
FAA
Commercial Space Transportation
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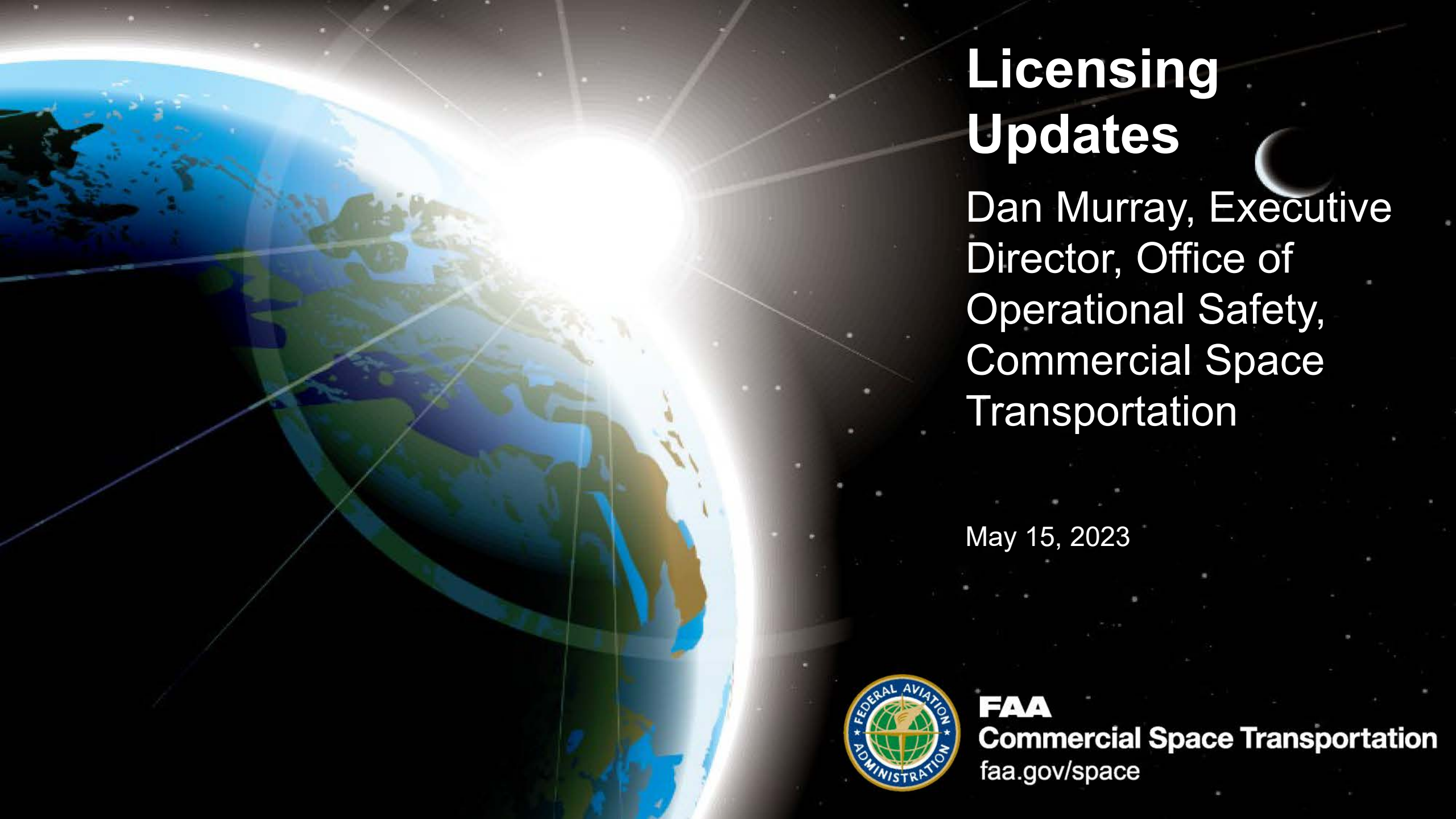
COMSTAC
May 15, 2023
Questions can be sent in through: YouTube Live Stream Chat
https://youtu.be/CAmwyiNasCc

- This meeting is being held pursuant to a notice published in the Federal Register on April 28, 2023. The agenda for the meeting was announced in that notice, with details as set out in the agenda posted on the COMSTAC website. I am the Designated Federal Officer responsible for compliance with the Federal Advisory Committee Act, under which the meeting is conducted. It is my responsibility to see to it that the agenda is adhered to and that accurate minutes are kept. I also have the responsibility to adjourn the meeting should I find it necessary to do so in the public interest. Only Commercial Space Transportation Advisory Committee (COMSTAC) members may participate in any discussions and vote on matters put to a vote by the Chair. There are some updates to the agenda which have been posted. I have approved those changes at the request of the Chair.

Agenda

- 10:00 – 10:04 Welcome remarks by DFO, James Hatt.
- 10:05 – 10:14 COMSTAC Chair Opening Remarks and Introductions
- 10:14 – 10:16 COMSTAC Chair Introduction of FAA Administrator
- 10:16 – 10:21 FAA Administrator Remarks
- 10:21 – 10:22 COMSTAC Chair Introduces FAA Associate Administrator Kelvin Coleman (AST-1)
- 10:30: **Policy Updates**
- 10:30 – 10:40: Licensing Updates Dan Murray, Executive Director, Office of Operational Safety, Commercial Space Transportation
- 10:40 – 10:50: National Airspace Integration Duane Freer, Manager, ATO Space Operations.
- 11:10 – 11:20: IWG on National Spaceport Strategy Pam Underwood, Director, Office of Spaceports, Commercial Space Transportation 2
- 11:20 **Transition to Invited Speakers**
- 11:21 – 11:35: ASTM F47 SDO Update Michael Lopez-Alegria, Chief Astronaut, Axiom Space
- 11:35 – 11:50: RAND Corporation Briefing on the Independent Assessment Report to Congress Benjamin M. Miller, Economist, RAND Corporation
- 12:30 – 12:45 **NSSL Phase 3, Range of the Future Plans, and Range Updates**, Major General Stephen Purdy, United States Space Force



