023



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Understanding the Common Standards Working Group (CSWG) and Senior Steering Group (SSG)





- 2. Purpose
- 3. Scope
- 4. Capabilities



Composition

CSWG SSG

- Mr. Kelvin Coleman (FAA/AST-1)
- Mr. Russ DeLoach (NASA OSMA)
- Maj Gen Jeannie Leavitt (DAF/SE)

CSWG Tri-chairs

- Dr. Paul Wilde (FAA)
- Ms. Sandy Hudson (NASA)
- Mr. John Orpen (USSF)

Secretariat

• Ms. Diane Doran (FAA)



Chartered Representatives

- FAA/AST
- NASA-HQ, KSC, WFF
- USSF-HQ, SLD-30, SLD-45
- AF Safety Center (AFSEC)

Invited Participants

- NRO/OSL
- Reagan Test Site (RTS)

Not an all-inclusive list.

Additional agencies/organizations can be admitted with Tri-Chair approval.

CSWG is a USG forum, with industry invited for select meetings.





- Formally chartered the CSWG in 2004 for the purposes of:
 - (1) Protecting the public and critical assets from hazards associated with space launch and reentry events, and
 - (2) Developing and maintaining a stable framework of common safety standards and recommended practices for the space launch industry with appropriate checks and balances, but minimal administrative burden for the U.S. Government and the commercial sector.
 - Common standards and recommended practices provide economies of scale and transparency that are beneficial to the space transportation enterprise.
- The CSWG is *intended to provide timely and efficient coordination between the three agencies without altering or otherwise modifying the roles and responsibilities delineated by statute or national policy* applicable to the DAF, FAA, or NASA.
 - **The CSWG functions exclusively as an advisory body**, not a decision-making authority for operations authorized or conducted by the DAF, FAA, or NASA.
 - Common standards and recommended practices should be applied uniformly to operations authorized or conducted by the DAF, FAA, or NASA unless directed from senior leadership.





- Common Safety Standards Public safety-related requirements, the uniform application of which are recognized as necessary for the safety or regularity of space transportation, which are consistently employed and adopted by the DAF, FAA, and NASA in agency-specific regulations for launch and reentry activities.
 - For example, the FAA codifies common safety standards in 14 Code of Federal Regulations (CFR), advisory circulars, and other identified acceptable means of compliance; at the Eastern Range/Western Range (ER/WR), common safety standards are implemented through DAF or Space Force launch/range safety publications (e.g., appropriate 91-series documents); and for NASA launch and reentry activities, common safety standards are implemented through NASA Agency and local Center policy and requirements documents.
- Recommended Practices Public safety-related requirements and practices, the uniform application of which are recognized as highly desirable in the interest of safety, regularity, or efficiency of space transportation, and to which the DAF, FAA, and NASA will endeavor to jointly employ, adopt, and promote.
- Common safety standards and recommended practices (as defined above) that are purely technical in nature are *intended to apply across the space transportation enterprise: at Federal and non-Federal sites*.



Scope (2) – Subgroups

- Sub-working groups established as needed with Tri-chair approved charters.
- Current and recent sub-working groups are listed below.
- Distance Focused Overpressure (DFO)
 - Improve DFO risk assessments. Coordinate current standards and recommended practices
- Assured Access to Space Explosive Safety
 - Propose improved explosive safety standards related to AATS
- LOX/Methane (collaborating with NESC)
 - Support the development of common safety standards for LOX/Methane
- Nuclear Safety
 - Evaluate if current standards will meet the needs of commercial and USG for space launches

- Probability of Failure
 - Provide common framework for POF analyses
- Reduced Rigor Flight Safety Systems
 - Develop a standardized approach to estimate the reliability of RR-FSS and develop AC 450.143 for FSS

• Airspace Surveillance and Control

Develop options to mitigate potential for launch scrubs due to aircraft intruders within launch hazard areas



The CSWG demonstrated a capability to:

- 1. Provide an efficient interagency review of common standards, including performance based common standards during the development of 14 CFR Part 450 and associated advisory circulars.
- 2. Provide guidance on the proper implementation and tailoring of safety standards and recommended practices with respect to highly reliable flight safety systems (i.e. joint tailoring of RCC 319).
- 3. Consult on the efficacy of new concepts and complex practices intended to demonstrate compliance with common safety standards, e.g. on probability of a launch failure and the explosive hazards of a new propellant.
- 4. Eliminate conflicts with respect to duplication of approvals for safety services performed by a Federal site.
- 5. Develop MOUs, e.g. on resolving requests for relief from common safety requirements
- 6. Monitor decisions and analyze trends regarding requests for relief from common safety standards.