Licensing Updates

Dan Murray, Executive Director, Office of Operational Safety, Commercial Space Transportation

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National Airspace Integration

Duane Freer, Manager,
ATO Space Operations

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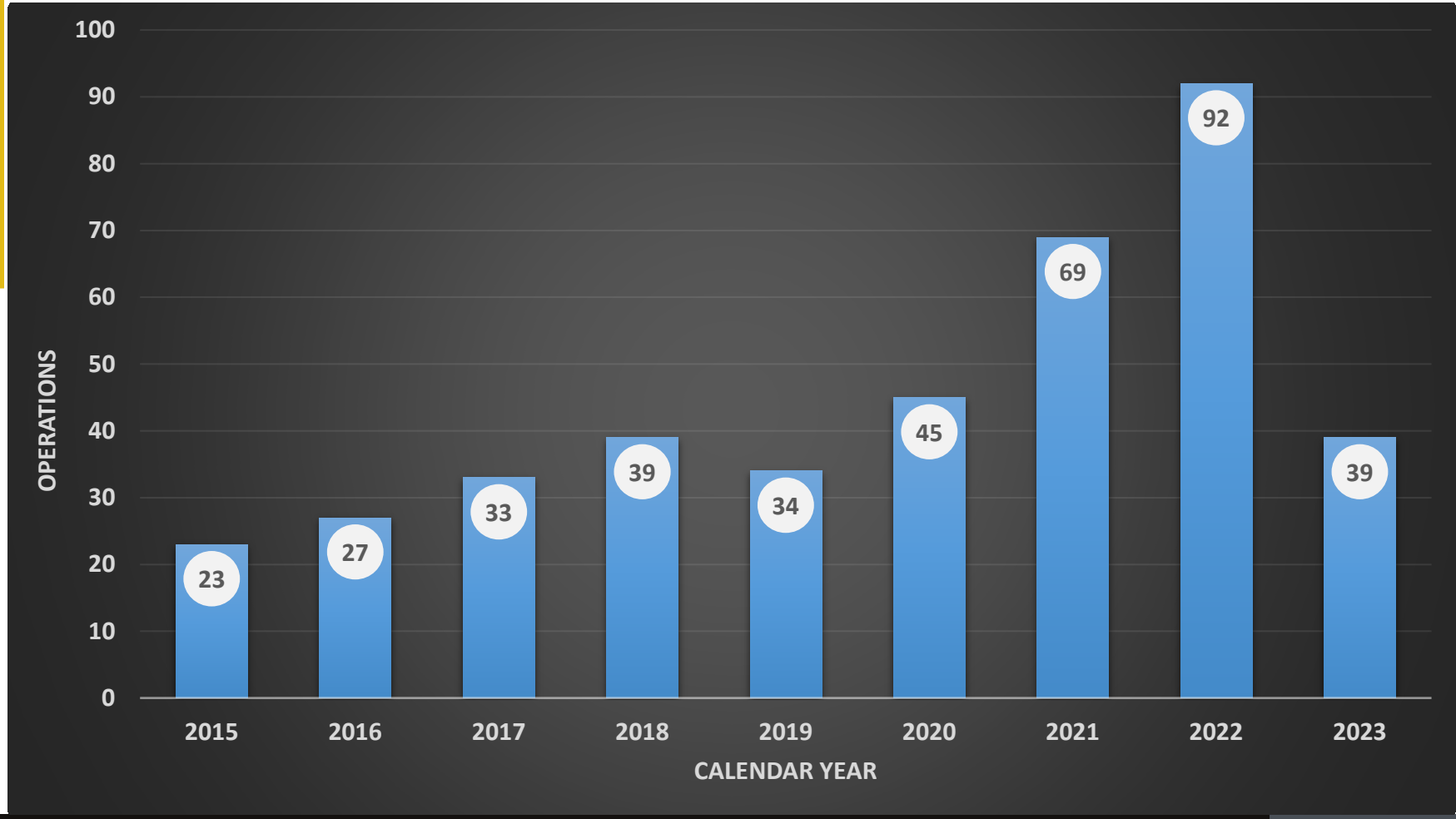
ATOSysOps

COMSTAC

May 15, 2023

Total Operations by Calendar Year

ATOSysOps



ATOSysOps

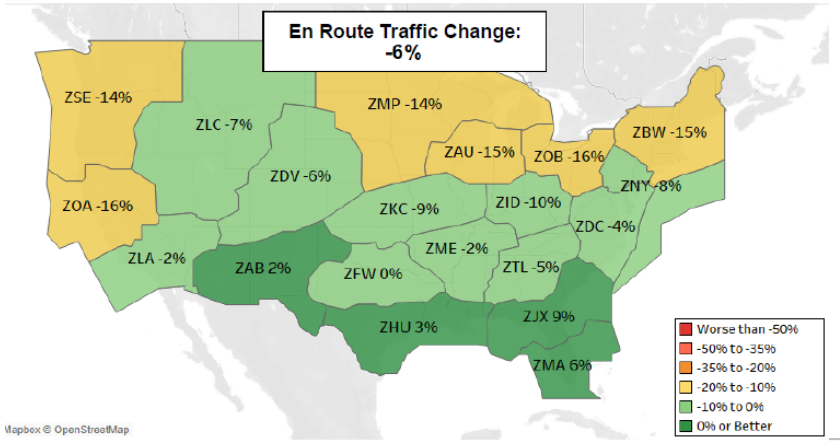
Focus on Florida

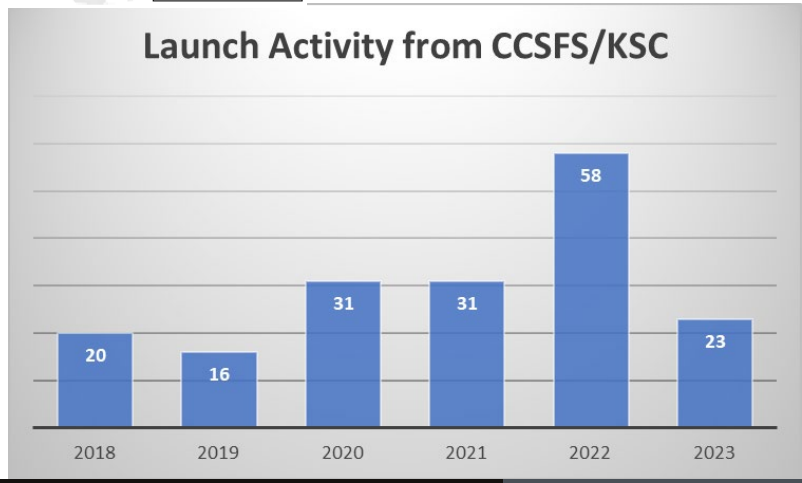
ATO Space Operations

Focus on Florida

Post COVID

- Historical trends **November through April** represent elevated aviation demand in the Florida and Caribbean market **“Snowbird Season”**
- **Beginning in December 2021**, traffic volume began increasing in Florida market due to **shifting travel patterns and demand**
- **Demand exceeds pre-COVID numbers**
- **Launch demand at Cape Canaveral Space Force Station (CCSFS) and Kennedy Space Center (KSC)** also experiencing unprecedented demand.
- **Scrubbed launches** are a significant concern