Update on SpARC 440 and 460

Sabrina Jawed, Manager, Space Regulations and Standards Branch, Commercial Space Transportation

May 15, 2023



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Discussion and Vote on COMSTAC Observations and Recommendations

Human Space Flight Task

May 15, 2023



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Discussion and Vote on COMSTAC Observations and Recommendations

1. Given the FAA's Report on Human Space Flight Safety Framework and the RAND report on Assessing the Readiness for Human Commercial Spaceflight Safety Regulations, what recommendations and advice does COMSTAC have on the FAA's report? What recommendations does COMSTAC have for the activities most appropriate for an initial safety framework?



Background.

- Through enactment of the Commercial Space Launch Amendments Act of 2004, Congress established a "learning period" for commercial human space flight activities which prohibited the Secretary, absent death, serious injury, or an unplanned event during launch or reentry that posed a high risk of causing a serious or fatal injury, from promulgating any regulations governing the design or operation of a launch vehicle intended to protect the health and safety of crew and space flight participants until the year 2012.
- Congress has extended the learning period twice, with it currently set to expire on October 1, 2023, absent additional Congressional action.



Background

 The FAA drafted a report to fulfill the Secretary of Transportation's requirement under 51 U.S.C. § 50905(c)(7) to submit a report to Congress that identifies the commercial human space flight (HSF) activities described in 51 USC § 50905(c) and (d) most appropriate for a new safety framework:

Not later than March 31 of each of 2018 and 2022, the Secretary, in consultation and coordination with the commercial space sector, including the Commercial Space Transportation Advisory Committee, or its successor organization, shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report that identifies the activities, described in this subsection and subsection (d) most appropriate for a new safety framework that may include regulatory action, if any, and a proposed transition plan for such safety framework.

 COMSTAC was tasked with reviewing and providing comment to the FAA's draft "Report to Congress: U.S. Department of Transportation Evaluation of Commercial Human Space Flight Activities Most Appropriate for New Safety Framework."



Observations

- The commercial human space flight industry continues to grow in maturity and consistency.
 - Commercial HSF missions are still infrequent and only one operational orbital HSF provider (two commercial SFP missions total) and two suborbital providers have conducted commercial HSF operations.
 - Data on such missions remains limited and based on few and dissimilar vehicle designs.
- The report characterizes the FAA and industry as "ready to implement a new safety framework."
- The report presumes that a "new safety framework" involves transition away from informed consent.



Findings

- COMSTAC does not agree with the FAA's report as written.
 - Commercial HSF stakeholders unanimously agree that a continued learning period is crucial to informing a framework for a robust and safe HSF industry.
 - Some COMSTAC members prefer to transition toward regulation although not in FY24 at the current expiration of the learning period.
- COMSTAC supports the ongoing development of industry consensus standards and encourages participation in those efforts.
- The metrics and methodologies used by the FAA to determine the readiness of industry and the FAA to implement a new safety framework are unclear and require further substantiation.



Recommendations

- The FAA should detail how it analyzes the readiness indicators outlined in the report and provide more thorough substantiation of the agency's findings regarding the industry's readiness to implement.
- The FAA should continue to encourage current efforts to develop industry consensus standards through the devotion of resources and incentives for operators to participate.
- The FAA should prioritize updating the 2014 Recommended Practices for Human Space Flight Occupant Safety document, including COMSTAC review, prior to taking further action.
- The FAA should continue collaboration with COMSTAC and industry partners to determine the HSF SpARC's scope, participants, and pace.
- Should additional activity be required with respect to HSF, the FAA should seek additional resources.
- In a limited resource environment, the FAA should ensure that activities in this area should not negatively impact the FAA's ability to manage the current and expected increase in launch and reentry licensing activity and other current statutory duties of the office.



Discussion and Vote on COMSTAC Observations and Recommendations

Regulatory Working Group: STEM Task

May 15, 2023



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Discussion and Vote on COMSTAC Observations and Recommendations

2. How can the FAA partner with industry to increase and encourage greater diversity and participation in STEM education supporting the growing need in the commercial space workforce? Provide a white paper or other report with recommendations, findings, and/or observations.