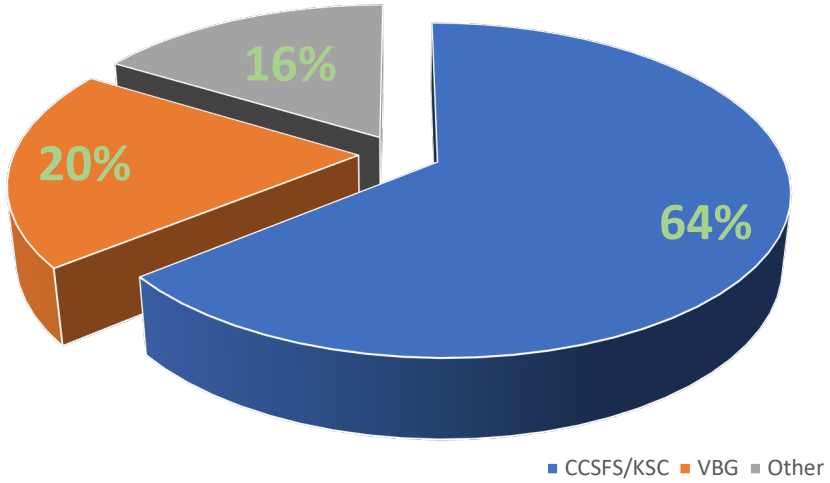




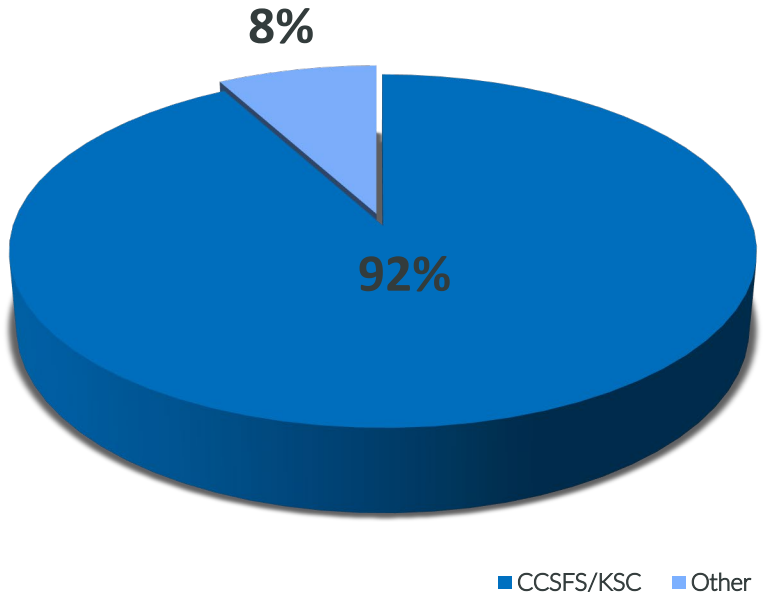
Focus on Florida

ATOSysOps

2022 U.S. Launch and Reentry Activity



2022 U.S. Launch and Reentry Affects on Aviation



LAUNCH EFFICIENCY EFFORTS

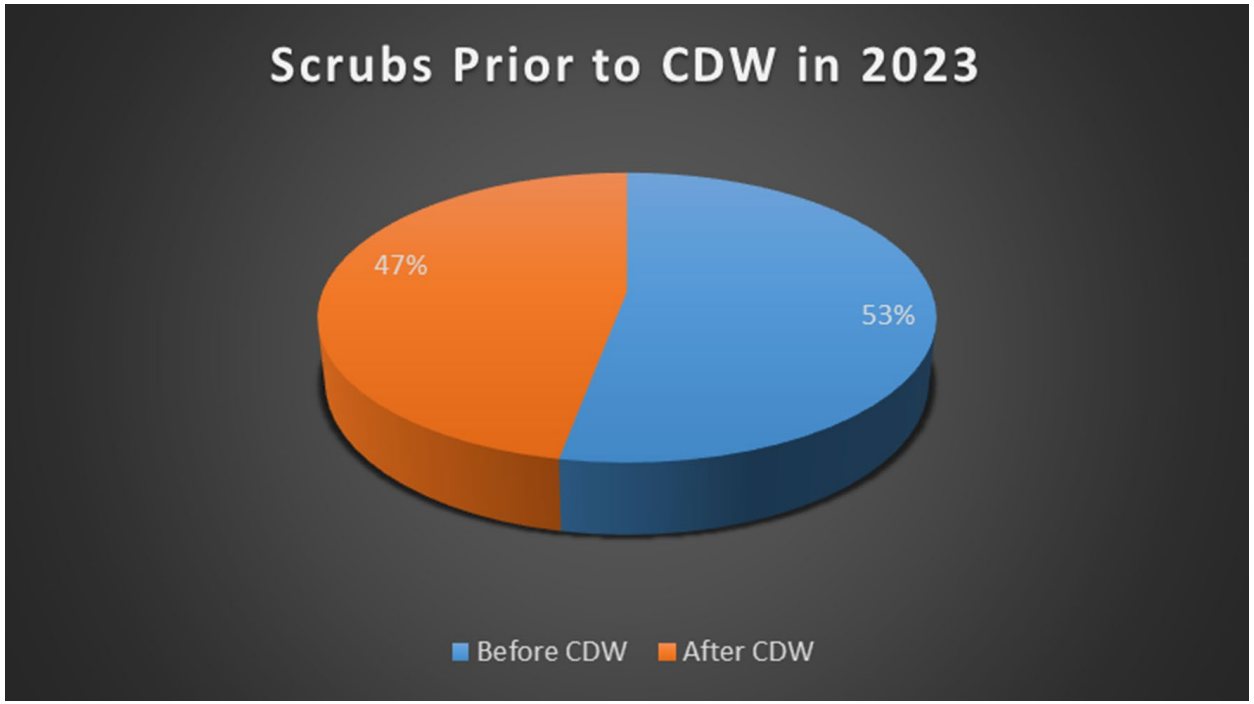
- ✓ Real time release of hazard area airspace (2018)
- ✓ Time Based Launch Procedures (2020)
- ✓ Dynamic Launch and Reentry Windows (2020)
- ✓ Space Data Integrator (2021)
- ✓ Collaborative Mission Planning (2021)
- ✓ Critical Decision Windows (2022)
- ✓ Cape Canaveral/Kennedy Space Center Playbook Routes (2022)
- ✓ Hazard Area Calculation Improvements (2022)
- ✓ Airspace Management (2023)

Focus on Florida

CRITICAL DECISION WINDOWS

Goal: Eliminate lost capacity due to scrubs

- **2021** CDWs introduced at Pacific Spaceport Complex Alaska to encourage scrub decisions prior to PACOTS route structure publication
- **2022** CDWs introduced at all launch locations



Focus on Florida

Overview

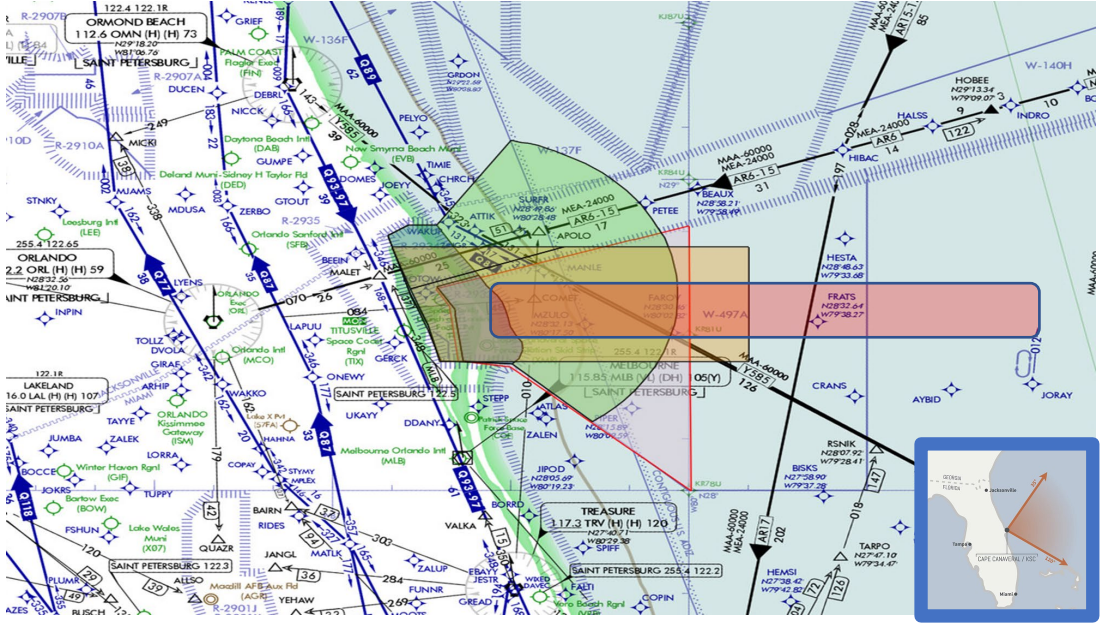
Partial clamshell (91.143 TFR) in an effort to **leave AR6-15 open**

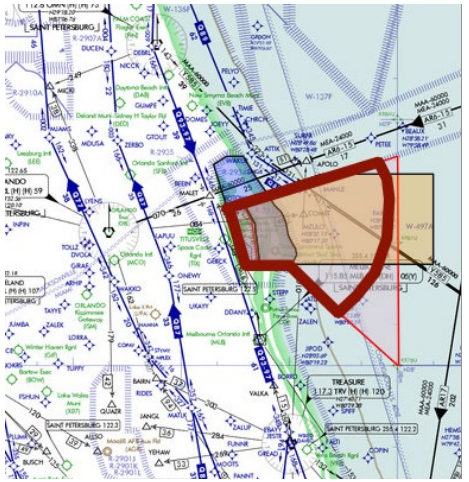
Revised airspace management will apply to missions on easterly to southerly trajectories **(84% of missions since 11/1/2022)**

- 10-12 aircraft per hour
- 5-10 minutes extra flying time per flight
- 25-50 extra miles flown per flight

3 hour window impacts

- Number of aircraft: 30-36
- Extra minutes flown: 150-300 extra minutes flown
- Extra miles flown: 750-1500 extra miles flown
- Passengers impacted: 3,600-4300





CDM General Session

IWG on National Spaceport Strategy

Pam Underwood,
NSIWG Chair; Director,
Office of Spaceports,
Commercial Space Transportation

May 15, 2023

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NSIWG Formation

- FAA announced formation of the group at 2022 FAA Conference on February 15, 2022
- NSIWG conducted 2 planning meetings to prepare group objectives and charter
- NSIWG officially kicked off with signature of the charter on June 2, 2022

NSIWG Member Agencies

- FAA
- NASA
- Space Force
- Department of Defense
- Department of State
- Department of Commerce

Charter

Goals of the National Spaceport Interagency Working Group:

- Maintain U.S. leadership role in commercial space transportation
- Develop a strategy for a resilient, interoperable network of spaceports to meet national objectives
- Collaborate on policies and standards for spaceport utilization
- Advocate for resources and programs to enhance and promote U.S. spaceport infrastructure

Initial Objectives

1. Establishment of a comprehensive NSIWG Action Plan focused on defining spaceport strategy and policy, commensurate with meeting U.S. strategies for space
2. Develop a plan for a spaceport infrastructure grant program and alternative investment opportunities in spaceports
3. Establish and advocate for common terminology, standards, and infrastructure

Initial Objectives

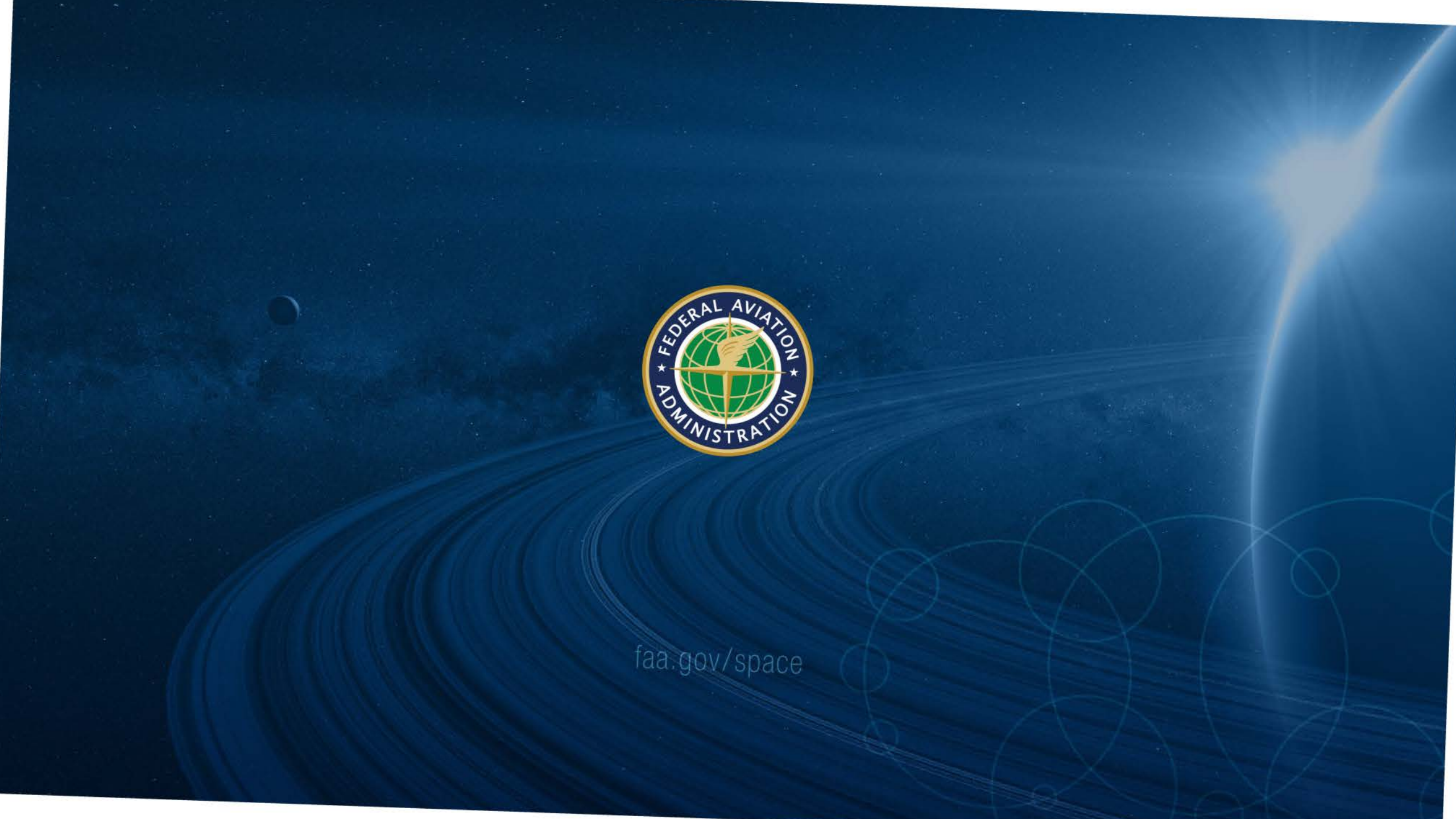
4. Analyze the relationship between federal spaceports, state/local spaceports, and private spaceports, as well as best practices and lessons to be learned in spaceport operation and integration
5. Identification and pursuit of opportunities associated with technologies, investment methods, and international partnerships
6. Study the best economic approach to increase launch cost-effectiveness