To encourage greater diversity and participation in STEM education, the COMSTAC working group developed the following recommendations for the FAA to consider:

- Work closely with National Space Council and its member agencies to speak with a unified voice and minimize duplication:
 - Ensure harmonization between The Department for Transportation (DOT) STEM workforce efforts and the White House-led Space Industry Skilled Workforce Coalition.
 - Create a space workforce messaging portal and newsletter to notify STEM workforce partners of opportunities.
 - Facilitate participation from historically excluded academic communities at space conferences and workshops.



Work with Industry to:

- Establish a mechanism for industry inputs into the DOT-related tasks of the Interagency Roadmap to Support Space-Related STEM Education and Workforce.
- Establish executive-level workforce development officers to build strong local and regional STEM workforce pipelines, including developing regional postsecondary STEM internship programs.
- Allow designating of FAA-licensed spaceports as regional education hubs to support programs and promote space industry activities for students early in their education.



COMSTAC Recommendation #3

Work with Middle Schools, High Schools, Universities, and Student Organizations to:

- Highlight space industry jobs available and identify academic and extracurricular points of engagement within FAA AST.
- Extend the Department of Labor's Space-focused Apprenticeship Accelerator model to not only promote areas of research interest to FAA AST, but to also support the space industry's workforce pipeline directly, like the U.S. Space Force University Partnership. This pipeline should emphasize the employment of historically excluded communities in commercial space transportation.



Discussion and Vote on COMSTAC Observations and Recommendations

Safety Working Group Voluntary Consensus Standards

May 15, 2023



FAA Commercial Space Transportation faa.gov/space The FAA would like the COMSTAC's recommendations on:

- 1. How the FAA can measure the implementation of voluntary consensus standards developed within Standards Development Organizations in the U.S. commercial space industry.
- 2. The ways the FAA can encourage the development of industry consensus standards as a means of compliance for performance-based safety requirements.



Background

- The CSLCA of 2015 required the FAA to submit reports on the progress of the commercial space industry in developing voluntary industry consensus standards that promote best practices to improve industry safety.
 - Required an assessment on the general progress of the industry in adopting voluntary consensus standards.
- In its 2022 report, the FAA found that while it was encouraged by the increasing availability of industry standards, it was unclear the extent to which the industry is incorporating voluntary standards into commercial space operations.
 - The RAND Corporation reported in their 2023 Congressionally mandated independent report, that although some standards related to participant safety exist, companies have yet to clearly or consistently adopt them in a manner that can be confirmed or verified publicly.



The FAA would like the COMSTAC's recommendations on:

- 1. How the FAA can measure the implementation of voluntary consensus standards developed within Standards Development Organizations in the U.S. commercial space industry.
- 2. The ways the FAA can encourage the development of industry consensus standards as a means of compliance for performance-based safety requirements.



Tasker 1: Observations

- As the industry continues to contribute significant time and effort in developing human spaceflight (HSF) standards, several factors continue to impact standards development, including:
 - Limited crewed flight data
 - Identifying commonalities with the industry's diverse vehicles and operations
 - Competing demands on company resources and priorities
 - Contractual requirements for NASA Commercial Crew missions
- There are several HSF standards published, with more currently under development.
- Many HSF operators reference government standards or guidance materials related to HSF safety.
- As the industry works diligently in developing standards, it is still taking actions above and beyond what is available or required to ensure the safety of its operations, although it may be difficult to



Tasker 1: Findings

- Being able to measure the implementation of voluntary consensus standards is important to demonstrate the improved safety outcomes and innovative safety solutions that an industry-led safety framework can produce.
- Evaluating the implementation of standards can improve safety performance by providing the industry and the government with valuable insights, such as:
 - The effectiveness and quality of the standards developed
 - How well the developed standards achieve the FAA's interest in protecting public and occupant safety
 - The applicability of developed standards to unique new technologies
 - How to avoid duplication of efforts with other government standards or requirements
 - Guiding the development of additional voluntary consensus standards
- Assessment should not only evaluate whether standards are being implemented, but should collect feedback to understand:
 - The degree to which a standard is implemented in a company's operations
 - What benefits or burdens did implementing a standard create
 - What lessons were learned by implementing a standard
 - What other government or industry standards and guidance materials being used in place of voluntary consensus standards



Tasker 1: Recommendations

- FAA should conduct a voluntary, non-attributable survey with the industry to assess the implementation of developed voluntary consensus standards.
- FAA should conduct the survey <u>after</u> working with the industry to identify and develop an initial set of high-priority HSF standards to provide a more comprehensive baseline for the survey assessment.
- Should the FAA conduct the survey prior to the completion of a more complete set of standards, the survey should assess the implementation of contractually required government standards or other practices being used by a company in addition to published consensus standards.



The FAA would like the COMSTAC's recommendations on:

- 1. How the FAA can measure the implementation of voluntary consensus standards developed within Standards Development Organizations in the U.S. commercial space industry.
- 2. The ways the FAA can encourage the development of industry consensus standards as a means of compliance for performance-based safety requirements.



Tasker 2: Observations

- The FAA and COMSTAC have long recognized the important role that the development of voluntary consensus standards can play to:
 - Improve the safety of the commercial spaceflight industry as a whole
 - Help provide a baseline for compliance with potential future regulations covering human spaceflight once the industry has reached sufficient operational cadence and technological maturity
- With more than 100 active members from industry, government, and academic stakeholders, ASTM's F47 Committee continues to serve as the lead SDO responsible for the development of HSF voluntary consensus standards.
- FAA has a long history of utilizing voluntary consensus standards as a means of compliance for performance-based frameworks and HSF industry standards, such as those developed by ASTM, can provide best practices that can serve as a means of compliance for future performance-based regulations.



Tasker 2: Findings

- Focusing industry standards development efforts into one SDO with the most active industry involvement is important to avoid disjointed efforts, duplicative or conflicting standards, and increased workload for all parties.
- Increasing FAA's participation in, and resource commitment to, ASTM's F47 Committee can accelerate and encourage the development of industry consensus standards.
- There is a need for the FAA to provide guidance on how it plans to review and accept voluntary consensus standards that can be used as means of compliance.
- The objectives of any future performance-based requirements should be clear to both operators and regulators and the means of compliance should provide certainty to operators that implementation of voluntary consensus standards will achieve the requirements' objective.
- Utilizing government standards and unique means of compliance developed by an individual applicant can:
 - Avoid duplication of efforts and redundant requirements for operators who are contractually required to follow other government standards; and
 - Help account for diverse levels of operator experience and types of systems, which will support the continued development and innovation of the industry.



Tasker 2: Recommendation

- The FAA should focus and increase its participation in the ASTM F47 Committee to guide, develop, and assess standards development efforts.
 - To guide efforts, the FAA should:
 - Play a more active role in strategic planning with ASTM F47 Committee, including the Standards Road-mapping Subcommittee.
 - Aggregate its knowledge of launch operators' safety frameworks to recommend areas of high commonality that might lead to streamlined development of standard.
 - Evaluate the skillsets of its existing and planned resources against a standards roadmap and provide feedback as to where developing standards may help bolster any gaps in expertise.
 - To support development efforts, the FAA should:
 - Continue to provide technical feedback on standards that have been developed or are currently under development and participate in the balloting process.
 - To assess standards, the FAA should:
 - Assess the completeness of standards to serve as a means of compliance and provide guidance on how it will review and accept standards as a means of compliance.



Tasker 2: Recommendation

- Should seek COMSTAC's feedback on the updated Recommended Practice for Human Spaceflight Occupant Safety document to enable COMSTAC to identify how the document may be used to support strategic planning for standards development.
- As the SWG continues to review its recommendation for how voluntary consensus standards can be used as a means of compliance with performance-based requirements, initial findings are that:
 - In addition to industry standards, means of compliance for future performance-based requirements should include government standards and other unique means of compliance developed by an individual applicant.



Report to the Commercial Space Transportation Advisory Committee of the Innovation & Infrastructure Working Group

Maj Gen Ed Bolton, ret. Innovation & Infrastructure WG Chair Melanie Preisser, Co-Chair

May 15, 2023



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Overview

- Review of Innovation and Infrastructure WG Task
- Our Responses and Observations
- Our Findings and Recommendations
- Innovation & Infrastructure WG Members



Review of Innovation & Infrastructure WG Task

How can the current approach to flight authorization and the decision process to adjudicate access to government-provided range services be modified to better facilitate launch operations & launch range operations. How does this impact the transition to spaceports?

Please provide information and perspectives on ongoing materials and resource related issues that are negatively impacting launch operators/launch operations, launch range operations and the transition to spaceports.

Are these issues also negatively impacting timely launch operations, reentry licensing, and economic development? If so, please discuss the impacts and implications.