Current Challenges

- Aging and inadequate infrastructure
- Congestion
  - Scheduling conflicts & prioritization with airspace and maritime users
- Capacity
  - Lack of sufficient vertical launch sites and engine test sites
- Government policy, funding and lack of proper legislative authorities
  - Excess capacity model, redundancy in government approvals, duplication of efforts
- International leadership

Engagements with Industry

- In September 2022 the NSIWG held a 3-Day focused Industry Summit where we engaged with spaceport directors, staff and launch service providers to discuss the work the group was doing and receive feedback
  - Met with 10 Spaceports
  - Met with 9 Launch Operators
- NSIWG Follow-up Industry Summit planned for June 2023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ASTM 47 SDO Update

Michael Lopez-Alegria,
Chief Astronaut, Axiom Space

May 15, 2023

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U.S. Legal and Policy Framework

National Technology Transfer and Advancement Act of 1995 (NTTAA)

- Requires federal government agencies to use standards developed by voluntary consensus standards organization, when possible
- Encourages federal government agencies to participate in standards development organizations

"…all Federal agencies and departments shall use technical standards that are developed or adopted by voluntary consensus standards bodies, ….and shall, …participate with such bodies in the development of technical standards."

OMB Circular No. A-119

- Reinforces goals of the National Technology Transfer and Advancement Act
- Discourages federal agencies from using government-unique standards
- Clarifies that agency representatives can participate, vote, and even lead activities

"A voluntary consensus standards body is defined by the following attributes: (i) Openness. (ii) Balance of interest. (iii) Due process. (vi) An appeals process. (v) Consensus"

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Committee F47 on Commercial Spaceflight

- Formed in 2016 with support/interest from CSF and other industry stakeholders
- More than 130 members
- Eight (8) sub-committees (with growth plans)
- Seven (7) published standards (15-20 in pipeline)
- Full committee meets twice/year in-person
- Executive Committee meets monthly
- Task groups hold bi-weekly to monthly meetings to develop standards

Current Structure

F47.01 Occupant Safety
F47.02 Unoccupied Orbital Vehicles and Operations
F47.03 Launch & Reentry Vehicles
F47.04 Spaceports
F47.05 Cross-Cutting
F47.90 Executive Committee
F47.91 Terminology
F47.92 Standards Roadmapping
F47.93 Liaison

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Committee F47 Priorities

- Goal -- safe launch, reentry and missions with data driven shared best practices for learned improvements and innovation

- Coordinate with FAA on spaceflight regulations, Advisory Circulars and commercial standards that can serve as alternative means of compliance

- Develop and promulgate commercial human spaceflight (HSF) safety standards and other standards that will enable the commercialization of LEO & beyond

- Share best practices and consensus guides with industry, academia, other standards organizations, Congress, and the Executive Branch and its departments / entities such as NASA, DOC, DOS and DOD

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ASTM F47 – Stakeholders / Members

Broad Representation

–Vehicle operators and parts manufacturers

–Regulators / Other USG users & advisory groups

– National Air Space (NAS) users

– Spaceport operators

– Medical professionals

–Other interested stakeholders

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F47 Standards Development Phases

Phase 1

Start-up, Learn, Recruit, Respond to User Pull, Coordinate

- Learn “ASTM Way”
- Organize the Committee & Sub-committees
- Identify Early Standards to Produce (“User Pull”)
- Coordinate with Admin., Industry/Orgs, other SDOs
- Recruit SMEs

Phase 2

Accelerate, Grow, Address HSF & “End of Learning Period”

- Respond to industry needs for creation of safety framework
- Engage with FAA-AST, NASA, & industry on HSF
- Eval FAA HSF Recommended Practices, NASA Crew Reqs, & map to candidate standards
- Congressional Coordination

Phase 3+

Expand, Means of Compliance, Enable LEO Commercialization

- Re-organize to meet more new challenges & needs
- Enable sustainable LEO & beyond operations:
  - Rules of road, active debris removal, end of life/disposal
  - SSA/STC & Space Operations
  - Habitats, exploration, resource utilization related standards