What specific recommendations can the working group provide the FAA to address concerns and mitigate risks associated with the current oversight approaches and the issues the team identified?



Observations: Flight Authorization & Decision Processes for Govt-provided Range Services

- State and private spaceports should have more access to government-provided range supplies and services, and the opportunity to participate in regular coordination regarding national spaceport strategy, planning, or operations
- Federal funding of govt-provided launch infrastructure inadvertently competitively disadvantages state and private spaceports due to disadvantaged access to government-provided range supplies and services.
- The USG is doing a fair job of improvising and adapting to meet commercial demands, but there is a limit to their efficacy and efficiency. The provision of commodities and services to state and private spaceports are not core to the mission of the USG ranges.
- USG regulatory approvals can delay the "first mission" of new vehicles coming to the launch ranges. This includes coordinating launch licenses, meeting range safety requirements etc., which can take months.



Observations: Materials and Resource-related Issues

- There is currently no federal program to provide funding for space-related infrastructure, such as spaceports.
- Being beholden to limited government-provided launch infrastructure is becoming a bottleneck. The number of private launch service providers today is saturating the capabilities and capacity of government-provided launch infrastructure.
- As private space transportation capabilities mature and launch rates increase, there will be corresponding pressure on commodities supply, production throughput, and timely availability.
- The workforce demands of the 2nd, 3rd, and 4th tier suppliers is also growing, a threat that is not being adequately addressed.



Observations: Materials and Resource-related Issues Impacts

- The need for more licensed spaceports in the future will necessitate both streamlined licensing processes and additional resources, in order for the government to provide timely regulatory action as new customers emerge.
- Private launch service providers may seek alternative launch bases as infrastructure and facility construction delays and commodity shortages adversely affect schedules and increase cycle times at federal launch ranges.
- Federal launch ranges have priority for materials and commodities because they are designated as national assets. The limited access to materials and commodities can slow the pace of launch for state and private spaceports and their customers. This is potential constraint to spaceports' potential role as critical infrastructure for assured access to space and stronger resiliency for national security.



Innovation & Infrastructure WG Findings & Recommendations (1)

Findings:

- Shortages, delays, and cumbersome approval procedures impact state and private launch providers more severely since they are not given priority at US ranges
- Designating state and private ranges as "critical launch infrastructure" may level the playing field and provide additional launch capability
- Decreasing reliance of state and private launch providers on the USG may improve efficacy and efficiency of US launch capabilities (federal, state, and private)
- State and private spaceports have limited opportunity to participate in regular coordination regarding national spaceport strategy, planning, or operations



Innovation & Infrastructure WG Findings & Recommendations (2)

Recommendations:

- FAA/AST provide update on efforts to streamline licensing, range safety approvals and other processes
- FAA/AST brief results from National Spaceport Interagency Working Group and solicit state and private spaceports' participation and feedback
- US Space Force brief results of federal ranges supply chain study
- FAA/AST brief National Space Council on launch infrastructure and facility construction delays and commodity shortages and proposed initiatives to address space-related infrastructure shortfalls



Innovation & Infrastructure Working Group

Chair	Major General Edward Bolton, Retired
	Ms. Melanie Preisser
Co-Chair	EVP, York Space Systems
	Mr. Dale Ketcham
	VP of Govt & External Relations, Space Florida
	Major General Roosevelt (Ted) Mercer, Retired
	CEO, Virginia Space
	Dr. George Nield
	President, Commercial Space Technologies



Discussion and Vote on COMSTAC Observations and Recommendations

Regulatory Working Group Part 450

May 15, 2023



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RWG Task #2

Identify any requirements in 14 CFR Part 450 that COMSTAC believes require additional clarification by the FAA or a regulation change. If regulation changes are recommended, provide recommendations on how the FAA should prioritize a part 450 rulemaking in comparison to rulemakings on financial responsibility (part 440) and the operation of launch or reentry sites (part 420 and 433).



Background

- The FAA published the final rule, *Streamlined Launch and Reentry License Requirements*, adopting the Part 450 regulations, on Dec. 10, 2020 (85 Fed. Reg. 79739).
- The effective date for the rule was March 10, 2021. Existing license holders were given until March 10. 2026, to convert to a Part 450 license.
- Part 450 was drafted to replace "many prescriptive regulations with performance-based rules, giving industry greater flexibility to develop means of compliance that meet their objectives while maintaining public safety."