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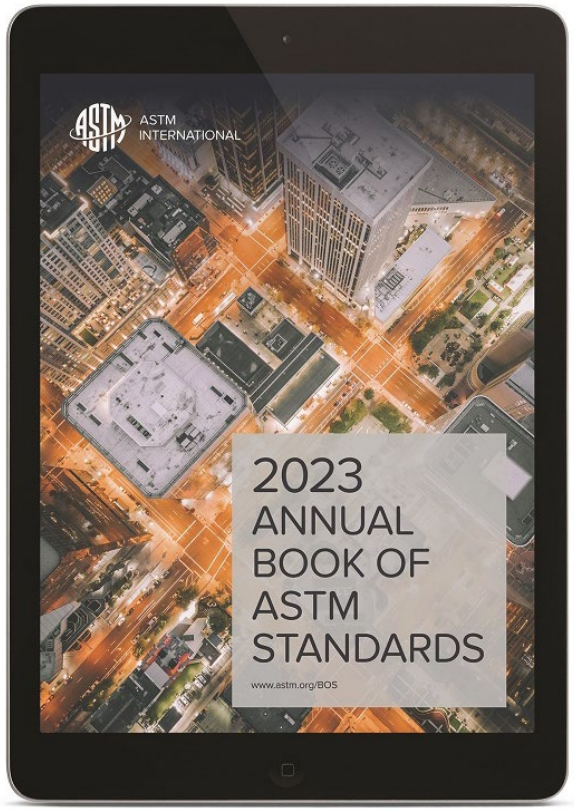
SDO = Standard Development Organization, SME = Subject Matter Expert, HSF = Human Space Flight

Published Standards (Primarily Phase 1)



Published Standards (Abbreviated Names)

– F3344 Storage, Use, and Handling of Liquid Rocket Propellants

– F3377 Terminology for Commercial Spaceflight

– F3479 Failure Tolerance for Occupant Safety of Suborbital Vehicles

– F3514 Space Data Exchange to Integrate Space Ops into NAS

– F3520 Training/Qualification of Safety-Critical Space Ops Personnel

– F3550 Classifying Safety-Related Events

– F3610 Standard Practice for Descriptions of Spaceport Capabilities

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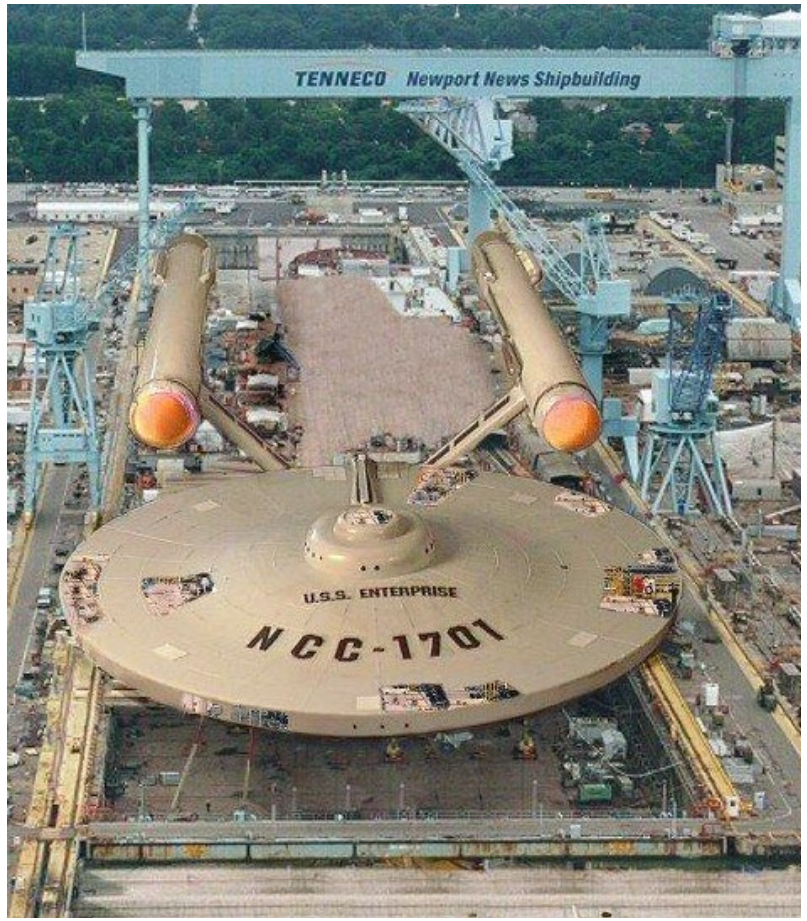
Standards Under Construction (Phase 1&2)



Standards Currently in Development (dynamic)

WK61254	Standard Classification for Spacelaunch and Reentry Vehicles ***ON BALLOT**
WK70011	Standard Practice for Crew Safety
WK73835	Standard Guide for Spaceflight Participant Safety and Emergency Training
WK74019	Standard Guide for Qualification for Safety-Critical Systems in Space Flight
WK76057	Standard Guide for Medical Qualifications for Suborbital Vehicle Passengers * **ON BALLOT**
WK76298	Standard Test Method for Verification of Software and Systems for Commercial Space Flight Vehicles
WK77620	Standard Guide for the Design of Space Vehicless
WK84313	Standard Practice for Human Factors in Commercial Spaceflight
WK85993	Standard Test Method for Standard Test Method for Measuring the Insulation and Contact Temperatures Change of an Instrumented Hand in Glove Assemblies worn on Extravehicular Activities
WK85994	Standard Guide for Evaluating Impact Abrasion Resistance of Textile Fabrics Used in Spacesuits and Spacesuit Gloves
WK85995	Standard Test Method for Measuring Cut Resistance of Materials Used in Spacesuits and Spacesuit Gloves Under Cryogenic Conditions with Tomodynamometer Test Equipment

Items in the pipeline*:
Standard practice for developing an Emergency Response Plan for Spaceports
Standard Practice for Flight Operations
** 16 more prioritized for future development*