Observations

- 4 Vehicle Operators Licenses (VOLs) have been issued to date.
- The FAA licensed and permitted 74 launches and reentries in 2022; only 1 was under Part 450.
- The FAA has issued 15 Advisory Circulars (ACs) providing guidance on Part 450 compliance.
- Dozens of applications are under review by the FAA.



Observations

- FAA has exceeded the 180 day statutory timeframe for license issuance under Part 450 despite using its tolling authority.
- Vehicle operators identified a variety of issues with the requirements in Part 450 and its implementation.
- The FAA is requesting \$42 million for FY 2024, a \$4.4 million increase over FY 2023 enacted. The budget request includes funding for 20 additional full time employees (FTEs).



Findings

- The publication of Advisory Circulars is important to applicants' understanding and compliance with Part 450.
- No vehicle can launch or reenter at a spaceport without a vehicle operators license. A spaceport license does not authorize launch or reentry operations.
- Applicants report that instead of allowing for diverse approaches that were tailored to the vehicle or operations, FAA has applied Part 450 in a manner that has driven applicants toward strict requirements and, in some cases, placed limits on their operations with no public safety benefit.



Findings

- Applicants report that Part 450 subjects reentry applicants to numerous requirements that are not applicable or appropriate to reentry operations.
- The FAA and licensees would benefit from process improvements that reduce application review timeframes and increase transparency.
- As the FAA receives an increasing number of applicants and existing licenses transition from existing licenses to Part 450, delaying the perfection of Part 450 will be damaging to operators' ability to deliver capabilities for their customers and contribute to the growing US space economy.
- Delaying the perfection of Part 450 will be damaging to operators' ability to deliver capabilities for their customers and contribute to the growing US space economy.



Recommendations

- Ensure that Advisory Circulars are accurate and accommodate variations in vehicle complexity and prevent regulatory burdens with no public safety benefit.
- ACs should make distinctions between launch and reentry when differences exist.
- The FAA should revise Part 450 to address challenges with requirements that are distinct to launch or reentry.
- Similarly, ACs should distinguish between launch vs. reentry license requirements or at least include distinct sections discussing the difference in applicability of many of the regulations.
- The FAA should provide more transparency into the software and analysis tools that have been accepted for use. That information would offer new applicants the ability to efficiently develop a plan for developing their means of compliance for Flight Safety Analysis, toxic release analysis, etc.



Recommendations

- The FAA should also develop and implement a change control process for technical standards. That process should account for the impact of changing technical standards during an ongoing licensing effort.
- A review of Part 450 implementation should include identification of key roles and expertise within the FAA required to evaluate license applications in a performance-based framework.
- The FAA should prioritize Part 450 clarification and reforms to ensure that it is prepared to efficiently and effectively manage an increasing number of applicants and existing licenses transitioning from existing licenses to Part 450.



Public Comments

May 15, 2023



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Closing Remarks James Hatt, DFO, Commercial Space Transportation

May 15, 2023



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- COMSTAC and FAA have discussed the creation of a Lessons Learned Database for several years.
- Due to few operators and their vehicles being so unique, possible identification, even through an anonymous reporting system, was a major concern (June 2018 COMSTAC).



 "If the proposal for the LLIS is supported by the industry, we envision that this information system would provide de-identified safety lessons learned which are common across the industry from previous mishaps. The FAA would also provide an opportunity for the industry to voluntarily submit general nonmishap related lessons learned to the FAA. The FAA would plan to make this information available to the public via our website." (AST response to NTSB Safety Recommendation A-15-26)



Timeline

- 2015 initiated an implementation plan but put it on hold
- Spring/Summer 2023 updating the previous plan to include obtaining approval of form to be used by industry to submit lessons learned
- Summer 2023 providing the draft plan to COMSTAC for review, advice and recommendations on implementation
- Winter 2023 implement the LLIS



- FAA is developing a plan to initiate an LLIS database
 - Initially, the database would be populated with items from AST – from licensing inspections, and mishap investigations. This information would be de-identified and provide broadly applicable lessons learned.
 - Industry will be invited to voluntarily submit their own lessons learned, in a manner that protects proprietary information via an OPM approved form.



Closing Remarks

- Compliance & Enforcement Workshop on Monday, July 10, 1pm – 3pm EDT contact us at ASTOperations@faa.gov
- Next COMSTAC
 - November 7 & 8, 2023, in person.
 - Location: TBD