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Recent & Upcoming Meetings

- In person meetings twice a year (pending pandemics)
  - Previous: April 21, 2023 - Friday after the Space Symposium
  - Next: Fall 2023; TBD (location likely to be Washington, DC)

SAMPLING OF ONGOING WORKS …

- May 22nd, 4PM ET – WK 76298 – Software Verification “Tiger Team”
- May 26th, 12PM ET – Roadmapping Sub-Committee (prioritize and analyze gaps)
- June 1st, 12PM ET – Qualification for Safety Critical Systems Task Group
- June 8th, 11:00AM ET – F47 Executive Committee

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RAND Corporation Briefing on the Independent Assessment Report to Congress

Benjamin M. Miller, PhD, Economist, RAND Corporation

May 15, 2023

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ASSESSING THE READINESS FOR HUMAN COMMERCIAL SPACEFLIGHT SAFETY REGULATIONS

CHARTING A TRAJECTORY FROM REVOLUTIONARY TO ROUTINE TRAVEL

Principal Investigators: Doug Ligor and Ben Miller

Background

The 2015 U.S. Commercial Space Launch Competitiveness Act calls for the FAA, in collaboration with COMSTAC, to produce several reports regarding the development of participant safety standard for commercials space activities

SECTION 111 MANDATES AN INDEPENDENT ASSESSMENT OF

1. Progress of the commercial space industry in adopting voluntary industry consensus standards
2. Progress of the commercial space industry toward meeting key industry metrics
3. Whether areas identified in previously issued reports are appropriate for regulatory action or further development of voluntary industry consensus standards

FAA selected RAND to conduct this assessment

RAND CORPORATION

Key Takeaways

- Allow the moratorium on spaceflight participant safety regulations to end on October 1, 2023, as per current law
    - This will allow informal rulemaking activities to proceed concurrently with the continued voluntary development of consensus standards
- Standards Development Organizations (SDOs) have developed some standards, but the process is slow and adoption cannot be verified
- Safety practices exist but are treated as proprietary; current metrics are not defined in a manner that would support objective assessments
- Not a binary decision
    - Some industry operations may be ready for regulation before others
    - The moratorium can end without regulations being immediately implemented

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1

FINDINGS (as to development of voluntary standards)

- SDOs have developed voluntary standards that could impact participant safety
- However…
  - Consensus can be difficult
  - Information and data sharing is constrained
  - Stakeholders are concerned the process is too slow to ensure safety
- No evidence that extending the moratorium would speed the creation of consensus standards

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FINDINGS (as to development of voluntary standards)

- Adoption and implementation of voluntary industry consensus standards cannot be independently and objectively verified
  - Details of company safety practices are proprietary or otherwise not publicly releasable
  - Commercial spaceflight companies have their own set of safety practices that may (or may not) incorporate SDO standards
  - No single set of standards has been adopted across industry
- Despite its shortcomings, stakeholders find the process of building consensus standards valuable

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2 FINDINGS (as to key metrics supporting voluntary standards)

- Current metrics (aka indicators) cannot be used to assess and validate industry progress toward meeting safety standards
  - Unclear how (and by whom) data would be collected
  - No agreement on target metrics that would indicate readiness to transition to a safety framework that may include regulations
- Industry progress towards meeting metrics
  - Slower industry growth than previously anticipated, but signs of potential acceleration
  - Few safety incidents to date, but not none

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3

FINDINGS (as to appropriateness of regulatory action)

We consider "readiness" for regulation based on five factors*

1. Access to, and understanding of, the regulatory process
   - Commercial space stakeholders have appropriate understanding
   - Small start-ups may not have the resources or staff to engage in Aerospace Rulemaking Committees (SpARCs) or informal rulemaking process
2. Certainty of future regulations
   - A safety framework that may include regulation is inevitable and should ideally be in place prior to a catastrophic event
   - Legislation in reaction to a catastrophe likely to be suboptimal

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* Peter H. Kobos, et al., "Timing is Everything: A Technology Transition Framework for Regulatory and Market Readiness Levels," *Technological Forecasting and Social Change*, Vol. 137, December 2018.

3

FINDINGS (as to appropriateness of regulatory action)

3. Effectiveness of regulatory support
    - SpARCs and informal rulemaking processes enabled industry and stakeholders to provide appropriate input and feedback
    - FAA is not currently resourced to develop appropriate regulations
4. Costs (“do not harm”)
    - FAA (or other regulatory agency) would be sensitive to concerns about overly burdensome regulation that could stifle industry growth
5. Ability to pass regulation
    - SpARCs and informal rulemaking processes would support development of standards and regulation but are resource intensive
    - FAA engagement is limited due to budget and staffing constraints

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Additional Findings

Stakeholders do not necessarily view this issue as a binary decision

Recommendations

For Congress	Allow the moratorium on spaceflight participant safety regulations to end as per the current law (October 1, 2023)
	Resource the FAA appropriately to enable the consideration of potential regulations and to implement informal rulemaking procedures as needed
For the FAA	Convene a SpARC for spaceflight participant safety
	Consider limited informal rulemaking
For Stakeholders	Continue to develop voluntary industry consensus standards and key metrics

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QUESTIONS?

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NSSL Phase 3, Range of the Future Plans and Range Updates

Maj. General Stephen Purdy,
Program Executive Officer
Assured Access to Space;
Director of Launch and Range
Operations Space Systems
Command; Commander,
Space Launch Delta 45;
Director, Eastern Range,
United States Space Force

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Break
Return at 1:05
Questions can be sent in through: YouTube
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